



## REPLANTATION AND NON-SURGICAL TREATMENT OF AN AVULSION TEETH DUE TO PHYSICAL TRAUMA IN REMOTE AREA: A CASE REPORT

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### Abstract

Dental avulsion is the complete displacement of a tooth from its socket due to trauma that requires complex treatment. An avulsed tooth is reinserted into its socket and supported by splinting immediately to avoid damage to the periodontal ligament which can affect the prognosis of the tooth after treatment. The fast treatment time for avulsed teeth and appropriate post-avulsed tooth storage media can help slow the occurrence of tooth resorption which is one of the complications of tooth replantation. A 7-year-old male patient avulsed tooth #32 which was stored in a milk bath. After the tooth is replanted, root canal treatment and occlusal adjustments are carried out to avoid the risk of infection in the tooth. Control of patients 30 days after replantation showed good results. Patients were instructed to return periodically.

**Keywords:** Avulsion, Periodontal Ligament, Replantation

### INTRODUCTION

Dento-alveolar trauma occurs as a result of sudden injury to the teeth and the structures involved which can cause a variety of traumas including loss of the tooth from the socket and alveolar bone which is called an avulsion.<sup>1</sup> Avulsion of permanent teeth has a prevalence of 0.5% to 16% of all trauma to the teeth.<sup>2</sup> Trauma to the permanent anterior teeth often occurs during childhood between the ages of 7 and 10 years, where facial growth and psychosocial development are of great importance. The most commonly affected

teeth are the maxillary central incisors, followed by the maxillary lateral incisors, and then the mandibular central incisors. Avulsion injuries often result from falls and sometimes occur during sporting activities or traffic accidents. In avulsion trauma, damage occurs to the periodontal ligament, neurovascular, cementum, alveolar bone, and gingiva. Therefore, complex treatment is required because many dental components are involved.<sup>3</sup>

According to the International Association of Dental Traumatology (IADT), the management of an avulsion

must strive to prevent infection of the pulp tissue. If the tooth is out of the mouth for more than 60 minutes, usually has a poor long-term prognosis. Thus, all avulsed permanent teeth must be replanted quickly. If immediate replantation of the tooth cannot be achieved, the avulsed tooth should be kept in milk, saline, or sodium fluoride solution to preserve the biological components of the tooth. It has been suggested that cold milk is a suitable medium for storing avulsed teeth because the ideal pH range is 6.5–7.2 with temperatures <25°C.<sup>3</sup>

A study by Khinda et al discussed other liquid media that are Hank's Balance Salt Solution (HBSS), tooth rescue box (Dentosafe), and coconut water which are better storage media for avulsed teeth than milk. However, these media are considered impractical because they are difficult to obtain at the time of tooth avulsion. Storage media such as well water, saliva, alcohol, and saline solutions have a pH that is not ideal, so they are not recommended.<sup>3</sup>

Care must be taken in treating avulsed teeth. Replantation is done by holding the crown of the tooth instead of the root because it can cause damage to the periodontal ligament cells. Prompt treatment to perform tooth replantation will improve the overall dental prognosis. If treatment is not taken immediately there

will be long-term consequences, such as inflammation and root resorption.<sup>3</sup>

Physiologically, an undamaged tooth root can be protected from the risk of resorption by a non-mineralized layer of cementum tissue which depends on the severity of the traumatic defect, the number of remaining periodontal ligament cells, and the ability of the cementum to regenerate. The existence of pathological stimuli such as bacterial contamination or infection, remaining necrotic tissue, and mechanical stress can increase the occurrence of resorption and cause rapid tooth loss which is called resorption due to inflammation.<sup>4</sup> To prevent infection and residual necrotic tissue after replantation, it is recommended that the tooth undergo root canal treatment because the pulp of an avulsed tooth will become necrotic. If the tooth is not treated, there is a possibility that the tooth will experience discoloration, abscess formation, and even resorption leading to tooth loss.<sup>5</sup>

After the tooth is replanted, the tooth is splinted to prevent mobility and facilitate root canal treatment. Splinting is also useful for supporting periodontal ligament repair. However, the placement of the splint must be precise so as not to cause additional trauma to the teeth.<sup>6</sup>

The aim of this case report is to present a replantation case of an avulsed permanent mandibular lateral incisor and evaluate it 30 days after replantation.

## CASE REPORTS

A 17-year-old male patient came to the emergency room of Ratu Aji Putri Botung Hospital with the main complaint of avulsed mandibular anterior teeth (Figure 1). The patient was kicked in the face during a silat competition (traditional Indonesian martial art). The patient carries his avulsed tooth in a milk bath. The following are the results of clinical examinations performed on the patient:

Level of consciousness: Compos mentis

GCS : E4V4M6

Vital signs : Blood pressure: 110/80 mm Hg, pulse: 88 x/minute, respiration : 20x/minute, temperature : 36,5 0C

Extraoral : Face symmetrical, lower lip normal

Intraoral : There is ulceration with a reddish base, irregular edges and active bleeding, tooth #32 is missing, and

open socket. The patient is wearing a fixed orthodontic appliance in the maxilla and mandible

Tooth Avulsion : Tooth #32 appears intact without any fracture

Examination of the oral cavity is carried out carefully to identify the source of bleeding and the presence of dirt, then irrigate the area around the wound using a sterile saline solution. Then put sterile gauze on the bleeding site with pressure applied to control the bleeding. We keep the patient's head elevated to minimize bleeding by reducing blood flow to the head and neck area. Further examination was carried out by taking panoramic radiographs, and no alveolar bone fractures and root fractures were seen, tooth #31 was superposition and tooth #32 was missing with an open socket (Figure 2).



**Figure 1.** Pre-operative



**Figure 2.** Pre-operative orthopantomogram (OPG)

Due to limited equipment in the ER of a hospital in a remote area, we splinted the replanted tooth using the tools and materials available in the ER. Because the patient was wearing a fixed orthodontic appliance, we performed temporary splinting using non-resorbable 3/0 silk sutures attached to the fixed orthodontic appliance (Figure 3). After the patient's

condition was stable, we moved the patient from the emergency room to the nearest dental room and we removed the patient's power chain, then we fixed it using a 0.12 passive wire on teeth #34, #33, #32, #31, and #41, interdental fixation #33 – 32 and #31 – 41 using glass ionomer cement (Figure 4).



**Figure 3.** Temporary splinting with 3/0 silk attached to a fixed orthodontic appliance near an avulsed tooth



**Figure 4.** Tooth replantation and splinting using wire

The teeth were checked for mobility, and we did one visit endodontic treatment and occlusal adjustment. We prescribe Amoxicillin 500mg taken 3 times daily for 5 days and Diclofenac Potassium 50mg taken 3 times daily for 3 days. Patients were given instructions to maintain oral hygiene, and patients were instructed to control after 30 days.

After 30 days, the patient was satisfied and felt comfortable. The patient's

mastication also improves after the teeth are splinted because the mobility of the teeth is minimal. However, there was an acute traumatic ulcer on the gingiva in tooth regions #31 and #32 (Fig. 5). We prescribe chlorhexidine gluconate 0.12% and gargle 2 times a day (5ml). Patients are given instructions to maintain oral hygiene and regular dental controls to monitor the progress of treatment.



**Figure 5.** Control clinical photos 30 days after replantation

## Discussion

Avulsion of permanent teeth has a prevalence of 0.5% to 16% of all dental trauma and occurs frequently at a young age.<sup>2</sup> According to a study conducted by Cvek et al., the prognosis of an avulsed tooth is largely determined by the condition of the periodontal ligament fibers because it connects the avulsed tooth to the alveolar bone. Therefore the periodontal ligament on the root surface of the avulsed tooth must be in good condition before the tooth is replanted. If the avulsed tooth is not replanted before 60 minutes, the cell viability of the periodontal ligament will be reduced.<sup>3</sup> Delayed replantation has a poor long-term prognosis because the periodontal ligament will be necrosis which can affect its regeneration during the healing process.<sup>7</sup>

The avulsed tooth must be placed in a special storage media to preserve the periodontal ligament. The American Association of Endodontics stated that milk is a storage medium for avulsed teeth that can maintain the viability of the periodontal ligament cells for 6 hours so it can support tooth replantation and allow the healing of the periodontal ligament.<sup>8</sup> In this case, the patient came with an avulsion of tooth #32 in the milk media. After the patient underwent a radiographic examination and found no fracture of the alveolar bone,

irrigation was carried out in the area around the wound, and control of bleeding. Next, the tooth is replanted into the socket and then splinted.

Splinting is the treatment of choice that provides the occlusion function physiologically. Splinting is usually used to stabilize tooth mobility, including stabilization of avulsed teeth. The classification of splinting is rigid, semi-rigid, and flexible splinting. When no alveolar fracture is involved, a semi-rigid splint is a good option.<sup>9</sup> However in this case, due to limited equipment and materials in the ER, temporary stabilization was performed using non-resorbable 3/0 silk threads attached to the patient's fixed orthodontic appliance.

After the patient's condition stabilized, removal of the power chain was carried out and tooth fixation was carried out using a 0.12 passive wire on teeth #34, #33, #32, #31, and #41, as well as interdental fixation #33 – 32 and #31 – 41 which is cemented using glass ionomer cement. The tooth was necrotic so endodontic treatment was performed after stabilization of the tooth. In mature teeth with closed apex, revascularization cannot occur after replantation. Bacteria will contaminate the root surface of the avulsed teeth until before the tooth is replanted so it will cause necrotic pulp tissue through

various routes, which are from apical foramen, lateral canals, open dentinal tubules, or from fractures in the enamel-dentin. The possibility of infection in the pulp chamber occurs as soon as 2-3 weeks after tooth replantation, so in permanent teeth, early root canal treatment is highly recommended.<sup>10</sup>

After the teeth were replanted and endodontic treatment was carried out, occlusal adjustments were performed to obtain a good occlusion and to avoid occlusion trauma. The patient was also prescribed Amoxicillin 500 mg taken 3 times a day for 5 days and Diclofenac Potassium 50 mg taken 3 times a day for 3 days. Patients were given instructions to maintain oral hygiene, and patients were instructed to control after 30 days.

After 30 days post-replantation, the patient felt comfortable and had good mastication function. However, there was an acute traumatic ulcer on gingiva #31 and #32, so 0.12% chlorhexidine gluconate was prescribed. Patients are given instructions to maintain oral hygiene and follow up to find out the progress of treatment.

Replanted teeth should be followed up clinically and radiographically after 2 weeks, 4 weeks, 3 months, 6 months, one year, and thereafter annually for a minimum of five years. Clinical and radiographic

examination will provide information to determine the outcome of the treatment. Regular clinical and radiographic examinations are important because of the risk of resorption associated with infection (inflammation) of the teeth and alveolar bone which can occur quickly if this is not identified. If the radiographic examination does not reveal any space in the periodontal ligament and there is a metallic sound when the tooth is percussed, ankylosis should be suspected. With periodic examinations, it is hoped that treatment can be monitored and further dental treatment planning can be carried out.<sup>7</sup>

## CONCLUSION

An avulsed tooth must be replanted immediately to preserve the tooth. Many factors affect the prognosis and success of replantation treatment. Therefore this treatment must be reviewed periodically through clinical and radiographic examinations to determine the progress of the treatment that has been carried out.

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