

The Effect of Using an Educational Poster on Elementary School Health Teachers' Knowledge of Emergency Management of Traumatic Dental Injuries

Sara Ghadimi¹, Bahman Seraj²✉, Hooman Keshavarz³, Ahmad Reza Shamshiri⁴, Raziieh Abiri⁵

¹Assistant Professor, Laser Research Center of Dentistry, Department of Pediatric Dentistry, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

²Associate Professor, Dental Research Center Dentistry Research Institute, Department of Pediatric Dentistry, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

³Assistant Professor, Department of Community Oral Health, School of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran

⁴Assistant Professor, Dental Research Center Dentistry Research Institute, Department of Community Oral Health, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

⁵Dentist

Abstract

Objective: The purpose of this study was to evaluate the effect of an educational poster on elementary school health teachers' knowledge about emergency management of traumatic dental injuries.

Materials and Methods: Before poster presentation, a questionnaire was distributed to 40 health teachers (30 in the study group and 10 in the control group). One month after poster distribution, the subjects were re-evaluated in both groups using the same questionnaire.

Results: The percentage of participating health teachers who answered the questions correctly after poster distribution regarding crown fracture was 93.3% in the test group vs. 60% in controls; for management of luxation and avulsion, the percentages for cases and controls were 63.3% vs. 40% and 100% vs. 60%, respectively. One month after distribution of the educational poster, rate of correct responses increased in management of crown fracture, luxation, and avulsion in the test group, but there was no improvement in controls ($P < 0.001$).

Conclusion: Use of an educational poster enhanced the knowledge of health teachers. Use of posters is an effective way to inform teachers of the management of traumatic dental injuries.

Keywords: Dental Trauma; Education; Management

Journal of Dentistry, Tehran University of Medical Sciences, Tehran, Iran (2014; Vol. 11, No. 6)

✉ Corresponding author:
B. Seraj, Department of Pediatric Dentistry, School of Dentistry, Tehran University of Medical Sciences, Tehran, Iran

serajbah@tums.ac.ir

Received: 11 March 2014
Accepted: 6 August 2014

INTRODUCTION

Traumatic dental injuries (TDIs) constitute a public dental health problem worldwide. TDIs have life-long consequences.

It has been shown that injury to teeth and face is common and affects approximately 20-30% of those with permanent dentition. It may have dire consequences such as psychological re-

percussions, depression, loss of self-esteem and functional and aesthetic problems [1-3].

It has been reported that more than 20% of school-age children suffer TDIs [1, 4].

Previous studies indicate that the majority of TDIs occur at school [4, 5].

In most cases, the child is referred to a dentist without any emergency management at the accident site, resulting in irreversible complications and consequences [6].

Therefore, school teachers especially health teachers can play a critical role in the primary management of TDIs and improve the prognosis of traumatized teeth.

A multitude of international studies in different countries have demonstrated inadequate knowledge of school teachers regarding emergency management of dental injuries [7-18].

Two such studies have been conducted in Iran [19, 20]; both have indicated a lack of knowledge about TDI management among elementary school staff. These studies have underlined the need for educational campaigns. A recent study in Kerman demonstrated inadequate knowledge of TDI in health teachers [21].

The purpose of this study was to evaluate the effectiveness of using an educational poster to increase elementary school health teachers' knowledge about TDI management.

MATERIALS AND METHODS

Study subjects and data collection

This study investigated the effect of an educational intervention delivered in the form of a poster. Our target population included health teachers of elementary schools in Tehran, Iran.

The public and private elementary schools of two municipal regions of Tehran were invited via convenient sampling to participate in the study in 2011.

All participating schools (n=40) were divided randomly into two groups. According to sample size calculations, 30 health teachers were allocated randomly to the test group and the other 10 to the control group.

Sample size of this study was calculated primarily to show the effect of intervention in a before-after design, considering McNemar's test for data analysis. According to our pilot study on 15 health teachers of elementary schools, we assumed that about 85% of subjects would show knowledge improvement among all discordants. Also we assumed that the ratio of discordants to concordants would be 1/2. The minimum sample size was calculated to be 30 (95% confidence interval and statistical power of 80%). Prior to the intervention, health teachers' knowledge of emergency management of TDIs was evaluated by a questionnaire in both groups. After that, the intervention (distributing an educational poster) was carried out in the schools of the test group. A month later, the subjects' knowledge was evaluated again in the both groups using the same questionnaire. Health teachers were not informed of the second evaluation in advance.

Questionnaire

The questionnaire consisted of 16 questions divided into three parts:

Part I: Ten questions collected information on gender, age, education level, work experience as a health teacher, previous courses on first aid, previous encounters with TDIs, and the preferred place for referring a TDI case.

Part II: Three questions explaining three different cases of TDI (one with a crown fracture, another with dental luxation, and a third one with avulsion) were directed to health teachers' action in such situations.

Part III: Three questions evaluated health teachers' knowledge of some important points regarding how to clean an avulsed tooth, when to refer a TDI case, and how to transfer an avulsed tooth.

An expert panel of pediatric dental specialists checked the content validity of the questionnaire.

In a pilot study on 15 health teachers from the same region, the reliability of the question-

naire was tested by a test-retest method with a seven-day interval.

Health teachers involved in our pilot study were excluded from the main study.

Educational poster

The educational poster used in this study was designed at the Dental Research Center of Tehran University of Medical Sciences to promote knowledge of emergency management of TDIs among school teachers, especially elementary school health teachers.

The Oral Health Bureau of the Ministry of Health and Medical Education, and the Iranian Dental Association approved the poster as well.

The poster included guidelines on three types of TDIs namely crown fracture, dental luxation, and avulsion.

Each part consisted of graphics and texts. The texts tried to describe the pictures more clearly, and in further detail.

- If your student's tooth has been broken:

- 1- Look for the fractured piece.
- 2- In presence of the fractured piece, the tooth can be better repaired.
- 3- Visit a dentist as soon as possible.

- If your student's tooth has been dislocated or is mobile:

- 1- Do not manipulate the tooth.
- 2- Visit a dentist as soon as possible.

- If your student's tooth has been avulsed:

- 1- Look for the tooth.
- 2- Hold the tooth by its crown, and never touch its root.
- 3- Cautiously wash the tooth under a slow stream of cold water.
- 4- Do one of the followings:
 - a- Put the tooth in cold milk, saline, saliva, or cold water (in order of preference).
 - b- Replace the tooth in its hole.
- 5- Visit a dentist immediately (within 2 hours).

Statistical methods

The data were analyzed with PASW Statistics for Windows, version 18.0 (SPSS Inc., Chicago, IL). McNemar's test was used separately in both test and control groups for evaluating the changes of the percentage of correct answers after the intervention. Having divided cases in each group into two categories (with improved knowledge at the second data collection, and without improved knowledge), Chi-square test was used to compare knowledge acquisition between the test and control groups. All participating health teachers (30 tests, 10 controls) filled out the questionnaires in the both evaluations (before and after the intervention).

Each health teacher who gave a wrong answer at the first data collection to a question and a correct answer to the same question at the second data collection was considered as one with improved knowledge. The statistical significance level was set at $P < 0.05$.

RESULTS

Table 1 shows the participants' socio-demographic characteristics. Half the schools in the test group were exclusively for boys, while the corresponding figure for the control group was 60%.

Table 2 presents the distribution of participants based on their previous encounters with TDI cases and first aid courses they had previously attended. Most of the health teachers in both groups preferred to refer a TDI case to a dentist (general practitioner or pediatric dental specialist).

Table 3 shows the number of the health teachers who answered the questions correctly. While there was no change in the proportion of correct answers for all questions in the control group, the proportion of correct answers in the test group increased significantly in management of crown fracture, luxation, and avulsion in the test group one month after the intervention ($P < 0.001$). The distribution of the participants according to their preferred

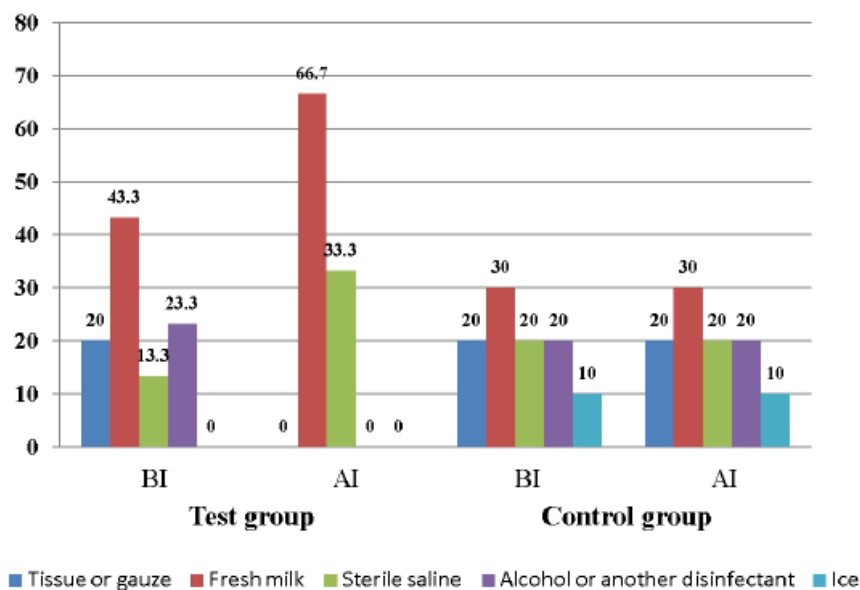


Chart 1. Participating health teachers' preferred storage medium for transferring an avulsed tooth (BI=before the intervention, AI=after the intervention)

storage medium for an avulsed tooth is shown in Chart 1.

As shown in Chart 1 all health teachers selected milk and saline as suitable storage media for avulsed teeth one month after the intervention in the test group.

The proportion of health teachers with improved knowledge is shown in Table 4 in both the test and control groups. Except for the appropriate time for referring a student with an avulsed tooth, improved knowledge was observed in all other questions.

Table 1. Participating health teachers' socio-demographic characteristics

	Test group (n=30) n(%)	Control group (n=10) n(%)
Gender		
Female	28(93.3)	9(90.0)
Male	2(6.7)	1(10.0)
Age		
39 years old or younger	21(70.0)	6(60.0)
40 years old or older	9(30.0)	4(40.0)
Educational level		
High school diploma	1(3.3)	0(0.0)
Associate's degree	8(26.7)	4(40.0)
Bachelor's degree	20(66.7)	6(60.0)
Master's degree	1(3.3)	0(0.0)
Work experience as a health teacher		
< 5 years	18(60.0)	6(60.0)
≥ 5 years	12(40.0)	4(40.0)
School type		
Public	12(40.0)	7(70.0)
Private	18(60.0)	3(30.0)

Table 2. Distribution of participating health teachers according to their previous courses on first aid and previous encounters with traumatic dental injuries

	Test group (n=30) n(%)	Control group (n=10) n(%)
Have you ever attended a first aid course/workshop?		
Yes	28(93.3)	9(90.0)
No	2(6.7)	1(10.0)
How long ago did you attend a first aid course/workshop?		
No course	2(6.7)	1(10.0)
< 5 years	16(53.3)	5(50.0)
5-10 years	5(16.7)	4(40.0)
≥ 10 years	7(23.3)	0(0.0)
Did the first aid course you attended include traumatic dental injuries management?		
No course	2(6.7)	1(10.0)
Yes	11(36.7)	4(40.0)
No	17(56.7)	5(50.0)
Have you ever encountered a student with a traumatic dental injury?		
Yes	20(66.7)	9(90.0)
No	10(33.3)	1(10.0)

Table 3. Proportions of participating health teachers who answered the questions correctly before poster distribution and one month later

	Test group (n=30)			Control group (n=10)		
	BI n(%)	AI n(%)	P [†]	BI n(%)	AI n(%)	P [†]
Management of a crown fracture case	15(50.0)	28(93.3)	<0.001*	6(60.0)	6(60.0)	1
Management of a luxation case	8(26.7)	19(63.3)	0.001*	4(40.0)	4(40.0)	1
Management of an avulsion case	17(56.7)	30(100.0)	<0.001*	6(60.0)	6(60.0)	1
Knowledge of the proper action when the avulsed tooth is found on the ground	12(40.0)	27(90.0)	<0.001*	4(40.0)	4(40.0)	1
Knowledge of the appropriate time for referring a student with an avulsed tooth	21(70.0)	25(83.3)	0.34	3(30.0)	3(30.0)	1
Knowledge of the suitable storage medium for transferring an avulsed tooth	17(56.7)	30(100.0)	<0.001*	5(50.0)	5(50.0)	1

† P values derived from McNemar's test. (*= Statistically significant)

- Before the intervention (BI)

- One month after the intervention (AI)

DISCUSSION

In Tehran (Capital of Iran), most schools have a health teacher. School health teachers are responsible for health status of students. They teach students about health issues, and help children and other teachers to manage emergent health problems and injuries, so they were used as the study population in our research.

The prognosis of injured teeth depends on proper emergency treatment.

Different studies have examined the knowledge of school teachers, physical education teachers, physicians, and dentists in this regard.

The results of these surveys have shown inadequate levels of knowledge among these groups about emergency management of TDIs [2, 6-24]. To improve the knowledge of TDI management, most authors suggested that education should be provided, but only a few studies have assessed the effect of educational lectures, posters, leaflets, pamphlets, and mailed guidelines [2, 8, 25-28].

The purpose of this study was to investigate the knowledge of health teachers about the emergency management of TDIs before and after distribution of an educational poster. Health teachers are responsible for promoting the health of students in schools. They play an important role in improving the prognosis of traumatized teeth because they can be close to the accident site. In this study, 72.5% (29/40) of participants reported previous close encounters with dental trauma, hence their greater potential for emergency management of TDIs. Studies in Hong Kong, Singapore, Kerman, Istanbul, and Porto have shown that 28.2%, 24%, 47.2%, 35.8%, and 23% of participants, respectively, had experienced close encounters with dental trauma [2, 15, 20, 11]. However, 69% of teachers in the US have never had such an experience [6].

In this study, 93.3% of the intervention group and 90% of the control group had passed first aid courses, but only approximately 40% of participants said the course included TDI management.

Table 4. Comparison of knowledge change between the test (n=30) and control (n=10) groups

	With improved knowledge [†]		P
	Test n(%)	Control n(%)	
Management of a crown fracture case	13(43.3)	0(0.0)	0.02*
Management of a luxation case	11(36.7)	0(0.0)	0.04*
Management of an avulsion case	13(43.3)	0(0.0)	0.02*
Knowledge of the proper action when the avulsed tooth is found on the ground	15(50.0)	0(0.0)	0.006*
Knowledge of the appropriate time for referring a student with an avulsed tooth	7(23.3)	0(0.0)	0.16
Knowledge of the suitable storage medium for transferring an avulsed tooth	13(43.3)	0(0.0)	0.02*

[†] Each health teacher who gave a wrong answer at the first data collection to a question, and gave a correct answer to the same question at the second data collection was considered as a health teacher with improved knowledge.

- P values derived from χ^2 test. (*= Statistically significant)

It seems that only about 50% of health teachers in the test and control groups answered correctly to questions regarding TDI management; although 72.5% had previously encountered TDI.

The prognosis of avulsion depends upon immediate and appropriate replantation of the avulsed tooth in the socket or rapid transportation of the child and the tooth (in proper storage media) to a dentist [29, 30]. For appropriate replantation of an avulsed tooth a 90% chance of success has been reported if done within 30 minutes; however, after two hours, the chance of success decreases to 5% [31].

Regarding the question about knowledge of the appropriate time for referring a student with an avulsed tooth, there was an improvement in knowledge in the test group, but the increase was not significant ($P=0.34$). This finding may be due to awareness of health teachers of the need for immediate dental treatment for serious dental injuries like avulsion before distribution of the educational poster.

After intervention, 83% of health teachers in the test group answered correctly.

Before distribution of the educational poster, 50% of participating health teachers in the control group and 66% in the test group preferred milk and saline as storage media for transferring an avulsed tooth. After the intervention, however, 100% of health teachers selected milk and saline as suitable storage media.

Previous studies have employed various methods to improve the knowledge of teachers and parents such as lectures, leaflets, and posters [25-28]; however, no ideal method has been identified so far. The current study utilized a poster as an educational tool. Lecture-based education requires staff to leave their workplace during working hours, which can cause operational problems. Educational leaflets are inexpensive tools, but people usually lose them and cannot refer to them. Therefore, as our intervention, we chose distribution of

educational posters in schools, as health teachers can refer to them in case of TDIs because posters are readily available on the wall, can be seen at any time and are conspicuous.

In this study, we included a no-intervention control group, so we could compare any change of knowledge between the test and control groups from baseline to finish after one month. Our results illustrated that there was no knowledge acquisition in the control group.

CONCLUSION

Health teachers had a low level of knowledge about TDI management. Our results showed that the use of an educational poster can improve the knowledge of health teachers and that it was an appropriate way of informing health teachers about traumatic dental injuries. Long-term studies, however, are required to determine their long-term effectiveness.

ACKNOWLEDGMENTS

The authors would like to thank Dental Research Center of Tehran University of Medical Sciences for financial support.

REFERENCES

- 1- Andreasen FM, Andreasen JO. Crown fractures. In: Andreasen JO, Andreasen FM, Andersson L (eds). Textbook and Color Atlas of Traumatic Injuries to the Teeth. Odder: Blackwell Munksgaard, 2007. p.290–296.
- 2- Chan AW, Wong TK, Cheung GS. Lay knowledge of physical education teachers about the emergency management of dental trauma in Hong Kong. Dent Traumatol. 2001 Apr;17(2):77-85.
- 3- Wong FS, Kolokotsa K. The cost of treating children and adolescents with injuries to their permanent incisors at a dental hospital in the United Kingdom. Dent Traumatol. 2004 Dec;20(6):327-33.
- 4- Traebert J, Peres MA, Blank V, Boell Rda S, Pietruza JA. Prevalence of traumatic dental injury and associated factors among 12-year-

- old school children in Floriano'polis, Brazil. *Dent Traumatol.* 2003 Feb;19(1):15-8.
- 5- Bastone EB, Freer TJ, McNamara JR. Epidemiology of dental trauma: a review of the literature. *Aust Dent J.* 2000 Mar;45(1):2-9.
- 6- McIntyre JD, Lee JY, Trope M, VannWF, Jr. Effectiveness of dental trauma education for elementary school staff. *Dent Traumatol.* 2008 Apr;24(2):146-50. doi: 10.1111/j.1600-9657.2008.00573.x.
- 7- Vergotine RJ, Govoni R. Public school educator's knowledge of initial management of dental trauma. *Dent Traumatol.* 2010 Apr;26(2):133-6. doi: 10.1111/j.1600-9657.2009.00854.x. Epub 2010 Jan 11.
- 8- Al-Asfour A, Andersson L, Al-Jame Q. School teachers' knowledge of tooth avulsion and dental first aid before and after receiving information about avulsed teeth and replantation. *Dent Traumatol.* 2008 Feb;24(1):43-9. doi: 10.1111/j.1600-9657.2006.00476.x.
- 9- Blakytyn C, Surbutis C, Thomas A, Hunter M. Avulsed permanent incisors: knowledge and attitudes of primary school teachers with regard to emergency management. *Int J Paediatr Dent.* 2001 Sep;11(5):327-32.
- 10- Al-Jundi S, Al-Waeili H, Khairalah K. Knowledge and attitude of Jordanian school health teachers with regards to emergency management of dental trauma. *Dent Traumatol.* 2005 Aug;21(4):183-7.
- 11- Caglar E, Ferreira L, Kargul B. Dental trauma management knowledge among a group of teachers in two south European cities. *Dent Traumatol.* 2005 Oct;21(5):258-62.
- 12- Mohandas U, Chandan G. Knowledge, attitude and practice in emergency management of dental injury among physical education teachers: a survey in Bangalore urban schools. *J Indian Soc Pedod Prev Dent.* 2009 Oct-Dec;27(4):242-8. doi: 10.4103/0970-4388.57660.
- 13- Feldens E, Feldens C, Kramer P, da Silva K, Munari C, Brei V. Understanding school teacher's knowledge regarding dental trauma: a basis for future interventions. *Dent Traumatol.* 2010 Apr;26(2):158-63. doi: 10.1111/j.1600-9657.2009.00863.x. Epub 2010 Jan 19.
- 14- McIntyre J, Lee J, Trope M, Vann WJ. Elementary school staff knowledge about dental injuries. *Dent Traumatol.* 2008 Jun;24(3):289-98. doi: 10.1111/j.1600-9657.2007.00542.x. Epub 2008 Apr 9.
- 15- Sae-Lim V, Lim L. Dental trauma management awareness of Singapore pre-school teachers. *Dent Traumatol.* 2001 Apr;17(2):71-6.
- 16- Al-Obaida M. Knowledge and management of traumatic dental injuries in a group of Saudi primary schools teachers. *Dent Traumatol.* 2010 Aug;26(4):338-41. doi: 10.1111/j.1600-9657.2010.00894.x.
- 17- Bayrak S, Tunc ES, Sari E. Evaluation of elementary school teachers' knowledge and attitudes about immediate emergency management of traumatic dental injuries. *Oral Health Prev Dent.* 2012;10(3):253-8.
- 18- Tzigkounakis V, Merglová V. Attitude of Pilsen primary school teachers in dental traumas. *Dent Traumatol.* 2008 Oct;24(5):528-31. doi: 10.1111/j.1600-9657.2008.00645.x.
- 19- Mesgarzadeh A, Shahamfar M, Hefzollasan A. Evaluating knowledge and attitudes of elementary school teachers on emergency management of traumatic dental injuries: a study in an Iranian urban area. *Oral Health Prev Dent.* 2009;7(3):297-308.
- 20- Mesgarzadeh AH, Shahamfar M, Hefzollasan A. Elementary school staff knowledge and attitude with regard to first-aid management of dental trauma in Iran: a basic premise for developing future intervention. *Oral Health Prev Dent.* 2009;7(3):297-308.
- 21- Raof M, Shokouhinejad N, Izadi A, Nourzadeh M, Afkham A, Forghani FR, et al. Long-term effect of an educational intervention regarding dental trauma first aid: a phase II study. *Dent Traumatol.* 2014 Jan 26. doi: 10.1111/edt.12090. [Epub ahead of print]
- 22- Westphalen VP, Martins WD, Deonizio MD, da Silva Neto UX, da Cunha CB, Fari-

- niuk LF. Knowledge of general practitioners dentists about the emergency management of dental avulsion in Curitiba, Brazil. *Dent Traumatol.* 2007 Feb;23(1):6-8.
- 23- Cınar C, Atabek D, Alaçam A. Knowledge of dentists in the management of traumatic dental injuries in ankara, Turkey. *Oral Health Prev Dent.* 2013;11(1):23-30. doi: 10.3290/j.ohpd.a29372.
- 24- Lin S, Levin L, Emodi O, Fuss Z, Peled M. Physician and emergency medical technicians' knowledge and experience regarding dental trauma. *Dent Traumatol.* 2006 Jun;22(3):124-6.
- 25- Lieger O, Graf C, El-Maaytah M, Von Arx T. Impact of educational posters on the lay knowledge of school teachers regarding emergency management of dental injuries. *Dent Traumatol.* 2009 Aug;25(4):406-12. doi: 10.1111/j.1600-9657.2009.00798.x. Epub 2009 Jun 9.
- 26- Al-Asfour A, Andersson L. The effect of a leaflet given to parents for first aid measures after tooth avulsion. *Dent Traumatol.* 2008 Oct;24(5):515-21. doi: 10.1111/j.1600-9657.2008.00651.x.
- 27- Kahabuka FK, Van't Hof M, Willemsen W, Burgersdijk R. Influence of seminar and mailed guidelines on knowledge of school teachers regarding emergency treatment for dental injuries. *East Afr Med J.* 2003 Feb;80(2):105-9.
- 28- Arikan V, Sönmez H. Knowledge level of primary school teachers regarding traumatic dental injuries and their emergency management before and after receiving an informative leaflet. *Dent Traumatol.* 2012 Apr;28(2):101-7. doi: 10.1111/j.1600-9657.2011.01042.x. Epub 2011 Jul 26.
- 29- Donaldson M, Kinirons MJ. Factors affecting the time of onset of resorption in avulsed and replanted incisor teeth in children. *Dent Traumatol.* 2001 Oct;17(5):205-9.
- 30- Dewhurst SN, Mason C, Roberts GJ. Emergency treatment of orodental injuries: a review. *Br J Oral Maxillofac Surg.* 1998 Jun;36(3):165-75.
- 31- Andreasen JO, Hjørting-Hansen E. Replantation of teeth. I. Radiographic and clinical study of 110 human teeth replanted after accidental loss. *Acta Odontol Scand.* 1966 Nov;24(3):263-86.