

Replantation of Avulsed Permanent Tooth after Extended Dry Storage of Ten Days: A Case Report

Dr. Rajib Saha¹, Dr. Amitava Bora², Dr. Mukta Bihanga Pandey¹, Dr. Piyali Datta¹, Dr. Supriya Banerjee¹, Dr. Prasanta Kumar Das¹, Dr. Shabnam Zahir³, Dr. Gautam Kumar Kundu⁴

¹3rd Year P.G.T, Department of Pedodontics and Preventive Dentistry, Guru Nanak Institute of Dental Science and Research, Kolkata

² MDS Pedodontics and Preventive Dentistry

³Professor, Department Of Pedodontics and Preventive Dentistry, Guru Nanak Institute of Dental Science and Research, Kolkata

⁴Professor and H.O.D, Department of Pedodontics and Preventive Dentistry, Guru Nanak Institute of Dental Science and Research, Kolkata

Abstract: Tooth avulsion is the most serious dental injury that affects the pulp tissue, periodontal ligament and the alveolar bone. It is more frequent in children aged 7-14 years and mostly the maxillary anterior teeth are affected. Management of avulsed permanent tooth often presents a challenge. Replantation of avulsed tooth can be defined as the insertion and temporary fixation of avulsed tooth that have resulted by traumatic injury. The prognosis of replantation is directly related to few parameters like physiological status of periodontal ligament, extraoral handling of affected tooth, stage of root development, length of extraoral dry time and lastly the proper storage medium. This case report presents a case of delayed replantation of avulsed tooth after extended dry storage period.

Key Words: Avulsion; dry storage; delayed replantation

I. Introduction

Tooth avulsion (exarticulation, total luxation) implies total displacement of the tooth out of its socket. Avulsion accounts for 0.5-16% of traumatic injuries in the permanent dentition, most commonly involving single maxillary incisor tooth and mainly occurs due to various sports activity^[1,2]. It can occur at any age, but is most common in young permanent dentition due to incompletely formed roots and resilient periodontal structure^[3].

Management of avulsion in mixed dentition period often presents a challenge due to continued alveolar growth of jaws, incomplete root development, difficult child behaviour management, delayed reporting to the dental offices and non physiological storage of avulsed tooth. Replantation is the recommended treatment procedure and refers to the insertion and temporary fixation of the avulsed tooth. Replantation of tooth beyond 5 minutes has been defined as delayed replantation by Andersen^[4].

When there is minimum extraoral dry time the periodontal ligament (PDL) left attached to the root surface does not dry out and the negative consequences of tooth avulsion are usually minimal. However, if excessive drying occurs, following replantation these PDL cells will elicit a severe inflammatory response, with physiologic bone remodelling on the root surface that will cause tooth ankylosis or even tooth loss^[5].

The replantation of an avulsed tooth depends on physiologic status of the PDL, the stage of root development and the length of extra oral dry time. Andreason has reported that if the tooth has been out of the mouth for more than 2 hours, there is 95% chance of external resorption. The choice of the storage media is dependent upon its capacity to maintain viability of periodontal ligament cells^[6,7].

Replantation is the last resort to retain alveolar bone and tooth-to-tooth relationships. Replantation of an avulsed tooth, particularly for a child, must be carried out even if the prognosis is not good.

The present case report presents a case of replantation procedure in a 10 year old female child with avulsed 21 after delayed extra oral dry time of 10 days.

II. Case Report

A 10-year-old girl child reported to the Outpatient Department of Department of Pedodontics and Preventive Dentistry of Guru Nanak Institute of Dental Science & Research with chief complaint of tooth coming out of socket due to accident 10 days back. The avulsed tooth was kept dry in a paper handkerchief for 10 days (Figure 1).

The patient gave history of accidental fall in bathroom. The patient and her parents went to a dental practitioner immediately after the accident. The dental practitioner prescribed systemic antibiotics, analgesics, tetanus toxoid vaccination and advised for prosthetic rehabilitation after complete wound healing. No relevant past medical history was noted.

Extraoral examination revealed convex facial profile with relative maxillary prognathism and maxillary lip incompetency. On Intraoral examination empty socket space was noted in 21 region filled with blood clot (Figure 2). Soft tissue examination revealed retained anterior tongue thrusting habit. Intraoral hard tissue examinations revealed that, the patient was in mixed dentition stage with presence of deciduous canines and deciduous second molars. Fracture was present in crown of 11 (873.61, WHO classification 1993) with enamel involvement. The teeth adjacent to the empty socket space and the teeth showed positive response to heat test and Electric Pulp Tester (Parkel Digitest 2). Intra Oral Peri Apical Radiograph of 11 and 21 region, which revealed empty socket in 21 region and no hard tissue injury (Figure 3). Occlusal examination revealed Angles class 1 permanent molar relationship on bilateral permanent 1st molars. Dental protrusion of 11 and 21 was present. Examination of the avulsed tooth revealed enamel fracture (873.61, WHO classification 1993) and complete closure of the root.

Considering the age of the patient, clinical and radiological findings a clinical decision of reimplantation of the avulsed tooth was taken in the empty socket. A written informed consent form was signed by the parent of the child.

On the 1st appointment, cleaning of the tooth surfaces was carried out first by storing it in 2.5% NaOCl (Endo Wash) solution for 20 min followed by keeping the cleaned tooth onto Tetracycline solution for 20 min (Figure 4). Tetracycline powder was prepared from tetracycline capsule (Subamycine, Dey's Pharma) by removing the coating and the powder was mixed with 0.9% Normal Saline. Local anaesthesia was achieved with buccal infiltration of 1 ml 2% Lignocaine (Lignox) with 1:80000 adrenaline in the buccal vestibular region of 21. The empty socket was gently curetted with a curette (GDC) to remove any coagulum, granulation tissue and pathologic tissue and gently irrigated with 0.9% Normal Saline solution for 5 minutes.

The avulsed tooth was then seated into the empty socket gently (Figure 5). Once the tooth was properly seated, it was checked for alignment and occlusion. The tooth was then splinted to the adjacent teeth (12, 53, 21, 22, 63) with a 0.5 mm stainless steel round wire (Figure 6) and light cure composite (Ivoclar Vivadent). After splinting the tooth was evaluated clinically and radiologically to exclude any pathological mobility, sharp edges and occlusal disharmony.

On the same appointment, access cavity preparation was done in 21. Working length measurement was taken with number 15 K file (Mani) followed by thorough irrigation of the canal with 5.2%, 20 ml/canal Sodium Hypochlorite (Endo wash) for 5 minutes with side vented irrigation needle (Max I Probe) followed by 0.9% Normal Saline 20 ml/ canal for 5 minutes. Canals were dried with paper point and a creamy paste of tri antibiotic paste mixture (minocycline, metronidazole and ciprofloxacin) in 1:1:1 concentration in normal saline vehicle was placed in the canals with sterile paper points below Cemento Enamel Junction. The access cavity was sealed with a layer of Zinc oxide eugenol cement (Cavit) followed by a second layer of Type II Glass Ionomer Cement (Fuji II). Oral hygiene instructions were given and twice daily application of 0.2 % Chlorhexidine mouthwash was recommended. A 5-day course of systemic penicillin and metronidazole was prescribed.

During the second appointment (after 2 weeks) the tooth was clinically and radiologically asymptomatic. Access cavity was reopened and conventional biomechanical preparation was performed. The canal was obturated with gutta-percha cones and Zinc Oxide Eugenol based sealer using the cold lateral condensation technique (Figure 7). The access cavity was closed with Type 2 Glass Ionomer Cement (Fuji II). On the third appointment (after 5 weeks), the tooth did not show any pathological finding on clinical and radiological examination. The splint was then removed. Coronal buildup was done in 11 and 21 with light cure composite resin (Ivoclar Vivadent) (Figure 8). Fixed habit breaking appliance was delivered to correct tongue thrusting habit (Figure 9).

Recalls were scheduled at 1st week, 1st month, 3rd month, 6th month and 1st year and then at 6 month interval up to 2 years. After 2 year follow up the avulsed tooth (21) showed negative response to percussion and palpation tests but adjacent teeth responded positively to heat or an electric pulp tester (EPT). No clinical and radiological sign of ankylosis or external resorption was observed during post operative check up (Figure 10 and Figure 11). Patient is further advised for regular recall visit in every 6 months. Future fixed orthodontic corrections are planned to correct malocclusion. The patient and her parent were informed about various possible complications like ankylosis or replacement resorption.

III. Discussion

The main factor influencing the prognosis of reimplantation of avulsed tooth is the extraoral dry storage time. According to the International Association of Dental Traumatology (IADT) 2007^[8] replantation of

avulsed permanent tooth should be done as immediately as possible. But for a variety of reasons immediate replantation of avulsed tooth may not always be possible.

According to Anderson replantation of tooth beyond 5 minutes has been defined as delayed replantation^[4]. It is well established that the prognosis of the reimplanted tooth becomes poorer as extraoral dry storage time increases. Replantation is usually not recommended if the avulsed tooth has a very immature root and has been air-dried for a prolonged period or if the patient's medical condition contraindicates replantation^[8]. In the case presented here, the avulsed teeth had been air-dried for 10 days, so it was anticipated that there was no healing chance. As a result, the management of this case differed from the accepted replantation protocol. Considering the patient's age, our essential treatment objectives were to retain the avulsed incisors, to maintain aesthetic appearance, occlusal function, to maintain alveolar bone support and tooth to bone and tooth relationship. After completion of alveolar bone and jaw growth the reimplanted tooth can be replaced with fixed partial denture if any sign of complication like ankylosis or external resorption occur.

According to Trope^[9], when severe damage and drying of periodontal ligament of avulsed tooth cannot be avoided and osseous replacement of the root is considered certain, steps are taken to slow the replacement process. Treatment of root surface with various agents such as tetracycline, dexamethasone, stannous fluoride, sodium fluoride, and tetracycline have been suggested by various authors^[10,11]. In this case the avulsed tooth surface was thoroughly washed with 2.5% NaOCl (Endo Wash) solution for 20 min followed by keeping the cleaned tooth onto Tetracycline solution for 20 min.

According to various authors replanted tooth should be splinted flexibly to the adjacent teeth for 7 to 10 days to enhance periodontal healing but here the avulsed tooth was splinted for extended period of 5 weeks until the sign of mobility decreases completely^[8].

The access cavity was prepared on the 1st appointment after splinting of the tooth intra orally. Extra oral access opening and root canal treatment of the avulsed tooth as suggested by different authors was not done as that would further cause delay in reimplantation. Tri antibiotic paste mixture (minocycline, metronidazole and ciprofloxacin) in 1:1:1 concentration in normal saline vehicle was placed in the canals for 2 weeks to completely sterilise the root canal to avoid further complications like inflammatory resorption. The root canal was obturated after 2 weeks after sterilisation of the canal was achieved.

In replacement resorption dental tissue is replaced with osseous tissue^[12]. Ebeleseder et al.^[13] found that replacement resorption of replanted mature teeth was more extensive and the overall prognosis was not good for children and adolescents when compared with adults.

If the avulsed incisors had not been replanted, another treatment option might have been a prosthetic rehabilitation with the avulsed tooth by splinting it with adjacent teeth with Fibre Reinforced Composite or prosthetic replacement of the missing incisors depending on the patient's age. However, this treatment plan is not as aesthetic as natural teeth and would result in depressed alveolar bone growth on that region that would make future prosthesis difficult.

IV. Conclusion

Although the risk of progressive resorption and subsequent tooth loss is high, delayed replantation can restore the patient's esthetic appearance and occlusal function shortly after the injury and the alveolar bone height and thickness can be maintained until the edentulous space can be restored with fixed prosthesis.

Reference

- [1]. Kin oshita S, Kojima R, Taguchi Y, Noda T. Tooth replantation after traumatic avulsion: A report of ten cases. *Dent Traumatol* 2002;18:153-6.
- [2]. Andreasen JO, Andreasen FM. Dental traumatology. *Quo vadis Endod Dent Traumatol* 1990;6:78-82.
- [3]. Goldbeck AP, Haney KL. Replantation of an avulsed permanent maxillary incisor with an immature apex: Report of a case. *Dent Traumatol* 2008; 24:120-3.
- [4]. Trope M. Current concepts in replantation of avulsed teeth. *Alpha Omegan* 1997;90:56-63.
- [4]. Fidel SR, Santiago MR, Reis C, de Berredo Pinho MA, S'ergio Fidel RA. Successful treatment of a multiple dental trauma: Case report of combined avulsion and intrusion. *Braz J Dent Traumatol* 2009;1:32-7.
- [5]. Andreasen JO. Effect of extra-alveolar period and storage media upon periodontal and pulpal healing after replantation of mature permanent incisors in monkeys. *Int J Oral Surg* 1981;10:43-5.
- [6]. Khalilak Z, Shikholislami M, Mohajeri L. Delayed tooth replantation after traumatic avulsion: A case report. *Iran Endod J* 2008;3:86-9
- [7]. Flores MT, Andreason L, Andreasen Jo, Bakland LK, Malmgren B, Barrett F, Bourgunignon C, et al. International Association of Dental Traumatology: Guidelines for the management of traumatic dental injuries II avulsion of permanent teeth. *Dental Traumatol* 2007;23:30-36.
- [8]. Trope M. Clinical management of the avulsed tooth: present strategies and future directions. *Dental Traumatology* 2002; 18: 1–11.
- [9]. Selvig KA, Bjorvatn K, Claffey N. Effect of stannous fluoride and tetracycline on repair after delayed replantation of rootplanned teeth in dogs. *Acta Odontol Scand* 1990;48:107–12.
- [10]. Keum KY, Kwon OT, Spangberg LS, Kim CK, Kim J, Cho MI et al. Effect of dexamethasone on root resorption after delayed replantation of rat tooth. *J Endod* 2003;29:810–13.

- [11]. Andreasen JO. Review of root resorption systems and models. Etiology of root resorption and the homeostatic mechanisms of the periodontal ligament. The biological mechanisms of tooth eruption and root resorption. Birmingham, AL: EBSCO Media, 1988; 9–21.
- [12]. Ebeleseder KA, Friehs S, Ruda C, Pertl C, Glockner K, Hulla H. A study of replanted permanent teeth in different age groups. Endod Dent Traumatol 1998;14: 274–8.

Legends:

Figure 1: Avulsed tooth

Figure 2: Intraoral examination reveals missing anterior

Figure 3: IOPAR of 11 and 21 region

Figure 4: Tooth kept on tetracycline solution

Figure 5: Avulsed tooth positioned on empty socket

Figure 6: Splinting done

Figure 7: Post obturation IOPAR

Figure 8: Coronal buildup on 11 and 21

Figure 9: Habit breaking appliance

Figure 10: 2 year post operative check up clinical view

Figure 11: 2 year post operative check up IOPAR



Figure 1



Figure 2



Figure 3

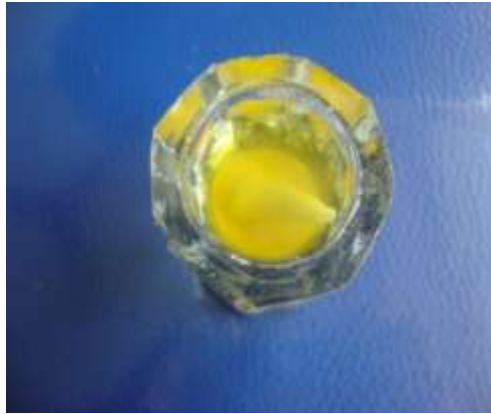


Figure 4



Figure 5



Figure 6



Figure 7



Figure 8



Figure 9



Figure 10



Figure 11