



## Traumatic Avulsion of a Young Permanent Tooth- Case Report

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### Abstract

Avulsion means a traumatic injury to a primary or permanent tooth that has been completely ejected from the alveolus by direct force. In dental practice, any trauma in the orofacial region that results in tooth avulsion is considered an emergency that must be treated immediately. An eight-year-old patient had an avulsion of tooth 21 after falling from a wheelchair. After a clinical examination, the tooth was replanted according to the guidelines of the International Association of Dental Traumatology (IADT) and stabilized using a wire splint with analgesic and antibiotic therapy. Conventional endodontic therapy of tooth 21 started seven days after replantation with radiographic diagnosis. After endodontic treatment, the vital tooth was compositely restored with prior bleaching with 35% hydrogen peroxide. Monitoring of the avulsed tooth was performed by radiographic diagnosis and clinical examination, which were without clinical signs and symptoms.

**Keywords:** Avulsion; Child; Replantation

### Introduction

Avulsion means a traumatic injury to a primary or permanent tooth that is completely ejected from the alveolus, and is caused by the action of direct force, i.e. direct contact between the tooth and the object that causes the trauma, or by the indirect action of force where the trauma to the lower jaw is transmitted to the upper teeth through the contact of the teeth. This form of traumatic injury results in impaired masticatory function and aesthetics, as well as a negative social and psychological impact on the patient [1,2]. Avulsion of young permanent teeth in the children's population ranges from 0.5% to 16%. The most common causes of this form of trauma are falls 52.6%, blows 22.7% and falling from a bicycle 10.1%.

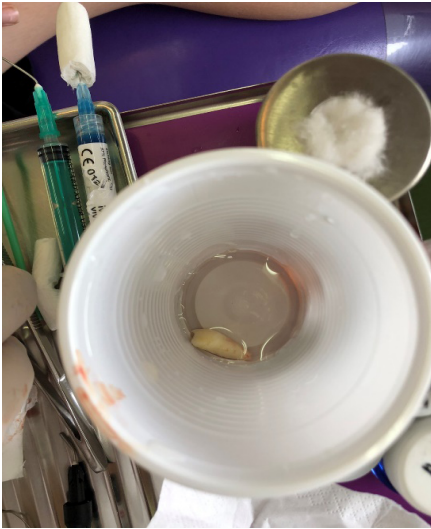
According to numerous studies, the replantation of an avulsed tooth has a long-term survival rate of about 79.3% if it is in accordance with the treatment guidelines prescribed

by the International Association of Dental Traumatology (IADT) [3]. Numerous factors from the patient's general health condition, maturity root apex, storage medium and extraoral time influence the successful outcome of the procedure replantation teeth [4]. If immediate replantation is not possible, the tooth must be cared for in a suitable medium because the cells of the periodontal ligament (PDL) that remained on the root surface of the avulsed tooth after trauma must be protected from dehydration in order to maintain their function and viability [5]. For this purpose, media that satisfy osmolarity, adequate PH, nutrients and minerals can be used, such as saliva, milk, physiological solution and specialized media (DentoSafe, Viaspan, HBSS) [6]. In younger and uncooperative children, the transport of an avulsed tooth from oral cavity is mandatory due to the danger of swallowing. It is very important to emphasize that it is better to put an avulsed tooth in something closed, than to carry it out in the open, because in this way the death of the cells of the periodontal ligament is accelerated, which is

of great importance for the outcome of the treatment.

### Case Report

An eight-year-old boy with the initials M.K. came to the children's dentistry office accompanied by his mother due to the avulsion of tooth 21, which resulted from a fall from a wheelchair. The boy kept the avulsed tooth in his mouth for twenty minutes since the impact occurred. With the quick intervention of the pedodontist, the tooth was submerged in a 95% NaCl solution, in a disposable plastic cup, taking care not to damage the root surface (Figure 1).



**Figure 1:** Avulsed tooth submerged in 95% NaCl solution



**Figure 2:** Empty alveolus of tooth 21 filled with coagulum.

The medical history states that in the park, the boy fell from the scooter and hit the front part of his face on the pavement. The boy denied loss of consciousness and the urge to vomit, was fully oriented and independently reconstructed the event completely. An extraoral clinical examination revealed a contusion of the upper lip.

During the intraoral examination, the left maxillary central incisor (21) was missing, the alveolus was filled with coagulum, and the marginal gingiva in the corresponding area was lacerated (Figure 2).

Inspection and palpation of the dentoalveolar ridge ruled out a fracture. After his mother gave consent, it was decided to reposition and replant the extracted tooth. According to the clinical protocol, with prior information that the patient has no drug allergies, local anesthesia (2% lidocaine without vasoconstrictor) was applied with labial and palatal infiltration in the affected area. The alveolus was gently washed with saline solution, as was the avulsed tooth. The tooth was repositioned with mild digital compression in the alveolus, which was not treated in any way except surface washing and was not curetted. The vestibular surface of the tooth was stained with 37% orthophosphoric acid and a wire splint was fixed to teeth 12, 11, 21, 22 with liquid composite resins while controlling the occlusion of the repositioned tooth (Figure 3). The fixation of tooth 21 with a wire splint lasted two weeks.



**Figure 3:** Fixation of teeth with a wire splint.

The patient was prescribed antibiotics (amoxicillin + clavulonic acid 457 suspension 2 x 7.5 ml) and analgesic therapy (Ibuprofen 100mg/5ml suspension 2x7ml), and was referred for X-ray diagnostics and to the dispensary of the school medicine for prescribing anti-tetanus

protection. He was also advised to follow a hygienic diet, use soft toothbrushes and 0.12% chlorhexidine solution to maintain oral hygiene. Seven days after tooth replantation, conventional root canal therapy started. After the application of local anesthesia, an access cavity was prepared, the patency of the canal was tested, followed by extirpation of the pulp and determination of the working length using a #15 K file (Figure 4).



**Figure 4:** View of the extirpated pulp.



**Figure 5:** Intracanal tooth filling 21

During the mechanical treatment of the root canal, the root canal space was irrigated with 2 ml of 1.5% sodium hypochlorite (NaOCl) solution, followed by a final rinse with a 17% ethylenediamine tetraacetic acid (EDTA) solution for one minute and saline solution while drying the channels with paper points. An intracanal medication based on calcium hydroxide was placed in the root canal space with a lentulo spiral, and the access cavity was closed with a temporary filling (Citodur, DoriDent Austria) (Figure 5).

Two weeks after replantation, the intracanal medication was removed, followed by definitive obturation of the root canal with gutta-percha and epoxy resin using the cold lateral compaction technique (Figure 6).



**Figure 6:** Definitive obturation of tooth 21.





**Figures 7 & 8:** Treatment of a replanted tooth with 35% hydrogen peroxide.

The access cavity is then closed with a temporary filling. The replanted tooth changed color during the endodontic treatment, which is why it was treated with 35% hydrogen peroxide (Opalescence™Endo) according to the manufacturer's instructions (Figures 7 & 8). Evetric (Ivoclar) was used for definitive composite restoration (Figure 9).



**Figure 9:** Composite restoration of tooth 21 after traumatic avulsion.

## Discussion

The treatment of dental avulsion is complex because it is influenced by various factors. One of the most important factors for the success of tooth replantation is the condition of the cells of the periodontal ligament at the time of replantation, which in many cases are not viable and are not expected to heal, as well as the patient's general health condition, the degree of root development, the storage medium and extraoral time during which the last two factors are the most critical [7,8].

This case report focuses on the replantation of an avulsed upper central incisor after an extraoral time of half an hour.

Many scientific studies have found that a tooth replanted within five minutes has the best prognosis, while delayed replantation results in PDL cell death when the extraoral time exceeds one hour [9,10].

Therefore, it is crucial to preserve the erupted tooth in an ideal storage medium, and replantation can be started as soon as possible. Among the various storage media readily available to the patient for the preservation of an avulsed tooth, milk is the most widely used and recommended because it is readily available and has the appropriate pH with appropriate growth factors, nutrients, and osmolarity. Also, milk, as a secretion of the gland, contains epithelial growth factor (EGF), which stimulates the proliferation and regeneration of the remnants of epithelial Malassez cells.<sup>6</sup> If replantation is delayed, PDL necrosis can be prevented by treating the surface of the root of the extracted tooth with 1.23% acidified phosphate fluoride (APF) gel. 20 minutes because it inverts hydroxyapatite into fluorapatite by direct action on dentin, cement and bone, preventing root resorption after tooth replantation [11].

The placement of a wire splint is of great importance for the success of the therapy. In this case, a 0.4 mm diameter orthodontic wire adapted with liquid composite resins was used after etching with 37% orthophosphoric acid after two weeks, according to IADT guidelines. During the dental treatment, conventional endodontic therapy of the necrotic pulp was also performed in order to prevent the spread of microorganisms and their toxins into the periapical area.<sup>11</sup> Calcium hydroxide was used in intercanal treatment for seven days due to its positive effects, such as inhibition of bacterial enzymes, activation of tissue enzymes, especially alkaline phosphatase, and stimulation of mineralization, which prevents root resorption [12-14]. The replanted tooth is monitored by clinical and radiographic examinations for up to one year, and then once a year for five years [15,16].

## Conclusion

Avulsion of teeth in children is an urgent dental condition that requires a quick and adequate reaction in order to preserve the function and aesthetics of the dental row. Timely replantation of the avulsed tooth, proper storage of the tooth before intervention (in media such as saline, milk or mouth) and emergency dental assistance are key factors for a successful treatment outcome. Also, education of parents and teaching staff in schools on proper handling in such situations can significantly increase the success of treatment.

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