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Knowledge of emergency management of avulsed teeth: a survey of dentists in Beijing, China

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Abstract – *Objectives*: There is a high frequency of dental trauma cases in China, where tooth avulsion is one of the most serious scenarios. The knowledge of how to take care of an avulsion is of great importance to the outcome of such an injury. This knowledge among dentists in Beijing, China has never been tested before. The purpose of this study was to evaluate professional experience and knowledge of emergency management of dentists working in urban and suburban areas of Beijing, China. *Material and Methods*: A two-part questionnaire was distributed to 175 urban and 99 suburban dentists in Beijing. The first part contained personal and professional information of the participating dentists. The second part evaluated dentists' knowledge about the emergency management of avulsed teeth. Data were entered into a SPSS database and analyzed using the chi-square test and Fisher's exact test for each question. *Results*: All dentists had a college or above degree. Almost five times as many urban dentists compared to suburban dentists presented with a Master or PhD degree. The knowledge levels of the participants presenting with correct answer in the respective knowledge areas were; storage medium (15.8%) intra-canal medication (45.0%), type of splint (45.1%) and splinting period (10.2%). Significantly more urban dentists (50.6%) compared to suburban dentists (34.8%) ($P = 0.016$), used calcium hydroxide paste as an intracanal medicament, and significantly more urban dentists (51.3%) than suburban dentists (34.1%) chosed a flexible splint ($P = 0.008$). *Conclusion*: The results revealed an uneven pattern of knowledge between urban and suburban dentists regarding the emergency management of avulsed teeth. The study highlighted Chinese dentists' need for continuing education in order to improve current knowledge in emergency management of avulsed teeth.

Traumatic dental injuries are frequent and widespread and represent a serious public dental health problem (1–3). Published studies in many countries have shown that a high rate of schoolchildren has experienced trauma in the permanent dentition (4, 5). This is similar to results obtained recently in China, where data from the records of 189 patients, seen in the dental trauma emergency department of Beijing stomatological hospital in 2008, were analyzed (6). The highest frequency of dental traumaocurred in the age group of 6–13 years (29.6%) and 24–30 years (21.2%).

Avulsion is a complete displacement of a tooth from its alveolus and represents a complex and a dramatic injury that affect multiple tissues (1, 6, 7). The maxillary central incisors are the teeth most commonly prone to avulsion (8, 9). Losing an anterior tooth may have severe psychological consequences (10). The prognosis for avulsed permanent teeth depends on correct measures taken immediately after the injury occurs (11). Dentists' knowledge in this field have a very important role. There are no published data for Chinese dentists. China is a large developing country and a certain difference exists between urban and suburban areas in the living conditions and medical treatment level. This difference is caused by the uneven development of economy between urban and suburban areas. Therefore, the purpose of this study was to evaluate the professional experience and the knowledge of emergency management of dentists working in urban and suburban areas of Beijing, China.

Materials and methods

The study population consisted of 274 dentists from 15 hospitals in urban and suburban Beijing. All of them served in the dental department of general hospitals or in different specialty of dental hospitals.

Questionnaires were given to participants under the supervision of the authors and were collected immedi-

Table 1. Demographic characteristics of respondents

Demographic data	Urban dentists %	Suburban dentists %	Total %
Years of professional experience			
1–5 years	39.8	38.5	39.3
6–10 years	16.9	18.7	17.5
More than 10 years	43.3	42.8	43.2
Education			
College	13.3	26.1	17.7
Bachelor	55.4	67.1	59.5
Master	25.3	6.8	18.9
PhD	6.0	0	3.9
Have you ever received any continuing education on traumatic dental injuries?			
Yes	46.2	40.4	44.1
No	53.8	59.6	55.9

ately after the participants had answered. Confidentiality was assured as no names or phone numbers were required.

The questionnaire was divided into two parts and the questions were close-ended (multiple-choice questions). The first part was designed to capture dentists' personal and professional data such as years of practice after graduation, educational level. The second part, consisting of nine questions, evaluated dentists knowledge in emergency management in dental avulsion.

Data obtained from returned questionnaires were entered into an SPSS database and analyzed using the chi-square test and Fisher's exact test for each question. A level of $P < 0.05$ was accepted as statistically significant. The results of the questionnaire were expressed in percentages.

Result

A total of 258 (94.2%) questionnaires were completely filled in and evaluated. In relation to years of professional experience, the majority of respondents (60.7%) reported a practice of 6 years or more. All dentists had a college or above degree. Among urban dentists 31.3% had a Master or a PhD degree, compared to 6.8% of suburban dentists. More than half of the participants (55.9%) responded that they had never received any continuing education regarding the emergency management of avulsed teeth. There were no significant differences between urban and suburban dentists concerning continuing education. Demographic data is presented in Table 1.

A cross tabulation showed that significantly more urban dentists (50.6%) would use calcium hydroxide paste as an intra-canal medicament, compared to suburban dentists (34.8%) ($P = 0.016$), and significantly more urban dentists (51.3%) would chose a flexible splint, compared to suburban dentists (34.1%) ($P = 0.008$) (Table 2).

Table 2. Knowledge on emergency treatment of avulsed teeth

Knowledge	Urban dentists %	Suburban dentists %	Total %
1.Critical time for treatment			
Within 30 min	88.3	88.9	88.5
30–60 min	8.0	8.9	8.3
1–2 h	3.7	1.1	2.8
Not sure	0.0	1.1	0.4
2.Optimal storage medium			
Hanks' balanced salt solution	21.0	6.6	15.8
Patient's mouth (Saliva)	35.2	44.0	38.3
Saline solution	30.2	37.4	32.8
Paper tissue	0.0	1.0	0.5
Cold fresh milk	13.6	11.0	12.6
Tap water	0.0	0.0	0.0
3.Intra-canal medication used for root canal treatment			
Zinc oxide paste	6.2	5.6	6.0
Antibiotic paste	11.1	27.0	16.7
Gutta-percha	30.2	31.5	30.7
Calcium hydroxide paste	50.6	34.8	45.0
Not sure	1.9	1.1	1.6
4.Need for applying a splint after replantation?			
Yes	98.2	94.4	96.9
No	1.8	5.6	3.1
5.Type of splint			
Rigid	43.3	59.3	49.0
Flexible	51.3	34.1	45.1
Does not matter	3.0	0.0	2.0
Not sure	2.4	6.6	3.9
6.Splinting period			
Up to 2 weeks	10.9	8.8	10.2
30 days	38.2	45.1	40.6
A month and a half	20.6	19.8	20.3
Above 2 months	29.1	25.3	27.7
Not sure	1.2	1.1	1.2
7.The most critical factor that may influence the outcome of replantation			
Root canal treatment initiated at the right time	2.6	2.3	2.5
Splinting period	3.2	2.3	2.9
Extra-alveolar dry duration	78.6	79.3	78.8
Storage medium	13.1	13.8	13.3
Proficiency level of practice	0.6	0.0	0.4
Accuracy of replacement	1.9	2.3	2.1
8.Replant avulsd teeth in all cases?			
Yes	29.3	23.3	27.2
No	70.7	76.7	72.8
9.Replantation of primary teeth			
Yes	10.2	18.0	12.9
No	89.8	82.0	87.1

The bold letters mean the correct answers in the text.

Discussion

This study focused on the knowledge in treating avulsed teeth and we found that the level of knowledge regarding critical time for treatment, replantation of primary and permanent teeth was acceptable, while the knowledge in storage medium, intra-canal medication and splinting technique were less satisfactory.

The most important factor in treatment of some dental injuries is time. The longer the time lapse between tooth avulsion and re-implantation, the greater the risk of replacement resorption and inflammatory root resorption (12). It is encouraging to note that 88.5% of the participants knew that 30 min is a critical time and that an avulsed tooth should be replanted within this time and that the majority (78.8%) correctly recognized the extra-alveolar period as the most critical factor to be considered for optimal healing (13, 14).

A majority of participants (87.1%) correctly reported that they would not replant an avulsed primary tooth. This response is in accordance with the current guidelines and recommendations suggested by the International Association of Dental Traumatology (IADT) (7). Regarding permanent teeth, most participants in this study responded correctly that they would not replant an avulsed permanent tooth in every case. It has been recognized that avulsed teeth presenting extensive caries, or severe root damage, should not be replanted (15). In addition, it has been recommended not to replant teeth with advanced periodontal disease (16). However, 27.2% of the participants responded that they would replant a permanent tooth in every case, probably because of their attitude to prevent permanent loss of the tooth at any cost.

The method of storage and preservation to avoid periodontal membrane necrosis is important for the long-term success of a replanted avulsed tooth (17–19). However, only 21.0% of urban dentists and 6.6% of suburban dentists said they would use Hanks' balanced salt solution, which is recommended by the guidelines of IADT. Although this specialized storage medium may be able to sustain the viability of PDL cells for a longer period of time than milk and saline (20), it might not be practical because it is more expensive and is unlikely to be easily obtained at the place of accident and at suburban hospitals. Most dentists preferred saliva or saline solution to store the tooth in despite numbers of research showing that cold fresh milk is superior to saliva in maintaining vitality, both *in vitro* and *in vivo* (21). This study demonstrated that Chinese dentists had a low knowledge of milk as a physiologic media.

It has been well recognized that calcium hydroxide paste should be placed into root canals as an intra-canal medicament first of choice in order to eliminate bacteria in root canals to prevent inflammatory root resorption. Forty-five percent of the participants answered this question correctly. A large proportion of respondents (30.7%), however, chose gutta-percha, a standard root canal material, as intracanal medicament. This may be due to a lack of clear indications in this field in the reference books in China.

When asked about the splinting, nearly all the dentists (96.9%) correctly reported that replanted permanent teeth needed a splint. A splinting technique should allow physiologic movement of the tooth during healing, and a maximum period of two weeks decrease the risk for ankylosis (1, 9, 22). However, every second dentist used a rigid splint. Significantly more urban dentists than suburban dentists would prefer a flexible splint. These findings may indicate a deficiency in recent trauma knowledge in suburban areas.

IADT suggested up to 2 weeks splinting for an avulsed tooth (7). Only 10.2% of the dentists chose the correct answer. We found that most Chinese dentists would splint for longer periods. This is in agreement with the result of a Brazilian study by Westphalen et al. (23), who reported 64% of dentists would splint more than 15 days. The choice of longer splinting time is due to domestic textbooks recommending 4–6 weeks splinting for avulsed teeth.

Above all, the results revealed an uneven pattern of knowledge among dentists regarding the emergency management of avulsed teeth. This is in agreement with the findings of a recently published study (24). Lack of standardization in treatment techniques and standard protocols may be one of the reasons; neglect of continuing education may be another reason. The third reason may be that updating of textbooks is slow, and international research progress in recent years has not been included in them. The survey shows that some significant differences exist between urban and suburban areas. In Table 1, 93.2% of the suburban dentists reported a college or a bachelor degree, compared to 68.7% among urban dentists; and 6.8% of suburban dentists had a Master or a PhD degree, compared to 31.3% among urban dentists. This reflected the reality of China that dentists with higher academic qualification have been attracted to city hospitals. In Table 2, the suburban dentists presented a poor level of knowledge in the questions related to the intra-canal medicament and type of splint, comparing with urban dentists. However, education background might not be the main reason for these differences since it was not statistically associated with the correct answers. Factors such as speed of spreading knowledge, international conference opportunities etc in urban and suburban areas could contribute to the difference in knowledge among dentists.

Conclusion

In conclusion, there is a need to improve the knowledge of dentists in emergency treatment of avulsed teeth. Knowledge improvement should be mandatory, because such injuries present multiple challenges for the dental team as well as complications to the patient that can result in life-long, time-consuming and costly treatments and maintenance. Continuing dental education courses is a formal way to improve the knowledge after graduation. This will be of great benefit to dentists in keeping current with the theoretical and management issues, and especially the maintenance of dental trauma should be well developed in those courses.

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