Dental Traumatology

Dental Traumatology 2009; **25**: 88–91; doi: 10.1111/j.1600-9657.2008.00706.x

German general dentists' knowledge of dental trauma

Gabriel Krastl[1], Andreas Filippi[2], Roland Weiger[3]

[1]Center of Dental Traumatology and Department of Periodontology, Endodontology and Cariology; [2]Center of Dental Traumatology and Department of Oral Surgery, Oral Radiology and Oral Medicine; [3]Department of Periodontology, Endodontology and Cariology, University of Basle, Basle, Switzerland

Correspondence to: Dr Gabriel Krastl, Center of Dental Traumatology and Department of Periodontology, Endodontology and Cariology, University of Basle, Hebelstr. 3, CH-4056 Basle, Switzerland
Tel.: +41 61 267 26 22
Fax: +41 61 267 26 59
e-mail: gabriel.krastl@unibas.ch

Accepted 22 March, 2008

Abstract – The purpose of this study was to evaluate the knowledge of German general dentists on different scenarios in dental traumatology, as well as to analyse, whether there was any correlation between practitioners' perceptions of their knowledge and their actual expertise. A questionnaire containing questions on demographic data and knowledge was handed out to general dentists at the beginning of different lectures in dental traumatology given by the authors. A total number of 181 questionnaires were evaluated. Sixty-three per cent of the dentists considered their knowledge as being sufficient or comprehensive, while only 37% indicated to have fragmentary knowledge in dental traumatology. Irrespective of the self-assessment, 40% of the questions were answered correctly. Although not statistically significant, there was a trend towards slightly better knowledge for dentists whose graduation was more recent. On the basis of the findings of this study, it can be suggested that the level of knowledge among general dentists in Germany is rather poor on different scenarios regarding dental traumatology and their self-assessment is inaccurate.

It is well known that dentoalveolar injuries are widespread (1) and without adequate treatment cause considerable burden for the patient (2). Due to a large number of studies and publications in dental traumatology in the last decades, an extensive knowledge was accumulated (3). Treatment guidelines have been published to promote optimal prevention and treatment service in the field of traumatic dental injuries (4, 5). However, this useful information may not reach every practitioner.

Several studies, mainly from UK and Brazil were published in an attempt to assess the knowledge of dentists regarding diagnosis and therapy of dentoalveolar injuries (6–13). Most of them came to the conclusion that there was inadequate knowledge of dental trauma management among the surveyed dentists. However, there are no published data for German dentists.

The purpose of this study was to evaluate the knowledge of German general dentists on different scenarios of dental trauma. Moreover, it was analysed, whether there was any correlation between practitioners' perceptions of their depth and range of knowledge and their actual expertise.

Material and methods

Included in the target population were 194 general dentists, who in the framework of continuing education courses in endodontology attended different lectures in dental traumatology. These courses comprised 10 weekends and were attended by about 20–25 dentists. Either half-a-day or a full day was reserved for dental trauma. The courses took place within the past 3 years (2004–2007).

Before the continuing education courses started, a questionnaire consisting of eight multiple choice questions was asked to be filled out. The first three questions addressed the profile of the dentist like the years since graduation (< 5 years, 5–15 years and more than 15 years), the dentist's self-assessment regarding their knowledge in dental traumatology (fragmentary, sufficient and comprehensive) and the frequency of patients with tooth injuries in their practice (very rare, occasional and frequent). Five questions and their multiple-choice answers concerned the professional qualification and were constructed to collect information on the knowledge of five typical scenarios in dental traumatology. The questions asked about:

- the cause of a radiographic periapical lesion after a luxation injury,
- the indication for partial pulpotomy after traumatic crown fracture,
- the decision-making and management of intra-alveolar root fractures,
- the subsequent treatment of an avulsed tooth that had been replanted within 30 min and
- the most adequate storage solution for avulsed teeth.

The participants had to choose the most appropriate answer for each question out of five alternatives. The correct responses were determined by means of the

accepted current literature. The results were expressed as frequency distribution and computed in percentages. Mean values and the corresponding 95% confidence intervals (CIs) were calculated.

Furthermore, the results were issued separately depending on the years of professional experience and the dentist's self-assessment.

Results

A total of 181 completely filled out questionnaires were evaluated.

Thirteen questionnaires were excluded due to missing answers regarding the characteristics of the participants. Half of the participants graduated 5–15 years ago. Nearly two-thirds of the dentists considered their knowledge as being sufficient (61%) or comprehensive (2%), while more than one-third indicated to have only fragmentary knowledge in dental traumatology (37%). Self-assessment differed between the three groups of professional experience (Fig. 1).

Only a few private practitioners (6.6%) stated to encounter tooth injuries frequently while most of the dentists indicated to have patients experiencing dental trauma very rarely (44.2%) or occasionally (49.2%) (Table 1).

The frequency of answers to the five professional questions is summarized in Table 2.

The number of correct answers varied between 0 and 4. The distribution of questions answered correctly related to the self-assessment of knowledge and to the years of professional experience respectively are summarized in Figs 2 and 3. No participant answered all of the five questions correctly. The average number of questions answered correctly per participant was two (41%), irrespective of self-assessment.

Seventeen participants (9.4%) failed to answer any question correctly.

Dentists with < 5 years of professional experience appeared to have a slightly better knowledge (46.3% correct answers; 95% CI: 37, 56) than practitioners with 5–15 years of experience (40.7% correct answers; 95% CI: 31, 50) and dentists with more than 15 years of experience (37.7% correct answers; 95% CI: 29, 48).

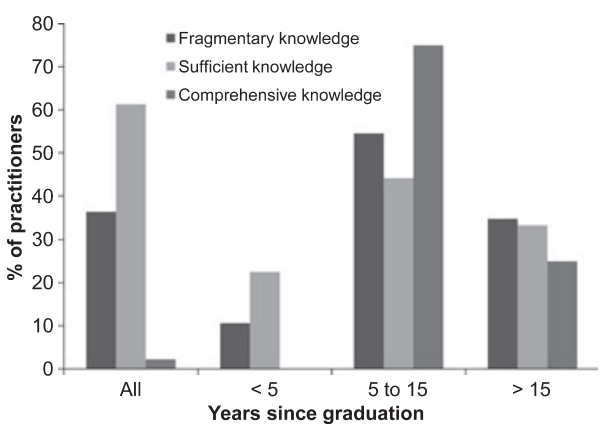

Fig. 1. Histogram showing years since graduation related to the self-assessment of knowledge.

Table 1. Characteristics of participating general dentists ($n = 181$)

Years since graduation	*n* (%)	95% CI
<5 years	32 (17.7)	13, 24
5–15 years	88 (48.6)	41, 56
more than 15 years	61 (33.7)	27, 41
Self-assessment regarding knowledge in dental traumatology		
Fragmentary	66 (36.5)	30, 44
Sufficient	111 (61.3)	54, 68
Comprehensive	4 (2.2)	1, 6
Frequency of patients with dental trauma in private practice		
Very rare	80 (44.2)	37, 52
Occasional	89 (49.2)	42, 56
Frequent	12 (6.6)	4, 11

CI, confidence interval.

Discussion

The study supports the statements of other authors that the treatment of tooth injuries is quite a rare event in the dental practice. The vast majority of the participants judged the frequency of patients with injured teeth as very rare or occasional. Thus it is not surprising that they were not confident in the management of different dental trauma cases. This may explain the rather poor knowledge.

Furthermore, the results of this study revealed an uneven pattern of knowledge among the surveyed general dentists. This is in agreement with the findings of a recently published study (6).

About one-third correctly considered the apical lesion of a tooth 6 months after a lateral luxation (question 1) as a sequel of microbial colonization of the root canal system. More than half believed that a sterile necrosis was the primary cause of apical periodontitis. This assumption may lead to delayed endodontic intervention and consequently to an increased risk of infection related root resorption in teeth with luxation injuries.

Literature demonstrates high success rates in preserving pulp vitality for partial pulpotomy after complicated crown fractures both in immature and mature permanent teeth (14, 15). However, these findings were only known by less than one-quarter of the participants (question 2). Most dentists thought partial pulpotomy was the only option for immature teeth.

The distribution of responses according to the most appropriate treatment for transverse root fractures (question 3) revealed that almost half of the dentists correctly answered that, in most cases, only the splinting of the tooth is required. This is in accordance with Andreasen et al. (16).

The results from question 4 revealed that most dentists realized that in the case of an avulsed tooth with a completed root formation, which was replanted within 30 min root canal treatment, should be initiated within 7–10 days. This is in accordance with the current recommended guidelines of the IADT (5), even

Table 2. Frequency of answers in the questionnaire (n = 181)

	n (%)	95% CI
Q1 Six months after lateral luxation of an upper incisor, the tooth does no longer respond to sensibility testing. The incisor is caries-free without any restorations. The x-ray shows a periapical lesion as a consequence of		
external inflammatory resorption limited to the apical area of the tooth	14 (7.7)	5, 13
the microbial colonization of the root canal system	*66 (36.5)*	*30, 44*
a bone free area due to the luxation injury which has not yet healed.	6 (3.3)	2, 7
a sterile necrosis, since no microorganisms could penetrate into the root canal system due to the intact clinical crown	95 (52.5)	45, 60
Q2 Partial pulpotomy after traumatic crown fracture		
offers high success rates merely in teeth with open apices	56 (30.9)	25, 38
is no longer indicated for teeth with complicated crown fracture.	13 (7.2)	4, 12
does not intend to maintain the vitality of the tooth	3 (1.7)	1, 5
can be carried out successfully also in teeth with completed root formation	*43 (23.8)*	*18, 31*
offers only small success rates when the apex is closed	66 (36.5)	30, 44
Q3 Intra-alveolar root fractures in the middle or apical part of the root		
result in most of the cases in loss of pulp vitality in the apical as well as in the coronal tooth fragment	36 (19.9)	15, 26
require root canal treatment of the coronal fragment in most cases	23 (12.7)	9, 18
require only splinting of the tooth in most cases	*85 (47)*	*40, 54*
can be diagnosed clinically in most cases	16 (8.8)	6, 14
require the surgical removal of the apical fragment	21 (11.6)	8, 17
Q4 An avulsed tooth with completed root formation, which had already been replanted within 30 minutes		
must be root canal treated immediately	27 (14.9)	11, 21
requires apical resection and transdental fixation	4 (2.2)	1, 6
should not be root canal treated in the first month after the trauma	26 (14.4)	10, 20
should be root canal treated within 7–14 days	*112 (61.9)*	*55, 69*
should never be root canal treated	12 (6.6)	4, 11
Q5 If a specialized cell culture medium is not available, the most adequate possibility for the storage of avulsed teeth would be		
tap water	0 (0)	0, 2
saline	116 (64.1)	57, 71
a clean handkerchief	1 (0.6)	0, 3
cold milk	*62 (34.3)*	*28, 41*
alcohol	2 (1.1)	0, 4

The correct answers are printed in italics.
CI, confidence interval.

though some studies suggest immediate intracanal placement of a steroid–antibiotic combination (Ledermix Paste, Ledermix, Haupt Pharma GmbH, Wolfrathausen, Germany) after replantation (17).

When asked their preference for storing an avulsed tooth in the event of a specialized medium not being available, two-thirds chose saline. Only about one-third opted for cold milk, which may be a better strategy for transporting the tooth due to composition and osmolality, when immediate replantation is not an option (18, 19). Fortunately, only a few dentists incorrectly recommended placing the tooth in tap water, alcohol or a clean handkerchief. This is in agreement with other studies reporting that these storage possibilities were identified as inadequate by oral health professionals and, therefore, not chosen (6, 10). However, milk was identified as the most appropriate storage medium in these studies. Although there is evidence for an improved prognosis of replanted teeth stored in a specialized storage medium such as 'Dentosafe®' (Medice, Iserlohn, Germany) (20) prior to replantation, specialized medium was not offered as a possible answer in the present survey. The

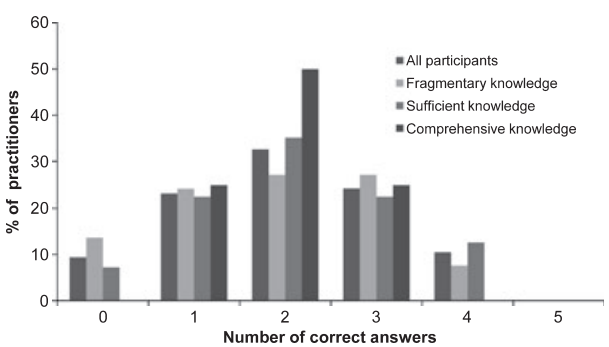

Fig. 2. Distribution of questions answered correctly related to self-assessment of knowledge.

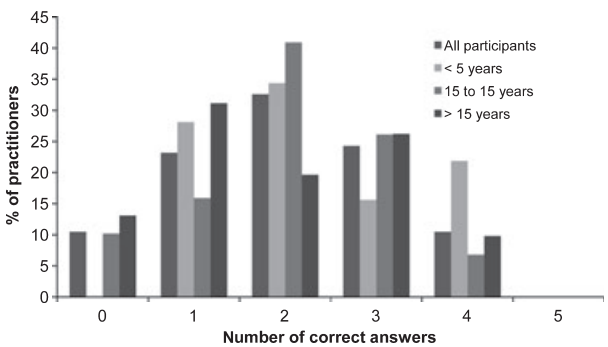

Fig. 3. Distribution of questions answered correctly related to the years of professional experience.

reason for this was that a specialized medium is rarely available at the place of accident.

One out of three dentists self-assessed their knowledge in dental traumatology as being fragmentary. This coincides with a recently published study by Loh et al. (21). However, the majority of the practitioners estimated to have a sufficient expertise in diagnosing and treating tooth injuries. Irrespective of self-assessment, the average number of questions answered correctly in this study was two. Self-assessment did not reflect the actual knowledge of the participants. These findings are of significance because inaccurate self-assessment may lead to an unrealistic perception of the dentist's competence to treat dental injuries. This could be approached in different ways. On the one hand, the need to develop strategies to improve the knowledge of dentists is evident. On the other hand, referral to a specialist centre may be a good option in complex cases of dental trauma (9).

Although not statistically significant, there was a trend towards slightly better knowledge for dentists whose graduation was more recent. This may be due to an improved undergraduate education in dental traumatology in recent years.

Conclusions

The survey demonstrated a generally poor knowledge among general dentists in Germany on different scenarios regarding dental traumatology. Furthermore, general practitioners were unable to accurately assess their own level of knowledge. Therefore, an improved undergraduate and postgraduate education on dental traumatology is needed to ensure an adequate treatment for patients with tooth injuries.

References

1. Andreasen JO, Andreasen FM. Dental trauma: quo vadis. Tandlaegebladet 1989;93:381–4.
2. Dorney B. Inappropriate treatment of traumatic dental injuries. Aust Endod J 1999;25:76–8.
3. Andreasen JO, Andreasen FM, Andersson L. Textbook and color atlas of traumatic injuries to the teeth, 4th edn. Copenhagen: Munksgaard; 2007.
4. Flores MT, Andersson L, Andreasen JO, Bakland LK, Malmgren B, Barnett F et al. Guidelines for the management of traumatic dental injuries. I. Fractures and luxations of permanent teeth. Dent Traumatol 2007;23:66–71.
5. 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;23:130–6.
6. Cohenca N, Forrest JL, Rotstein I. Knowledge of oral health professionals of treatment of avulsed teeth. Dent Traumatol 2006;22:296–301.
7. Hamilton FA, Hill FJ, Holloway PJ. An investigation of dento-alveolar trauma and its treatment in an adolescent population. Part 2: Dentists' knowledge of management methods and their perceptions of barriers to providing care. Br Dent J 1997;182:129–33.
8. Hu LW, Prisco CR, Bombana AC. Knowledge of Brazilian general dentists and endodontists about the emergency management of dento-alveolar trauma. Dent Traumatol 2006;22:113–7.
9. Jackson NG, Waterhouse PJ, Maguire A. Management of dental trauma in primary care: a postal survey of general dental practitioners. Br Dent J 2005;198:293–7.
10. Kostopoulou MN, Duggal MS. A study into dentists' knowledge of the treatment of traumatic injuries to young permanent incisors. Int J Paediatr Dent 2005;15:10–9.
11. Stokes AN, Anderson HK, Cowan TM. Lay and professional knowledge of methods for emergency management of avulsed teeth. Endod Dent Traumatol 1992;8:160–2.
12. 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;23:6–8.
13. Abu-Dawoud M, Al-Enezi B, Andersson L. Knowledge of emergency management of avulsed teeth among young physicians and dentists. Dent Traumatol 2007;23:348–55.
14. Cvek M. A clinical report on partial pulpotomy and capping with calcium hydroxide in permanent incisors with complicated crown fracture. J Endod 1978;4:232–7.
15. Fuks AB, Cosack A, Klein H, Eidelman E. Partial pulpotomy as a treatment alternative for exposed pulps in crown-fractured permanent incisors. Endod Dent Traumatol 1987;3:100–2.
16. Andreasen JO, Andreasen FM, Mejare I, Cvek M. Healing of 400 intra-alveolar root fractures. 2. Effect of treatment factors such as treatment delay, repositioning, splinting type and period and antibiotics. Dent Traumatol 2004;20:203–11.
17. Bryson EC, Levin L, Banchs F, Abbott PV, Trope M. Effect of immediate intracanal placement of Ledermix Paste(R) on healing of replanted dog teeth after extended dry times. Dent Traumatol 2002;18:316–21.
18. Blomlof L, Lindskog S, Hedstrom KG, Hammarstrom L. Vitality of periodontal ligament cells after storage of monkey teeth in milk or saliva. Scand J Dent Res 1980;88:441–5.
19. Blomlof L. Storage of human periodontal ligament cells in a combination of different media. J Dent Res 1981;60:1904–6.
20. Pohl Y, Tekin U, Boll M, Filippi A, Kirschner H. Investigations on a cell culture medium for storage and transportation of avulsed teeth. Aust Endod J 1999;25:70–5.
21. Loh T, Sae-Lim V, Yian TB, Liang S. Dental therapists' experience in the immediate management of traumatized teeth. Dent Traumatol 2006;22:66–70.