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Evaluation of dentists' knowledge on urgency conduct for avulsed teeth

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ABSTRACT. The aim of this study was to evaluate the knowledge of dentists in the city of Maringá, State of Paraná, Brazil, relative to the management of avulsed teeth. According to the sample calculation, 96 professionals, who were not specialists in Endodontics or oral and maxillofacial surgery, were selected by random draw. The method chosen for verifying their knowledge was the application of a questionnaire composed of multiple choice questions. The data obtained were analyzed by the Exact Fisher test. Among the results obtained, we point out that the definition of tooth avulsion was correctly answered by 99%; 50% indicated milk; 49% saliva; 40% physiological solution, and 7% water as storage media; 52% would use rigid splinting as a fixation method; and for 72% the ideal time of containment procedures would be 60 days. There was association between the years of experience of the professionals with management of cases of tooth avulsion (p = 0.04555). The authors concluded that the dentists in the city of Maringá, State of Paraná, did not demonstrate good knowledge about the procedures to be adopted for management of avulsed teeth. Misunderstandings were observed relative to the appropriate method of storing the avulsed tooth and the type of splinting procedure most indicated for stabilizing the reimplanted tooth.

Keywords: tooth avulsion; knowledge; dental trauma.

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Introduction

Tooth avulsion, which means the complete displacement of the tooth out of its alveolus, is considered one of the most serious dental lesions, and is generally caused by traumatism (Andreasen, Andreasen & Andersson, 2007; Andersson et al., 2012, 2016). Dental trauma is considered a public health problem due to its high prevalence and because it results in enormous harm to the daily life of patients involved (Santos, Guerra-Neto, Souza, Soares, & Palmeiras, 2010; Antunes et al., 2013). In the cases of avulsion, functional, esthetic and psychological damage to the patient are increased. Andreasen et al. (2007) attributed this to the fact that the most affected teeth are maxillary central incisors in the age range from 7 to 9 years.

Dentists are the professionals technically qualified for the treatment of tooth avulsion (Granville-Garcia et al., 2009; Sociedade Brasileiroa de Traumatologia Dentária [SBTD], 2012; International Association of Dental Traumatology [IADT], 2012; Andersson et al., 2012, 2016). Therefore, their action, based on scientific knowledge, is a primordial pre-requisite for success by the use of the correct and immediate procedure in cases of avulsed teeth. For this purpose, the International Association of Dental Traumatology (IADT) and the Brazilian Society of Dental Traumatology (Sociedade Brasileira de Traumatologia Dentária, SBTD) have developed guidelines available on their websites, about the most adequate treatment, post-attendance recommendations and follow-up for each case of dental trauma, including avulsion (SBTD, 2012; IADT, 2012). In spite of these guidelines being available on-line for free access by Dental professionals, and the approach to the subject in schools, courses and events, studies conducted in different countries (Zhao & Gong, 2010; Upadhyay, Rokaya, and Upadhayaya, 2012; Baginska & Wilczynska Borawska, 2013; Aljazairy et al., 2015; Skaare, Pawlowski, Maseng Aas, and Espelid, 2015) and in Brazil (Vasconcellos et al., 2009; Manfrin et al., 2007; Granville-Garcia et al., 2009; Santos et al., 2010; Antunes et al., 2013; Menezes et al., 2015) have demonstrated that the knowledge of dentists relative to the procedures to be adopted in cases of tooth avulsion is moderate to deficient. Even the studies that demonstrated an adequate knowledge about

the topic (Westphalen et al., 2007; Lima, Pereira, Swerts, and Fernandes, 2013; Skaare et al., 2015) pointed out the importance of reinforcing a continued education.

Therefore, the aim of this study was to evaluate the knowledge of dentists in the city of Maringá, State of Paraná, Brazil, relative to the urgency conduct of avulsed teeth. Thus, the null hypothesis tested was that there is lack of knowledge by dentists relative to the procedures to be adopted in cases of dental avulsion.

Material and methods

This study was approved by the Ethics Committee on Research involving Human Beings of the University Center of Maringá (Unicesumar), Report 1,173,044.

The sample universe began with the 1,130 dentists registered in the Regional Council of Dentistry of Paraná (CRO-PR), in the city of Maringá, State of Paraná, Brazil. Excluded from the study were professionals registered as Specialists in Endodontics and Oral and Maxillofacial Surgery, so that 745 professionals remained. A sample calculation was made considering the level of confidence of 95%, margin of error of 10%, so that a representative sample of this population was considered to be 87 professionals. Nevertheless, the authors opted to add 10% for possible losses and the final sample consisted of 96 dentists. A random draw was performed to select the professionals who participated in the study.

The method of choice for verifying the knowledge of the participants involved in the study was the application of a questionnaire. This was composed of 16 multiple choice questions that contained information about the characteristics of the sample, and aspects related to procedures in cases of tooth avulsion of permanent teeth.

The first contact with professionals or their secretaries - in their absence - was made by explaining the research and presenting the Term of Free and Informed Consent (TCIF) and delivering the questionnaire. A second contact was made to collect the TCIF dated and signed, and the answered questionnaire.

The data obtained were entered in a spreadsheet of the program *Microsoft* Excel* -2010. For description of the data, simple and double-entry frequency tables with percentage were used. For evaluating possible associations between the variables, the *Exact Fisher Test* was applied with a level of significance of 5%.

Results

The characteristics of the sample are listed in Table 1. It may be noted that the random draw led to close to half of the professionals in the sample (46.8%) were in the age-range from 34 to 47 years, and were female (52.1%). A significant majority worked in private dental offices (88.6%) and had over 10 years of professional experience (77.2%). Over half (56.3%) of the dentists updated themselves on the subject of dental traumatisms.

The professionals' knowledge about the procedure to be adopted in cases of tooth avulsion is presented in Table 2. The authors point out that 4.2% responded that the tooth should be kept; one professional, that the avulsed tooth should be handled by the root, and another, that it made no difference how it was handled. Also worth mentioning is that around half of the professionals responded that the avulsed tooth must not be kept in milk or saliva; and over half of the professionals responded that rigid splinting was the ideal, and around 72% would use it for 60 days.

When the years of experience were associated with some of the data collected, the majority of the professionals had over 10 years of experience and the authors observed that the association with attendance in cases of tooth avulsion was positive ($p = 0.04555$), as presented in Table 3.

Discussion

It must be reiterated that dentists are the professionals technically qualified for the treatment of tooth avulsion (Granville-Garcia et al., 2009; SBTD, 2012; IADT, 2012; Andersson et al., 2012, 2016; Menezes et al., 2015). Therefore, their action based on scientific knowledge, together with some factors that do not depend on the dentists, such as the time the tooth remained out of the mouth and storage medium in which it was kept, are determinants for the successful treatment in cases of tooth avulsion (Andreasen et al., 2007; Granville-Garcia et al., 2009; SBTD, 2012; IADT, 2012; Andersson et al., 2012, 2016). Our attention was drawn when we read that in Norway, 38% of the clinical dentists researched classified themselves as being insufficiently competent to treat cases of tooth avulsion (Skaare et al., 2015).

Table 1. Characterization of the sample (n = 96) composed of dentists registered in the Regional Council of Dentistry (Conselho Regional de Odontologia, CRO-PR), in the city of Maringá, State of Paraná, Brazil, 2015.

Data collected	n	%
Age Group		
From 20 to 33 years	19	19.8
From 34 to 47 years	45	46.8
From 48 to 61 years	28	29.2
From 62 to 75 years	4	4.2
Age		
Mean ± standard-deviation; Minimum-Maximum	43 ± 10.8; 20-74 years	
Gender		
Female	50	52.1
Male	46	47.9
Main place of work		
Private	85	88.6
Private and Public	5	5.2
Public	6	6.2
Years of professional experience		
<5	9	9.3
5 to 10	13	13.5
>10	74	77.2
Updating in dental traumatism		
Yes	54	56.3
No	42	43.8
Do you know what dental avulsion is?		
Yes	96	100
What is dental avulsion?		
It is the complete displacement of the tooth out of the alveolus after a traumatism	95	99
It is the displacement of the tooth into the alveolus after a traumatism	1	1
Have you attended or treated a case of dental avulsion?		
No	45	46.9
Yes	51	53.1

The sample was randomly drawn and its characterization is described in Table 1. Over half of the professionals reported having done some technical-scientific upgrading in relation to dental traumatisms, denoting interest in seeking improved knowledge about this public health problem. All the participants responded that they knew what tooth avulsion was; nevertheless, one of them responded incorrectly, by affirming the opposite-that displacement of the tooth occurred into the alveolus after traumatism. A little over half reported that they had attended or treated a case of tooth avulsion, a finding that may be related to the number of years of clinical practice, with which association was observed, thus corroborating the findings of previous studies (Manfrin et al., 2007; Baginska & Wilczynska-Borawska, 2013). However, all dentists are subject to receiving a case of tooth avulsion in their dental offices, considering that generally, treatment is sought near the place of its occurrence, or by a trusted dentist, which reinforces the need for professionals to be trained for this type of attendance.

About the procedure to be adopted in the case of an avulsion, 4.2% of the professionals responded that the tooth must be kept and not immediately reimplanted. If the respondents were from other professional categories, it could be supposed that they would feel they were not trained for this procedure. But coming from Dental professionals, this was incomprehensible. As 100% said that the time the tooth remained outside of the mouth must be the shortest possible, the authors detected an incongruence in these responses. The literature really emphasizes that one of the most important factors for successful treatment is the time the avulsed tooth remains out of the mouth, and that ideally the tooth should be reimplanted as quickly as possible (Manfrin et al., 2007; Westphalen et al., 2007; Granville-Garcia et al., 2009; Vasconcellos et al., 2009; SBTD, 2012; IADT, 2012; Andersson et al., 2012; 2016; Antunes et al., 2013; Lima et al., 2013; Menezes et al., 2015).

As regards the handling of the avulsed tooth, it should be mentioned that differently from the vast majority, one professional said that it would make no difference, and another said it would be handled by the root. By handling the tooth by the crown, the possibility of preserving the periodontal ligament that remained adhered to the root of the avulsed tooth is greater, making it difficult for subsequent ankylosis to occur, and contributing to the success of treatment (Andreasen et al., 2007; Consolaro, 2011).

Table 2. Knowledge about the procedure to be adopted in the case of avulsion of permanent teeth, according to the data collected from the sample (n=96) composed of dentists registered in the Regional Council of Dentistry (Conselho Regional de Odontologia, CRO-PR), in the city of Maringá, State of Paraná, Brazil, 2015.

Data collected	n	%
Procedure to be adopted		
Reimplant the tooth	92	95.8
Keep the tooth	4	4.2
Time the tooth remained out of the mouth		
The shortest possible	96	100
How to handle the tooth		
By the crown	94	97.9
By the root	1	1
Makes no difference	1	1
Storage of the tooth - Tissue paper		
No	96	100
Storage of the tooth - Plastic bag		
No	96	100
Storage of the tooth - Water		
Yes	7	7.3
No	89	92.7
Storage of the tooth - Physiological solution		
Yes	39	40.6
No	57	59.4
Storage of the tooth - Milk		
Yes	48	50
No	48	50
Storage of the tooth - Saliva		
Yes	47	49
No	49	51
Splinting method used		
Semirigid (flexible)	46	47.9
Rigid	50	52.1
Splinting time		
7 days	15	15.6
15 days	12	12.5
60 days	69	71.9
Antibiotic administration		
Yes	81	84.4
No	15	15.6
Endodontic Treatment		
Yes	85	88.5
No	11	11.5

When reimplantation cannot or was not performed at the time of the traumatism, the tooth must be stored until the time of urgency treatment. The survival of periodontal ligament cells depends on preservation of the tooth in an adequate medium, which ideally would be a cell culture solution, such as Hank's (Andreasen et al., 2007; Westphalen et al., 2007; Andersson et al., 2012; 2016; SBTD, 2012; IADT, 2012). As it may be difficult to have access to this solution at the time of traumatism, because it would be found in clinical or research laboratories, the alternatives suggested, in order of preference, would be: milk, saliva, physiological solution or water (Andreasen et al., 2007; Andersson et al., 2012, 2016; SBTD, 2012; IADT, 2012; Antunes et al., 2013). For 100% of the dentists, tissue paper and plastic bags were not considered ideal storage media. Dry preservation of the avulsed tooth increases the risk of dentoalveolar ankylosis by leading to non-viability of the periodontal ligament cells. The same could be said of preservation in water or physiological solution, which promote cell lysis, however, by preventing drying, this may allow the viability of some cells, which would avoid an inflammatory response and/or generalized ankylosis (Andreasen et al., 2007; Consolaro, 2011; Antunes et al., 2013), and would be a better alternative than keeping the tooth dry. Of those who responded, 7.3% indicated water; and 40.6% physiological solution; saliva was indicated by 49% of the professionals, as found in other previous studies (Zhao & Gong, 2010; Antunes et al., 2013; Aljazairy et al., 2015) justifying this option due to the low level of knowledge about milk as a storage medium. Saliva keeps the tooth humid, but it is not considered ideal due to the

presence of bacteria (Aljazairy et al., 2015). Proving the lack of knowledge about milk as the best option to choose, only 50% of the professionals responded that this would be their choice, thus corroborating the findings of a previous study (Santos et al., 2010). Milk is considered the ideal, because it can rapidly be acquired; it has pH and osmolarity compatible with those of vital cells; is relatively free of bacteria (Andreasen et al., 2007; Andersson et al., 2012; 2016; SBTD,2012; IADT, 2012; Aljazairy et al., 2015) and contains the EGF (epidermal growth factor), mediator that would contribute to non-occurrence of dentoalveolar ankylosis (Consolaro, 2011).

Table 3. Association between years of experience and data collected from the sample (n = 96) composed of dentists registered in the Regional Council of Dentistry (Conselho Regional de Odontologia, CRO-PR), in the city of Maringá, State of Paraná, Brazil, 2015.

Data collected	Years of experience						
	< 5		5 to 10		➢ 10		*p*
	n	%	n	%	n	%	
Gender							
Female	5	5.2	10	10.4	35	36.5	0.13969
Male	4	4.2	3	3.1	39	40.6	
Main place of work							
Private	9	9.4	12	12.5	66	68.8	0.74943
Private and Public	0	0	0	0	4	4.2	
Public	0	0	1	1	4	4.2	
Said they knew what dental avulsion is							
Yes	9	9.4	13	13.5	74	77.1	-
What is dental avulsion?							
It is the complete displacement of the tooth out of the alveolus after a traumatism	9	9.4	12	12.5	74	77.1	0.13086
It is the displacement of the tooth into the alveolus after a traumatism	0	0	1	1	0	0	
Had attended or treated an avulsed tooth							
No	5	5.2	10	10.4	30	31.3	0.04555*
Yes	4	4.2	3	3.1	44	45.8	
Procedure to be adopted							
Reimplant the tooth	8	8.3	13	13.5	71	74.0	0.43725
Keep the tooth	1	1	0	0	3	3.1	
Time the tooth remained out of the mouth							
The shortest possible	9	9.4	13	13.5	74	77.1	-
How to handle the tooth							
By the crown	9	9.4	13	13.5	72	75	0.96225
By the root	0	0	0	0	1	1	
Makes no difference	0	0	0	0	1	1	

*Significant by the Exact Fisher test considering the level of significance of 5%.

After tooth reimplantation, splinting must be performed to maintain the tooth in position, and this should ideally be done with semirigid or flexible material that allows the movements of gomphosis, and facilitates reorganization of the periodontal ligament fibers (Andreasen et al., 2007; Andersson et al., 2012; 2016; SBTD, 2012; IADT, 2012; Aljazairy et al., 2015). Over half of the professionals heard (52.1%) affirmed that they would use rigid splinting, in agreement with the findings observed in the study of Antunes et al. (2013) and in disagreement with the procedures described by other authors (Westphalen et al., 2007; Granville-Garcia et al., 2009; Vasconcellos e al., 2009; Zhao & Gong, 2010). This immobilization must have a duration of a minimum of 7 days, and maximum of 14 days, with one week being sufficient time to assure adequate periodontal support and that the gingival fibers would be repaired. In cases of the tooth drying out for over 60 minutes, immobilization must be retained for 4 weeks (Andreasen et al., 2007; Andersson et al., 2012, 2016; SBTD, 2012; IADT, 2012). The majority of the dentists (71.9%) considered 60 days to be the ideal time of splinting, corroborating the findings of previous studies and denoting lack of knowledge (Vasconcellos et al., 2009; Zhao & Gong, 2010).

The use of antibiotic therapy in tooth reimplantation is consensus in the literature, as a means of controlling contamination of the root and alveolus, particularly in cases of prolonged extra-alveolar periods; in addition, it would contribute to improving repair of the periodontal ligament. A large portion of the professionals (84.4%) responded that they would prescribe antibiotic therapy, validating the results found by Westphalen et al. (2007) and Vasconcellos et al. (2009) and, reiterating that this practice must not

be indiscriminate and especially indicated in cases in which tooth avulsion occurred in an insalubrious place (Granville-Garcia et al., 2009).

As regards endodontic treatment, 88.5% of the dentists affirmed that they would perform it. It is indicated before reimplantation or after 7-10 days, before removing the splinting (Andreasen et al., 2007; Andersson et al., 2012; 2016; SBTD, 2012; IADT, 2012), except when there is a chance of pulp revascularization; that is, in teeth with open apex that were immediately reimplanted or kept in adequate storage media for a short period of time (Andersson et al., 2012; 2016; SBTD, 2012; IADT, 2012).

The association found between years of experience and attending cases of tooth avulsion highlight the need for continued education of professionals, because studies have demonstrated that the longer the time since graduation, the lower was the level of knowledge about dental trauma (Vasconcellos et al., 2009). Furthermore, thought should be given to the teaching and practice of attendance to dental traumatisms and tooth avulsion in Dental Schools. Given the complexity of this type of dentoalveolar trauma, failures that occur during attendance may result in sequelae that lead to loss of the tooth, generating enormous harm to the daily life of the patient involved. Therefore, knowledge of the procedures to be adopted by dentists is fundamental so that they will have the confidence to attend to these cases and achieve successful treatment. In Norway, knowledge about the subject, measured by the responses obtained, did not correspond to the estimated competence for attendance self-evaluated by the professionals.

In addition to their technical-scientific knowledge and the experience gained in treating cases of tooth avulsion, dentists have other fundamental roles in society: namely, those of preventing its occurrence and participating in the education of the population. Only the integration of these factors could have a positive influence on the prognosis of tooth reimplantation (Manfrin et al., 2007; Kumar et al., 2017).

Conclusion

The authors concluded that the dentists in the city of Maringá, State of Paraná, did not demonstrate good knowledge about the procedures to be adopted for management of avulsed teeth. Misunderstandings were found relative to the appropriate method of storing the avulsed tooth and the type of splinting most indicated for stabilizing the reimplanted tooth. Thus, the null hypothesis tested - that there is a lack of knowledge by dentists regarding the procedures to be adopted in cases of dental avulsion - could not be rejected.

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