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# SAVREMENI PRISTUP REPLANTACIJI TRAUMATSKI EKSTRAHIRANIH ZUBA ACTUAL APPROACH TO REPLANTATION OF AVULSED TEETH- A CASE REPORT

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## SAŽETAK

Avulzija zuba (exarticulatio) ili traumatska ekstrakcija definiše se kao potpuno izbijanje zuba iz alveolarne čašice, gdje je kompletan zub odvojen od potpornih tkiva (alveolarne čašice i gingive). Avulziran zub se može spasiti replantacijom, što podrazumijeva postupak u kojem se izbijeni zub vraća na svoje mjesto. Prognoza uspjeha replantacije zuba, zavisi od vremena provedenog van alveolarne čašice, stanja avulziranog zuba, godina pacijenta, razvoja korijena. Cilj rada je pokazati postupak replantacije traumatski ekstrahiranih zuba, centralnog i lateralnog sjekutića u gornjoj vilici. Dentalna trauma je predmet interesovanja mnogih autora ne samo zbog načina terapije nego i zbog njenog ishoda. U tom pogledu naročito je interesantna avulzija zuba i replantacija kao njena terapijska mjera.

Mišljenja smo da ukoliko dođe do avulzije replantaciju treba uraditi gdje god je to moguće pridržavajući se pravila za zube sa završenim i nezavršenim razvojem korijena.

Kod mladih pacijenata, pogotovo onih u pubertetu, za replantaciju kod avulzija možemo reći da je jedini vid terapije pošto kod takvih pacijenata rast i razvoj još nisu završeni pa implantati i fiksni protetski radovi ne dolaze u obzir jer su kontraindicirani.

**Ključne riječi:** replantacija, avulzija, resorpcija

## ABSTRACT

Tooth avulsion (exarticulation) implies as total displacement of the tooth out of its socket. Various statistics have shown that exarticulation of teeth following traumatic injuries is relative infrequent, ranging from 0.5-16% of traumatic injuries in the permanent dentition and from 7%-13% in the primary dentition.

The goal of this case report is to present the delayed replantation of the central and lateral incisor in maxilla in a 14-year old child. At the same time analyzing modern literature, we are presenting different professional-scientific position about using different antiresorptive medicaments and different solutions for tooth preservation during the extra alveolar period.

Most replanted teeth demonstrate root resorption after certain period of time. Histologic examination of the replanted human and animal teeth has reevaluated three different root- resorption modalities: surface resorption, replacement resorption (ankylosis) and inflammatory resorption.

A number of clinical factors have been shown to be associated with root resorption after replantation, such as extra-alveolar period, type of extra-alveolar storage and tooth condition.

Teeth replantation at prepubertal and pubertal patients with avulsed teeth is method of choice because these patients are contraindicated for dental implants and fixed prosthetic devices.

**Key words:** replantation, avulsion, ankylosis

**T**ooth avulsion, disarticulation or traumatic extraction implies complete pulling out of a tooth from the alveolar caliculus whereby a complete tooth is separated from its supporting tissue (alveolar caliculus and gingival).



## INTRODUCTION

Tooth avulsion, disarticulation or traumatic extraction implies complete pulling out of a tooth from the alveolar calculus whereby a complete tooth is separated from its supporting tissue (alveolar calculus and gingival).

Different statistical data demonstrate that among dental traumas avulsion as such does not occur frequently and only 0.5-16% of all traumas of permanent dentition relates to it, and 7-13 % of all traumas of deciduous dentition.

The most frequent etiological factors causing avulsion of permanent teeth are fights and sports-related injuries, while falls on the hard ground are the most common causes of traumatic extractions of deciduous teeth.

Regardless of the kind of dentition (deciduous or permanent) the teeth most commonly avulsed are central maxillary incisors while the teeth in the lower jaw are less frequently affected.

Most commonly, avulsion occurs in children aged 7 to 9 years, and this is the time of eruption of permanent incisors. It is in this period that periodontal ligament is poorly structured and poorly resistant to force which causes avulsion. Coupled with the avulsion of either one or several teeth are other injuries, and among the latter the most frequent are those of the alveolar calculus and lips. The avulsed tooth can be saved by replantation which implies the procedure of repositioning the tooth to its primary place. Nevertheless, the prognosis for such a tooth depends upon the time it has spent outside the alveolar calculus but also on the condition of the avulsed tooth, a patient's age and root development. Thus, the replantation of the avulsed or traumatically extracted tooth can be divided into two categories:

1. Replantation undertaken shortly after the trauma (or in case when the avulsed tooth has been kept in some medicament), i.e. prompt replantation.
2. Replantation undertaken after some time has elapsed and in the meantime drying of periodontal membrane has taken place, i.e. the postponed replantation.

Replantation should be carried out whenever possible, regardless of the fact that the success prognosis for prompt and postponed replantation is different.

## AIM

The aim of this case study report is to demonstrate the replantation procedure of the traumatically extracted teeth, and at the same time, provide an overview of contemporary scientific discoveries in this particular area of research.

## A CASE REPORT

The patient M.O., born in 1989, was admitted into the Clinic for Oral Surgery in the early morning hours as an emergency case. By clinical examination we diagnosed the swelling (oedema) of the upper jaw with indications of a fresh hematoma. Intraorally, we



**Figure 1.**  
Traumatic  
extraction of  
teeth 21 i 22



**Figure 2.**  
X-ray after  
traumatic  
extraction

noticed the blood oedema in the vestibule region 21, 22, 23. The teeth 21 and 22 were missing in the alveolar while the remaining front teeth did not show any signs of mobility; their vitality has been preserved although they were slightly sensitive to percussion. No signs of the alveolar ridge mobility could be noticed (Figure 1).

In the x-ray shot of the retro-alveolar we noticed the vacant alveolar regions 21 and 22. The remaining teeth and the alveolar ridge did not show any signs of fracture or any serious traumatic injury (Figure 2).

On the basis of the above the diagnosis *Extractio traumatica dentium 21, 22* was established.

In the case history record the patient said that the injury was inflicted in the fight that had allegedly taken place an hour or so prior to his being admitted to the clinic. The patient brought with himself the tooth 21 while the tooth 22 was brought half an hour upon his admittance. The teeth which were brought back had not been kept in any fluid medium. They were brought in a paper handkerchief.

Consequently, the tooth replantation was carried out approximately two hours after the injury.

## OPERATIVE PROCEDURE

Operative procedure was done with respect to ethical standards regulated by Helsinki Declaration.

The traumatically extracted teeth 21 and 22 are deposited in a sterile vessel with the physiological solution. After that, careful cleaning of the roots of the traumatized teeth is carried out by applying the ultrasound remover of salivary calculus. Throughout

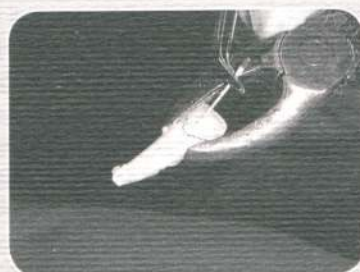




**Figure 3.**  
Cleaning the  
avulsed tooth  
with ultrasound  
remover of  
salivary calculus



**Figure 4.**  
Extraoral  
endodontic  
treatment



**Figure 5.**  
Filling with  
cement and  
gutaperca point



**Figure 6.**  
Reposition



**Figure 7.**  
Sutures



**Figure 8.**  
Wire composite  
immobilisation

the cleaning procedure and endodontic treatment teeth are held by forceps in order to avoid the injury of the remaining periodontal tissue on the roots of the traumatized teeth (Figure 3).

After thorough cleaning we resort to endodontic treatment in the sense of extirpation of the pulp tissue from the crown and root part whereupon the root canal is filled with phosphate cement and gutaperca point in a conventional manner (Figures 4 and 5). After applying the local anaesthetic the alveolar 21 and 22 are freshened while taking care simultaneously not to apply rough manipulations which could possibly crystallize the remaining periodontal tissue in the alveolar.

Following that, the replantation of the teeth 21 and 22 is carried out by repositioning them to their primary place with the occlusion control and reconstruction of the original position (Figure 6).

Thanks to surgical seams good adherence of papilla interdentally and high-quality haemostasis are ensured.

Immobilization is carried out by applying the wire-composite immobilization means which is positioned to the adjacent teeth.

The orthodontic wire of 0.4 mm and the bright polymer material

are applied preceded by etching and coating by *žhelio bond'* glue. (Figure 8).

The next stage is the x-ray control of replantation. The retro-alveolar x-ray shot demonstrates a good position of the replanted teeth which corresponds to the position prior the trauma (Figure 9).

The patient is given the antibiotics treatment besides the conventional medication which does not differ greatly from the cases of other oral surgical interventions. Soft calorie- rich diet is recommended but also regular rinsing and continuous maintenance of oral hygiene.

The regular check-up of the patient was done 24 and 48 hours after replantation.

In the postoperative phase there were no signs of infection, oedema, pain or mobility of the replanted teeth.

Three weeks later the removal of immobilization was carried out together with polishing and protection of porcelain on the teeth that served as carriers of the wire-composite immobilisation

There were no signs of inflammation of the surrounding tissue and the teeth did not show any signs of mobility (Figure 10).



regenerative process.

## DISCUSSION

therapeutic measure is of particular interest.

that the majority of textbook writers are against repatriation of

...the recovery chances are significantly reduced.

don'tic treatment.

dental ligament after replantation, resorption may be as follows:

ped if resorption stimuluses are removed, i.e. bacteria

comparison to older ones.

this is achieved by endodontic treatment.



after trauma



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Accordingly, resorption is a problem in almost any replantation because it is responsible for the loss of the replanted tooth. This is the reason why scientists of today have focused on searching for the corresponding substance that can slow down or stop the resorption process and thus prolong the life span of the replanted tooth. In this way Bryson and Levin (3) published a case study in which they presented evidence for the anti-resorption effect of tetracycline applied locally in the course of replantation of the avulsed tooth.

Ma and Sae-Lim (4) published a case study in which they presented even more interesting evidence about the effect of tetracycline, applied locally, on the anti-inflammatory and anti-resorption processes in the root of the avulsed tooth.

The aforementioned works rely on the results of case studies published in the past decade. The case studies present results on the efficacy of tetracycline applied per infusionem in experimental animals on which intentional tooth replantation has been carried out. Led by the knowledge about the anti-resorption effect of bisphosphonates, Levin and Bryson (5) conducted research on the experimental model of bisphosphonates of third generation alendronates. In their work they presented evidence of the strong inhibition activity of alendronates on osteoclasts which are basically the carriers of resorption processes in replanted teeth.

The discovery of substance where replanted teeth could be kept would significantly increase the number of prompt replantations. In the early 2000s interesting studies on successful prospects of replantation after preserving the replanted tooth in different mediums, were published.

Thus, Buttke and Troppe (6) published a case study on different results of tooth replantation where different mediums for preservation of the avulsed teeth were used.

In the experimental model Hank's solution without anti-oxidants was used, Viaspan solution and finally the solution with low concentration of H<sub>2</sub>O<sub>2</sub>.

Periodontal membrane of the root surface can survive in dry conditions up to 18 minutes; over half of them die within 30 minutes while the majority die within 120 minutes. Most cells of perio-

dontal membrane live for 120 minutes in a physiological solution; however, if kept in plain water, they will die out prior to expiry of 120 minutes. Milk has been known for a long time to be a good means of keeping avulsed teeth. Ankylosis will not occur within the six-hour period after replantation if the avulsed tooth has been kept in milk. Yet, there are new solutions for keeping avulsed teeth as well as the solutions applied in the course of tooth replantation. The application of such solutions enables the periodontal membrane of the avulsed tooth to survive up to 24 hours after the injury. In clinical terms, replantation should be carried out within 45 minutes after a sustained trauma if we want to preempt ankylosis.

Unfortunately, the doctor is not the only person responsible for a probable loss of vitality of periodontal ligament. In other words, if a patient or his escort brings the avulsed teeth in a paper handkerchief, PDL vitality is fatally jeopardized. In turn, this leads to progressive substitute resorption which results in progressive ankylosis.

In our case study the avulsed teeth brought in a paper handkerchief were immediately put into a liquid medium, namely, in the physiological solution. It would have been far better if they had been kept in milk or in oral cavity until the admittance into a dental surgery. In any case, our patient will continue to come for regular check-ups and x-ray will help us identify resorption if / when it occurs.

In his case study Škrinjar (7) resolves the traumatic extraction of the permanent central incisor by transplanting the second lower premolar with an open apex.

In his work, the above author emphasizes the importance of PDL vitality which is indispensable for periodontal healing. Its removal leads to enormous resorption. According to Škrinjar (7), the method of keeping a tooth in the course of transplantation is equally important for eventual resorption processes in the root. Thus, in order to ensure pulp revascularization the apex opening should be larger than 2 mm.

## CONCLUSION

1. In all cases of traumatically extracted permanent teeth replantation should be carried out whenever it is possible.
2. The stages of replantation procedure should conform to the growth and development of the avulsed tooth.
3. Strict measures should be taken to keep the extraoral period in the course of replantation to the minimum. PDL vitality, as the most important factor in healing process and exempt from root resorption, is dependent on proper timing so that the preservation rate of the replanted tooth is longer.
4. With younger patients, particularly those in puberty, in case of avulsion replantation is the only therapeutic method available since in these patients growth and development have not been completed yet so that implants and fixed prothetic aids are out of the question as they have proved to show counter indications.

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