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Practicability of a tooth rescue concept - the use of a tooth rescue box

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Introduction

A tooth rescue box (Dentosafe®, Dentosafe GmbH, Iserlohn, Germany) was developed containing a special cell culture medium. The box can be stored for three years at room temperature (below 37° Celcius). Vitality and proliferative capacity of PDL cells are maintained for at least 48 hours in vitro (1,2). In another clinical study all avulsed teeth that were rescued immediately in the tooth rescue box healed without complications (functional healing) after replantation. The extraoral storage in the rescue box was up to 53 hours (3).

Objectives

Aim of the study was to evaluate the practicability of the usage of tooth rescue boxes concerning the availability time of tooth rescue boxes and the storage duration of rescued teeth.

Material and Methods

The "Unfallkasse Hessen" (a public insurance responsible for the costs of accidents in public areas in Hessen, i.e. schools) distributed 2100 tooth rescue boxes in Hessen (a state of Germany), together with a questionnaire. The boxes were stored predominantly at schools and some also in other locations like public swimming pools or emergency cars. Only the information that a tooth rescue box was delivered and where it was stored was given to the teachers or other responsible persons. The questionnaire contained questions to the patient and the dentist. After receiving the questionnaires a telephone interview was conducted to confirm and complete the written answers.

Questionnaire (excerpts) for patients and dentists distributed along with tooth rescue boxes:

Questionnaire patients (excerpts):

- When and where did the accident occur?
- Where was the tooth rescue box stored?
- How much time elapsed before the tooth was put into the rescue box?
  - <10 min
  - 11-20 min
  - 21-30 min
  - 31-45 min
  - 46-60 min
  - >60 min

Questionnaire dentists (excerpts):

- Diagnosis of tooth injury
- Type of treatment
- How much time elapsed between use of tooth rescue box and beginning of treatment?

Results

In total 172 (8.2%) questionnaires were sent back. 18 questionnaires provided insufficient information on the number of injured teeth and the diagnosis. In the other 154 boxes in total 201 avulsed teeth or fragments of fractured teeth were rescued. In 166 cases the reaction time was noted, in 149 cases the storage location of the box and the location of the accident were given (Table 1).

type of injuries	rescued teeth	rescue situations (no. of questionnaires)
avulsion (permanent teeth)	49	--
avulsion (primary teeth)	22	--
crown fractures (permanent teeth)	130	--

total	201	154
insufficient data on rescued teeth	??	18
		172

Table 1: Teeth and tooth fragments rescued in tooth rescue boxes. Results from answered questionnaires.

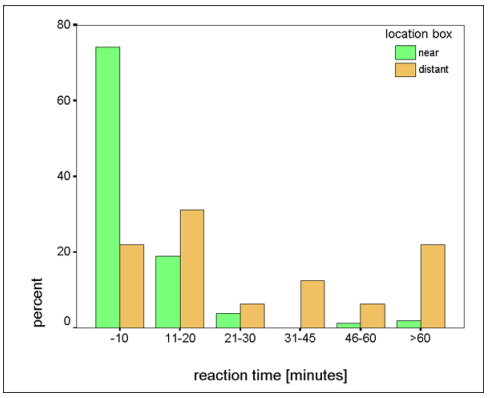

Fig. 1: Availability time of tooth rescue boxes in rescue situations: Time between accident and storage of avulsed teeth / crown fragments in tissue culture medium of tooth rescue box, stratified for distance between location of accident and storage location of tooth rescue box (n=131).

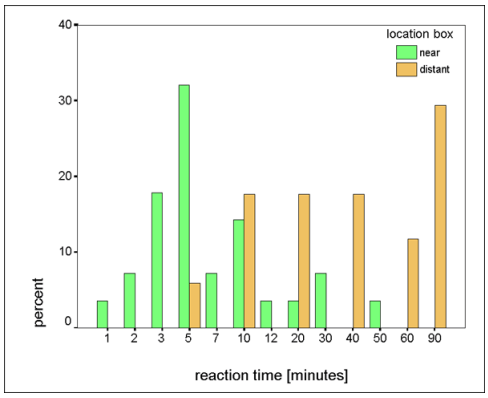

Fig. 2: Detailed availability time of rescue boxes in rescue actions (n=55). Time between accident and storage of avulsed teeth / crown fragments in tissue culture medium of tooth rescue box, stratified for distance between location of accident and storage location of tooth rescue box.

In 131 rescue situations the accidents occurred near the storage location of the box. In 72.5% of these situations teeth/fragments were rescued within 10 minutes, and 92.3% within 20 minutes. The grouped reaction times were significantly shorter (Chi square, $p<0.0001$) than in the cases in which the accident occurred more distantly from the storage location of the rescue box (n=18) (Fig. 1).

Beyond the marking of the time groups in the questionnaire in 55 cases exact details on the reaction times were additionally noted by the patients. When the box was stored near the accident the median of the reaction time was 5 minutes (mean: 9.3 ± 10.9). The median of the reaction time was 40 minutes (mean: 46.2 ± 33.3) when the boxes were stored distantly to the accident (Fig. 2).

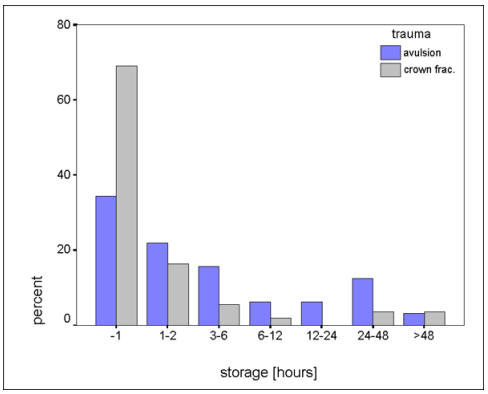

Fig. 3: Duration of storage of rescued avulsed teeth (n=53) and fractured crown fragments (n=70) in the tissue culture medium of the tooth rescue box until commencement of dental treatment (123 rescued teeth/fragments)

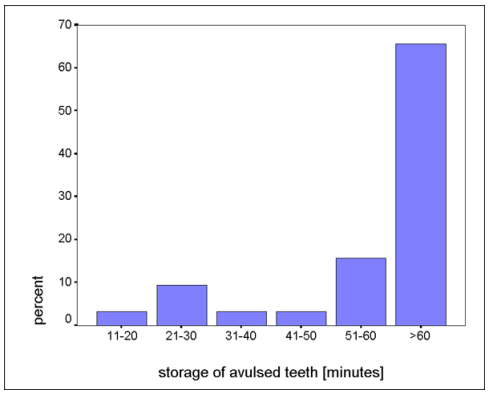

Fig. 4: Duration of storage of rescued avulsed teeth in the tissue culture medium of the tooth rescue box until commencement of dental treatment (32 rescue actions)

The mean storage time (time between storage in the rescue box and treatment) was 10 hours (median: 1 hour). The grouped storage times for crown fragments were significantly shorter (Chi square, $p=0.003$) than that for avulsed teeth (Fig. 3).

About 87.5% of the avulsed teeth had a storage time of 30 minutes or more, and 66% of 60 minutes or more before dental treatment started. In some cases the patients reported that dentists rejected the treatment (replantation) and sent the patients to other dentists (Fig. 4).

Conclusions

The tooth rescue concept - distribution of tooth rescue boxes - has been successful. Without any professional information the boxes were used in a correct manner by lay persons - even by children in elementary schools. No telephone calls to dentists had been necessary for a correct reaction following a severe tooth injury, and valuable minutes could be spared. Obviously the concerned persons remembered well that a tooth rescue box was available.
It could be shown that by storage of tooth rescue boxes at sites with high incidences of tooth trauma the reaction time until storage of avulsed teeth in an optimal medium could be dramatically reduced. The majority of avulsed teeth was rescued within 5 minutes, and nearly all within 20 minutes. Thus the prognosis of avulsed teeth could be clearly enhanced. All teeth rescued within 15 minutes in the tooth rescue box showed functional healing in a clinical long-term study (3).
A permanent retention of avulsed teeth becomes possible, and besides the medical advantages a valuable amount of costs can be spared. The estimated life-long costs for one tooth loss in a young individual exceed the costs for 2000 tooth rescue boxes. The "Unfallkasse Hessen" decided to deliver the tooth rescue boxes to all schools in Hessen. It is recommended to provide boxes also to sporting clubs, public pools, kindergardens, emergency facilities and families with children.

Literature

1. Y. Pohl and H. Kirschner. Autoradiographische Untersuchungen zur Erfassung von Zellneubildung im Restdesmodont isolierter Zähne des Menschen. Dtsch Z Mund Kiefer GesichtsChir 18:224-227, 1994.
2. Y. Pohl, U. Tekin, M. Boll, A. Filippi, and H. Kirschner. Investigations on a cell culture medium for storage and transportation of avulsed teeth. Aust Endod J 25:70-75, 1999.
3. Y. Pohl, A. Filippi, and H. Kirschner. Results after replantation of avulsed permanent teeth I.-III. Dent Traumatol 21:80-110, 2005

Abbreviations

PDL = periodontal ligament

This Poster was submitted by Priv.-Doz. Dr. Yango Pohl.

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Poster Faksimile:

Practicability of a tooth rescue concept – the use of a tooth rescue box

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Introduction

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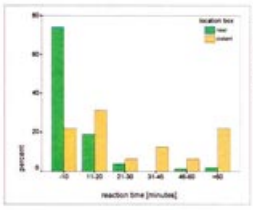

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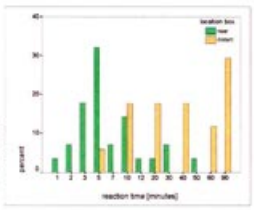

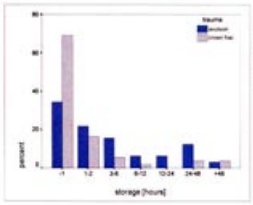

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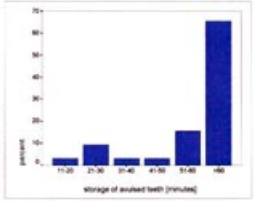

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(3) Y. Pohl, A. Filippi, and H. Kirschner. Results after replantation of avulsed permanent teeth. *In preparation.*

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