International Journal of Dentistry and Oral Science (IJDOS)
ISSN: 2377-8075

Delayed Replantation of Immature Avulsed Teeth: Two Case Reports

Case Report

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Abstract

Introduction: Dental avulsion is the complete traumatic displacement of a tooth from the socket. Treatment of dental avulsion replantation should be done immediately but cases of delayed replantation can still be done.
Case Report: Two children, both were 9 years old, had an avulsion of maxillary left central incisor with prolonged extraoral dry time. Treatment guideline for avulsed immature permanent tooth with prolonged extraoral dry time was carried out, then the endodontic treatment was performed extraorally and MTA was used to close the open apex. Wire with composite was used on case I, whereas fibre reinforced composite was used on case II. Replacement resorption was seen on radiograph but booth teeth remained in a stable and funcional position.
Discussion: On delayed replantation, the endodontic treatment may be done prior to replantation or after the replantation. MTA can be used to coated the root tip. It is suggested to use semi-rigid splinting on dental avulsion case. Although the prognosis of delayed replantation cases is uncertain, the goal of this treatment is to preserve the surrounding teeth and bone for several years.
Conclusion: Delayed replantation was still carried out in these cases to maintain aesthetic function, occlusion function, and to prevent the resorption of alveolar bone.

Keywords: Tooth Avulsion; Tooth Replantation.

Introduction

The prevalence of dental trauma in Indonesia is quite high [1]. Traumatic injuries to anterior teeth are common in 7 to 9 years old children. The cause of dental trauma is due to falling while learning to walk, run, play and exercise. If dental trauma occurs in children, it can interfere their speech, chewing, aesthetics, and eruption of permanent teeth, thereby disrupting the growth and development of teeth and jaws. One of the most common dental trauma of the anterior teeth is avulsion, which accounts for 0.5-16% of all traumas [2-5]. Dental avulsion is the removal of the entire tooth from the socket. The condition of the protrusive malposition of the teeth can exacerbate the avulsion [5]. Treatment of dental avulsion replantation should be done immediately. Replantation that is carried out for more than 60 minutes can damage the tissue around the teeth [4, 5]. Although the literature says that replantation should be done as soon as possible, cases of delayed replantation can still be done because of the aesthetic, functional, and psychological reasons and to maintain alveolar contour [6].

Case Report

Case I

A 9-year-old girl visited Dental Clinic in Jakarta with her mother because her upper left front tooth was avulsed while in the swimming pool. The mother carried the child's tooth in a plastic bag. Clinical examination showed that: the maxillary left central incisor was totally avulsed and the socket showed that there was little bleeding and the condition of the front tooth was protrusive with an overjet of approximately 11 mm. She has class 1 type 2 mal-

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Received: March 20, 2021
Accepted: April 02, 2021
Published: April 05, 2021

Citation: Eva Fauziah, Marianti Enikawati. Delayed Replantation of Immature Avulsed Teeth: Two Case Report. *Int J Dentistry Oral Sci.* 2021;08(04):2192-2195. **doi:** http://dx.doi.org/10.19070/2377-8075-21000433

occlusion (maxillary protrusion) and multiple diastema and poor oral hygiene condition. The avulsed tooth had enamel fracture with an open apex. There were no complex maxillary fractures neither intraoral nor extraoral swelling. The patient was planned to be treated with delayed replantation of the avulsion tooth.

After providing education to the patient's parents and signing the informed concent, then treatment began. The avulsed tooth was rinsed with a saline solution and cleaned without touching the root (Fig 1). The tooth was immersed in sodium fluoride gel for 20 minutes to prevent root resorption. Ekstraoral endodontic was done by opening the tooth access at the palatal site, then continued with root canal preparation. NaOCL was used for irrigation. Root canal filling with gutta percha during the treatment. (Fig 2) At the root tip of the avulsed toothwas coated with Mineral Trioxide Aggregate (MTA) and the sharp enamel was grinded.

The patient was administered local anaesthesia with buccal and palatal infiltration. After anesthetizing, the tooth socket was cleaned and irrigated with saline solution to clean the granulation tissue. The avulsion tooth was inserted into the tooth socket slowly and then splinting was performed using a semi-rigid wire with a composite on tooth 12 11 21 22.(Fig 3).

After splinting, the mother and her child were instructed to consume soft diet, avoid contact sport that endanger the healing process of the tooth, and to maintain oral hygiene in order to support the tissue repair process therefore the tooth can be properly represented. The child was also prescribed Amoxicillin 250mg for 5 days, Paracetamol 250mg for 3 days if needed, and chlorhexidine mouthwash. The patient was recommended to be monitored after one week, one month, 3 months and 6 months.

After 1 week, the tooth was asymptomatic with moderate oral hygiene. The patient was asked to pay more attention to oral hygiene. After 1 month, there was no complaints and no clinical signs of abnormalities. Splinting was removed and the avulsed tooth was in normal position. After twelve months, radiograph showed resorption without any sign of periapical infection. The replanted tooth remained in a stable dan functional position. The patient was scheduled for further follow up.(Fig 4)

Case II

A 9-year-old boy was referred to the dental hospital Universitas Indonesia after a fall while playing futsal. The accident happened 42 hours ago. The avulsed tooth was wrapped in the tissue paper. He visited physician right after the accident and was prescribed with antibiotics and analgesics. Two days later, he visited the dental hospital with his parents. Clinical examination showed the maxillary left central incisor wasavulsed and the socket showed no spontaneous bleeding. The anterior upper teeth was protrusive,and the overjet is 8 mm withclass 1 type 1 and 2 malocclusion (anterior crowding and maxillary protrusion). The avulsed tooth showed no fracture and had an open apex. There were no complex maxillary fractures and no intraoral or extraoral swelling.

The treatment guideline for avulsed tooth with open apex and prolonged extraoral time was followed. Information about the treatment was given and his parents signed the informed consent. Periapical radiographs showed no alveolar bone fracture. The tooth was cleaned with a stream saline. The tooth was immersed in sodium fluoride gel for 20 minutes slow down osseous replacement of the tooth. Endodontic treatment was carried out extraorally by opening the tooth access at the palatal area, then performed root canal preparation, during the preparation it was performed irrigation using NaOCL. Root canal filling with gutta percha during the treatment. At the root tip of the avulsed tooth was also coated with MTA.

Local anaesthetic was administered with buccal and palatal infiltration. The tooth socket was cleaned and irrigated with sterile physiological saline to clean the granulation tissue and remove the coagulum. The avulsion tooth was replanted into the tooth socket with light pressure. (Fig 5)

Radiograph showed that the tooth had been correctly positioned in the socket. The tooth was stabilized using fibre reinforced composite splint on tooth 12 11 21 22. (Fig 6)

The instructions explained to the parents and the child were as described in Case I. Three days after replantation, percussion test was positive, and there was no sign of inflammation. Radiograph showed healing sign at the apical area of the tooth. There was no clinical or radiograph sign of pathological changes in two weeks after replantation. After four weeks, splinting was removed. Percussion test was negative. Clinical and radiograph control was also done six months after replantation. Radiograph showed initial resorption and ankylosis without any sign of periapical infection. There was no spontaneous pain on every follow up. The aesthetic and functional were restored. (Fig 7)

Discussion

Most of dental avulsions occur in children aged 7-9 years. At that age, the permanent incisors are erupting so the structure of the periodontal ligament is still loose and the bones around the teeth have only minimal ability to compensate for pressure [5, 7]. This is in line with this case report where avulsion occurred in 9 years old children. The central incisors has the highest incidence of avulsion [5]. Increased overjet is a risk factor for dental trauma.[8] In the first case, the patient's overjet was 11mm, whereas in the second case, the patient's overjet was 8mm. Both of them have extreme increased overjet.

Figure 1. Case 1: 9-year-old girl with avulsed tooth.

Figure 2. Case 1: Extraoral endodontics.

Figure 3. Case 1: The tooth was replanted and splinted with orthodontic wire and composite resin.

Figure 4. Case 1: 12 month after replantation, radiograph showed resorption without any sign of periapical infection.

Figure 5. Case II: The avulsed tooth was replanted into the socket.

Figure 6. Case II: Clinical Condition after splinted using fibre reinforced composite and radiographic image after replantation.

Figure 7. Case II: Clinical condition and radiograph image at 6-month follow-up.

Dental avulsion treatment is carried out based on consideration of root maturity (open or closed) and the condition of the periodontal ligament cells. Extraoral dry time significantly affects the vitality of periodontal ligament cells [6]. Based on clinical studies, if the replantation treatment was carried out after 15 minutes of avulsion, the prognosis would be good. However, if it exceeds that period, care must be taken to maintain aesthetic function, occlusion function, prevent the resorption of alveolar bone until the facial growth is completed and prevent psychological trauma to children due to tooth loss [2-5]. In these cases, the avulsed teeth were outside the socket for more than 60 minutes in dry environment, but delayed replantation treatment may still be performed. Moreover, psychological aspects of the child and parents should also be considered in treatment of patient with trauma injury [5, 9].

Based on the guideline, when the extraoral dry time was more than 60 minutes, the endodontic treatment may be done prior to replantation or after the replantation [6]. In this cases, the endodontic treatment was done extraorally and the avulsed tooth was obturated with Gutta Percha because revascularization of the pulp is no longer possible to occur. Endodontic treatment was done prior to replantation to prevent infection, stimulate inflammatory response and root resorption [10]. The root tip of the avulsed teeth were coated with MTA, because the MTA could stimulate the cementoblast activation, cementum production for PDL cells regeneration, and prevent the occurrence of external resorption [11]. The use of MTA as apical seal on immature tooth was also recommended by AAPD [12].

In case I, the splinting was performed using a semi-rigid wire with a composite on tooth 12 11 21 22, whereas in case II, fibre reinforced composite was used.These semi-rigid splinting can resemble natural occlusal force, but still stabilize the mobility of the tooth. Hence, semi-rigid splint does not significantly affect the duration of the stabilization of the avulsed teeth and can be extended for the length of time needed for healing the supporting tissue [13, 14]. In these cases, the splint was removed 1 month after replantation and mobility of the avulsed tooth was normal.

According to Andreasen, regeneration of wounded cells of the oral cavity may be affected by bacteria contamination. Inflammation caused by bacterial contamination inhibits regeneration and causes formation of non-specific, inflamed granulation tissue during cell proliferation and migration. Therefore, oral hygiene must be maintained to support the healing of replanted teeth [5]. In these cases, there are no pathological findings, but the radiograph images revealed replacement resorption. This is the most common response happened after replantation of dental avulsion, especially in delayed replantation.It is caused by the absence of vital ligament periodontal cells [5, 15]. Most dental avulsion occurs before facial growth is completed. Although the prognosis for delayed replantation cases is uncertain, the goal of this treatment is to preserve the surrounding teeth and bone for several years. Therefore, delayed replantation should still be done [5]. In these cases, the replanted teeth remained in a stable dan functional position, without spontaneous pain. It demonstrates the importance of replantation following dental avulsion on permanent tooth.Follow up should be done regularly based on the guideline.

Conclusion

Delayed replantation was still carried out in these cases to maintain aesthetic function, occlusion function, prevent the resorption of alveolar bone until the facial growth is completed and prevent psychological trauma to children due to tooth loss.

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