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Delayed Replantation of Maxillary Left Central Incisor after 17hours: Case Report

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Abstract

Tooth avulsion is a severe type of traumatic injury which always challenging to clinician. Prognosis of such cases is guarded if time elapsed between tooth avulsion and replantation is more.

Reimplantation of avulsed anterior tooth as immediate and suitable treatment for growing child as it affects esthetic, function and has psychological impact. This case report elaborates on 3 years follow-up case of delayed replantation of maxillary left central incisor with an outcome of tooth ankylosis and inflammatory resorption. Subjective tooth is clinically asymptomatic and maintains the primary esthetic concern of child till further treatment if required in future.

Keywords: Avulsion; Replantation; Ankylosis; Resorption

Introduction

Injury to orofacial structure is major concern to children and parents alike. When anterior teeth are fractured or avulsed due to trauma, it would not only cause physical insult but also exhibited psychological impact as it affects psychology, function and esthetic concern of a child. Avulsion constitutes 0.5% to 16% of total traumatic injuries in the permanent dentition. Maxillary central incisors are the most commonly affected tooth [1]. Tooth avulsion occurs mostly in the age group of 7-9 years, when the relatively resilient alveolar bone provides only minimal resistance to extrusive forces [1,2]. Management of avulsed permanent dentition often presents a challenge as healing with a normal periodontal ligament (i.e.,regeneration) after replantation will occur only if the innermost cell layers along the root surface are vital [3].

As various clinical studies have reported that the prognosis is best for teeth replanted within 5 minutes after avulsion [2-8]. In this report, we are presenting a case of successful reimplantation of avulsed tooth with 3 years follow-up. Patient reported late to Nair Hospital (the tertiary care centre) 17 hours after the accidental fall carrying the avulsed tooth in the sterile water vial. Decision was made to reimplant the avulsed tooth so as it should not only affect the esthetic but also function and psychology of growing child. All pro and cons were explained to the patient. Endodontic treatment was carried out extraorally and immediately placed in the socket. Patient was completely happy with the reimplanted tooth after 3 years follow-up.

Case Report

A healthy 14 year old female patient reported to the department of Conservative dentistry and Endodontics at Nair hospital dental college, Mumbai, India with an avulsed left maxillary central incisor stored in sterile water vial (Figures 1 and 2).

On examination, it was observed that alveolar socket in the region of maxillary left incisor and Elli's # II fracture of right maxillary central incisor and the left maxillary lateral incisor. Patient gave history of trauma to maxillary anterior teeth while playing the previous evening with no history of unconsciousness or vomiting. Immediately after trauma, the parent rinsed the avulsed maxillary left central incisor with cold water and took the child to the local dentist. After examination, the local dentist referred the patient to the department of conservative dentistry at Nair Hospital Dental College, Mumbai, India for subsequent treatment. On advice of local dentist, patient stored the avulsed tooth in sterile water in a refrigerator overnight. The total extra-oral time for the avulsed tooth was approximately 17 hours. On examination, there were no other signs of intra-oral or extra-oral injury. Examination of the tooth socket did not reveal any fracture of the bony wall or tooth segment. An intra-oral periapical radiograph was advised to check out any broken tooth or bony segment in the socket (Figure 3). The root surface and the socket were washed with physiologic saline and all the debris was removed gently. The root surface was also cleaned with soft pumice prophylaxis and subsequently kept in 2% sodium fluoride (DentCare™ Prorinse Medicom, A. R. Inc.) solution for 20 minutes till the patient was prepared for the procedure of replantation. As extraoral time of avulsed tooth was more than 2 hours it was decided to accomplish endodontic therapy extraorally. Access opening was prepared followed by cleaning and shaping and obutration with gutta-percha and AH Plus sealer, thereafter access cavity was filled with composite restoration on

Figure 1: Avulsion of upper left central incisor.

Figure 2: Patient carried avulsed tooth in sterile water vial.

Figure 3: Iintraoral periapical radiograph of in relation to avulsed left maxillary incisor.

the same day extraorally (Figure 4). The alveolar socket was curetted and flushed with physiologic saline. The tooth was placed in the socket under local anesthesia with finger pressure (lignocaine: adrenaline in 1:80000) (lignocaine injection IP 2%, unijules, life sciences ltd, Nagpur, India) and splinting was done from maxillary right canine to maxillary left canine using multiflex wire for one month (Figure 5). It was ensured that occlusion was maintained without any premature contact to prevent injury to periapical tissue. Position of replanted tooth was reconfirmed on radiograph (Figure 6). Patient was asked to gargle with 0.1% chlorhexidine twice daily for one month after that she was sent to physician for tetanus booster dose. The maxillary splint was removed after 4 weeks and pulpal vitality of other fractured teeth i.e. maxillary right central and maxillary left lateral was checked with Electronic Pulp tester (Figure 7). Both the teeth showed vital response hence restored with composite restorations (Ivoclar Vivadent inc. NY,USA). Regular follow-ups were done. No resorption was evident radiographically at 2 year follow-up (Figures 8, 9 and 10); however, initial root resorption was evident at 3 year follow up (Figure 11). Clinically, the patient was completely symptom free with no mobility since the splint was removed. After 6 months of follow-up, the tooth showed firm response on horizontal and vertical percussion suggestive

Figure 4: Extraoral root canal opening of avulsed tooth.

Figure 5: Splinting of avulsed tooth.

Figure 6: Intraoral periapical radiograph of avulsed tooth obturated and splinted.

Figure 7: Avulsed tooth after removal of splint.

Figure 8: Follow up intraoral periapical radiograph after 6 months.

Figure 9: Follow-up intraoral periapical radiograph after 1 yr.

of ankylosis (Figure 12). The patient will be followed up till her pubertal growth is complete and further treatment will be carried out if needed.

Discussion

Avulsion is most severe type of traumatic injuries as it involves damage to several supporting structure. Dental avulsion is defined as complete displacement of tooth out of its alveolar socket [2]. Prevalence of tooth avulsion is more in males (male: female=3: 1) and age group of 7-14 years is most commonly affected [3]. Successful treatment and favorable prognosis of replantation procedure depends upon time elapsed between extra articulation of tooth and its replantation.

In the present case sterile water was used as interim transport media for 17 hours. Sterile water is a nonpyrogenic preparation of water for injection which contains no bacteriostat, antimicrobial agent or added buffer. Sterile water is not ideal transport medium but as per the availability it was used at primary level. Sterile water has pH of 5.4 (5-7). So it does not have any adverse effect on the tooth to be reimplanted. As per advice of local dentist avulsed tooth was place in the refrigerator overnight. It would not allow the tooth to become dry till

Figure 10: Follow-up intraoral periapical radiograph after 2yrs.

Figure 11: Follow-up intraoral periapical radiograph after 3years.

Figure 12: Maxillary central incisors after restorations.

it get reimplanted in the avulsed socket. Hank's Balanced Salt Solution (HBSS), ViaSpan, saliva, saline and milk should be used as storage media [3-5,10]. Dead periodontal ligament cells should be removed to slow down the osseous replacement of the root surface [8,9]. The root surface was cleaned with pumice prophylaxis to remove remaining non-viable periodontal ligament cells which may act as source of infection and subsequently accelerates infection related resorption [9]. The tooth was then immersed in 2% sodium fluoride solution for 20 min till the armamentarium and the patient was prepared for the procedure to minimize loss of precious time. The rationale for this fluoride soak is based on evidence that this procedure will delay but not prevent ankyloses [10].

Stannous fluorides, acidulated sodium fluoride (pH=5.5) are other agents also used for treatment of root surfaces before replantation [2-4]. Tooth was placed in the socket and semi-rigid splinting was done for 4weeks using acid-etch composite resin and multi-flex wire from canine-to-canine. A flexible type of splint (or semi-rigid splint) is the preferred type of splint in avulsion injuries because rigid splints have been shown to accelerate root resorption in both mature and immature teeth [2]. Systemic antibiotics in the form of doxycycline (in a standard dose of 100mg twice daily for seven days) was prescribed as this has been shown to lessen the resorptive attack on the root surface; although pulpal healing remains unaffected [2]. Endodontic access was prepared followed by cleaning and shaping and obturation with gutta-percha and AH Plus sealer, thereafter access cavity was filled with composite restoration in the same visit extra orally. As apical extrusion of debris, bacteria, irrigating solution, and/ or root canal sealer may cause/ contribute resorption of root and/ or alveolar bone [2]. The patient was recalled at 3 months, 6 months, 1year, 2 years and 3years after trauma and is still on yearly follow up.

Some author advised placement of calcium hydroxide in the canal for 1-3 months to prevent resorption and making the environment alkaline exhibiting antibacterial property [10]. However, intracanal $Ca(OH)_2$ showing antibacterial property extracoronally and prevention of external root resorption is questionable. Replacement of calcium hydroxide with obturating material may affect periodontium of avulsed tooth and its healing. Previously, it was considered that the $Ca(OH)_2$ will better help in reimpantation. Harris et al have used same technique of extraoral root canal therapy and then reimplatation like present case report [2]. Adverse effects expected in present case were inflammatory root resorption and/or ankylosis (replacement resorption) and eventually tooth will be lost by gradual resorption of the root surface followed by replacement with the bone. Inflammatory root resorption is seen in 26% of reimplanted teeth [16]. Operator does not have any control over inflammatory root resorption or ankylosis. Radiographically, resorption seen as radiolucent bowl shaped cavitations along the root surface with corresponding excavation along the adjacent bone. Clinically, tooth appears loose and extruded with inflammatory root resorption while ankylosed tooth appear immobile and infraoccluded.

Radiographically, ankylosis is characterized by absent periodontal ligament space and continuous replacement of root substance with the bone until little or no tooth substance remains. The percussion tone is often diagnostic in cases of ankylosis which is high compared to a dull tone in teeth with inflammatory root resorption [10]. An ankylosed tooth is often a desirable outcome for child or adolescent. As inflammatory root resorption will loosen the tooth and ultimately loss of tooth which will affect esthetic as well as resorption of alveolar bone will take place. So ankylosis is considered as successful outcome till pubertal growth is completed.

Conclusion

Replantation of permanent avulsed tooth with prolong storage in sterile water can be performed with favorable results although it is not standard interim transport medium. Prognosis of this case could have been better if immediate replantation would have done by private dentist and avulsed tooth would be carried in a suitable transport medium. Hence importance of preserving an avulsed tooth should be educated at primary heal th care level, all dentists, parents, primary school teachers and physical education teachers, nurses, health personnel.

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