

From: The University Hospital, Department of Dentistry, and the Royal Dental College, Copenhagen.

A FOLLOW-UP STUDY OF TEETH REPLANTED AFTER ACCIDENTAL LOSS

by

KAREN LENSTRUP

VIBEKE SKIELLER

The purpose of this study is to evaluate the long-term prognosis of teeth replanted after loss in accidents.¹

The literature on replantation is abundant in case histories, but the apparently successful results reported in many cases are often misleading owing to the rather short periods of observation.

The present follow-up study comprised 46 patients, viz. 8 adults and 38 children aged 5—18 years. Following replantation the patients were examined at regular intervals. The teeth were studied clinically and roentgenologically, and electric vitality tests were made.

The material was examined for the most frequent causes of accidental loss of teeth. The result appear in Table 1.

Table 1. Distribution according to cause of accidental loss.

Cause of accidental loss	Number of patients	
	Adults	Children
Fall	1	21
Traffic accident	3	4
Blow	1	3
Accident during anaesthesia or dental treatment	2	3
Unknown	1	7

¹ A detailed report was published in Danish in the October 1957 issue of Tandlægebladet.

In Table 2 the teeth lost by accident are grouped according to type of tooth.

Table 2. Distribution of the accidentally lost teeth according to type of tooth.

	Maxillary			Mandible		
	Central incisor	Lateral incisor	Canine	Central incisor	Lateral incisor	Canine
Number of accidentally lost teeth	47	9	1	3	0	0

Table 3 shows the number of accidentally lost teeth per patient.

Table 3. Distribution of number of teeth per patient

	Number of accidental lost teeth		
	One tooth	Two teeth	Three or more teeth
Number of patients	35	8	3

In Table 4 the 38 children are grouped according to sex and age at the time of the accident.

Table 4. Distribution of the 38 children according to sex and age at the time of the accident.

Number of children examined	♂	♀	Age in years at the time of accident													
			6	7	8	9	10	11	12	13	14	15	16	17		
38	26	12	3	3	10	2	7	4	2	5	1	1	0	0		

The time elapsed between the accidental loss and replantation of the teeth is given in Table 5, and Table 6 shows the different conditions of preservation during this period.

Table 5. Time (hours) between accident and replantation. Thirteen cases in which the exact time could not be ascertained are omitted.

Time (hours)	0-1/2	1/2-1	1-2	2-4	4-6	6-8	8-10	10-12	12-16	16-24
Number of patients	3	11	5	8	1	2	0	0	2	1

Table 6. Distribution of the teeth according to the conditions under which they were preserved between accident and replantation.

Storage conditions	Oral cavity exclusively	Oral cavity, after a shorter period extra-orally	wet	dry	unknown
Number of patients	3	4	14	13	12

In most patients replantation was performed after previous root canal treatment. The root canal was filled with guttapercha from the coronal end while the tooth was kept moist. One to two millimeters of the root tip was removed, and the apical surface slightly rounded off.

In a few patients replantation was performed without previous root canal filling, viz. in three cases in which immediate replantation was possible without removing the teeth from the oral cavity, and in some further cases in which wide apical openings were present.

As a rule, some type of fixation — acrylic splint, cap splint or *Sauer's* splint — was worn six to twelve weeks following replantation.

RESULTS

The material was divided into cases in which the replanted tooth was lost, and cases in which the tooth was still *in situ*.

Out of the total number of 46 patients twenty had lost the replanted tooth, in sixteen cases due to resorption, and in three cases due to periodontitis. In one case the replanted tooth was extracted for orthodontic reasons shortly after replantation.

The time of function of the replanted teeth in twenty patients appears in Table 7. For these twenty patients the period of observation varied from a few days to 5 years and 6 months.

Table 7. The period between replantation and loss of the replanted tooth (20 patients).

Time (months)	0—6	6—12	12—24	24—66
Number of patients	7	2	6	5

In the remaining 26 patients the replanted tooth was still present, but in 22 cases X-ray examination revealed root resorptions. For this group the period of observation varied from 2 to 56 months.

In four patients only no resorption of the root was found, and in two of these cases the root formation was not completed at the time of replantation. In both cases replantation was performed without previous root canal treatment. In one of these patients repositioning was made immediately without removing the tooth from the oral cavity. In the other case the tooth was preserved in a solution of penicillin and reinserted half an hour after the accident.

The results of the present study lead to the following conclusions

(1) The long term prospects of preserving a replanted tooth are unfavourable, since root resorption results in most cases.

(2) There is a great variation in the time of inception of the resorption and in the rate at which resorption proceeds.

(3) Neither the time elapsing from accident to replantation, nor the conditions under which the tooth is preserved in this period seem to be directly related to the time at which resorption commences, or the rate at which it advances. It seems, however, that the younger the tooth, i.e. the less mature its root, the more pronounced and progressive will be the resorption.

(4) Replantation of young teeth in the earliest stages of root development seems to give the best results if done *without* previous root canal treatment. A few cases showed that the pulp may recover vitality and that root development may continue — though in an atypical way. The pulp cavity, however, showed obliteration.

(5) The prospects of eliminating the damage by orthodontic measures should be evaluated in the individual case, before the decision for or against replantation of an accidentally lost tooth is taken.

SUMMARY

The follow-up examination comprised 46 patients, 8 adults and 38 children aged 5—18 years. The patients were examined at

regular intervals following replantation. The period of observation varied from two months to five years and 6 months.

The tables present information about location and number of the teeth involved, the most frequent causes of accidental loss, sex and age distribution of the 38 children, time elapsed between accident and replantation, and the conditions of preservation of the teeth during this period.

The replantation technique is outlined.

At the end of the follow-up examination 20 patients had lost the replanted tooth or teeth (time of function is given). The remaining 26 patients had retained the replants, which, however, showed evidence of root resorption except in four cases. In two of these cases the root formation was not completed at the time of replantation.

The authors arrive at certain conclusions regarding the long term prognosis of replanted teeth. These conclusions are given at the end of the article.

RÉSUMÉ

CONTRÔLE DE DENTS RÉIMPLANTÉES APRÈS LUXATION COMPLÈTE

La présente étude a porté sur 46 patients, dont 8 adultes et 38 enfants âgés de 5 à 18 ans. Les patients ont été examinés à des intervalles réguliers à partir du moment où la réimplantation a été effectuée. La durée d'observation a varié de 2 mois à 5 ans $\frac{1}{2}$.

Des tableaux indiquent les causes les plus fréquentes, la localisation et le nombre des dents impliquées, ainsi que la répartition par âge et sexe en ce qui concerne les enfants, et enfin le temps écoulé entre le moment de la luxation et la réimplantation, et le mode de conservation de la dent pendant ce temps.

Les méthodes de réimplantation qui ont été utilisées sont rapidement mentionnées.

A la fin de la période de contrôle, les dents réimplantées manquaient chez 20 des patients (durée de fonction indiquée) et étaient conservées en place chez 26 patients dont seuls 4 étaient exempts de signes de résorption — et dans 2 de ces cas l'apex des dents luxées était ouvert.

Il convient de souligner les points suivants parmi les résultats de ce contrôle:

1. Le pronostic à longue échéance pour les dents réimplantées est défavorable, car il se produit une résorption dans la plupart des cas.

2. La vitesse à laquelle la résorption progresse est très variable, ainsi que le moment où la résorption commence.

3. Le temps écoulé entre la luxation et la réimplantation, non plus que le mode de conservation de la dent luxée pendant ce temps, ne semblent avoir de rapport direct avec le moment où la résorption commence, ni avec la rapidité à laquelle elle progresse. Il semble par contre que, lorsqu'une résorption se produit, cette résorption sera d'autant plus accusée et progressera d'autant plus rapidement que la dent sera plus jeune, c.a.d. son apex moins fermé.

4. Dans les cas de réimplantation de dents jeunes, à apex très ouvert, il semble que les meilleurs résultats aient été obtenus dans les cas où la réimplantation a été faite sans traitement radiculaire préalable.

5. Avant de décider de l'opportunité de réimplanter une dent totalement luxée, il conviendra dans chaque cas particulier d'examiner soigneusement les possibilités de remédier aux dommages à l'aide d'un traitement orthodontique.

ZUSAMMENFASSUNG

EINE NACHUNTERSUCHUNG VON ZÄHNEN, DIE NACH ACCIDENTELLER EXARTIKULATION REPLANTIERT WURDEN

Die vorliegende Spätuntersuchung umfasst 46 Patienten, 8 Erwachsene und 38 Kinder, im Alter von 5 bis 18 Jahren. Seit der Replantation sind die Patienten mit regelmässigen Intervallen untersucht worden. Die Observationszeit hat von 2 Monaten bis 5½ Jahren gewechselt.

Die Tabellen geben eine Darstellung der häufigsten Ursachen sowie Lokalisation und Zahl der betreffenden Zähne; auch ist die Verteilung von Geschlecht und Alter der 38 Kinder untersucht worden. Schliesslich wird die verlaufene Zeit und Aufbewahrungsweise des Zahnes vom Zeitpunkt der Exartikulation zur Replantation angeführt.

Die Methoden der Replantation, die verwendet wurden, werden kurz besprochen.

Am Ende der Untersuchungsperiode waren bei 20 Patienten der oder die replantierten Zähne nicht mehr vorhanden (Die Funktionszeit wird angeführt). Die Zähne waren bei 26 Patienten noch erhalten; von diesen waren nur 4 ohne jedes Zeichen von Resorption — und in 2 von diesen Fällen waren bei den exartikulierten Zähnen die Wurzeln nicht fertiggebildet.

Von dieser Spätuntersuchung können folgende Schlussfolgerungen gezogen werden:

1. Die Prognose der replantierten Zähne ist auf die Dauer schlecht, da Resorptionen in den weitaus meisten Fällen eintreffen.

2. Die Geschwindigkeit, womit die Wurzelresorption fortschreitet, sowie der Anfangszeitpunkt der Resorption, wechseln von Fall zu Fall.

3. Weder die Zeit, die zwischen Exartikulation und Replantation vergeht, noch die Aufbewahrungsweise des exartikulierten Zahnes, haben anscheinend einen direkten Einfluss auf den Anfangszeitpunkt der Resorption oder die Geschwindigkeit, womit sie fortschreitet. Wenn eine Resorption stattfindet, ist sie anscheinend kräftiger und schneller fortschreitend, je jünger, d.h. je weniger die Wurzel entwickelt ist.

4. Replantation von Zähnen auf einer frühen Entwicklungsstufe der Wurzel ist anscheinend am erfolgreichsten, wenn sie ohne vorausgehende Wurzelbehandlung stattfindet.

5. In jedem einzelnen Fall muss die Prognose einer eventuellen orthodontischen Behandlung des Zahnverlustes beurteilt werden. Erst dann kann die Frage über Replantation des exartikulierten Zahnes entschieden werden.

Address: *The Royal Dental College,
4, Universitetsparken,
Copenhagen Ø, Denmark*