Re-implantation of Accidentally Avulsed Tooth

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Summary:

Accidental tooth avulsion is common among the children. Management of avulsed tooth within alveolar socket by re-implantation becomes a challenge for the clinician due to extra oral time and media of transportation. Although the long-term prognosis of re-implantation is poor, the time during which the tooth remain within the arch will guide the development of alveolar bone completely. Moreover, the re-implantation will maintain anatomical, functional and esthetic rehabilitation of the patient. In this case report, we presented a case of accidental avulsion where re-implantation was performed. After 12 months follow-up the periodontal space was healed perfectly without any resorption or ankylosis.

Key words: Trauma, avulsion, replantation.

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Introduction:

Dental injuries can occur at any age; however they are most common between the age of 7 to 10-year-old age group, when the children are very much active[1,2]. Certain predisposing factors like protruded maxillary incisors and insufficient lip closure may affect the extent of the dental trauma.[3, 4] Avulsed teeth usually lost at the accident scene and both accident victims and those attending them may neglect it. But the public should be aware of the possibilities that avulsed tooth can be saved by re-implantation. Immediately after re-implantation inflammatory process in periodontal tissues induced the re-organization of new attachment apparatus to induce healing. The healing process will be directly related to extra-oral period and condition in which the tooth was preserved prior to re-implantation. Depending upon severity of injury four types of healing may occur in periodontal ligament area as: (i) healing with normal periodontal ligament: Complete regeneration of the periodontal ligament along the root surface usually takes about 7-10 days. This will occur if the periodontal ligament cells remain vital; (ii) Healing with the surface resorption:- Histologically, areas of the localized resorption on the root surface are seen. Subsequently, these areas become repaired with normal cemental tissues. Clinically the tooth is asymptomatic and has a normal percussion tone; (iii) Healing with replacement resorption:- Histologically, fusion of the bone and the root surface is observed. Clinically, the tooth is not mobile. It may become infra-occluded over time and give a high percussion tone; (iv) Healing with inflammatory resorption:- Histologically it is characterized by areas of resorption in bone and adjacent root surface. This may progress till the tooth becomes mobile and extruded. Clinically, the-percussion tone is dull and patient may present with pain. More than one type of reaction may present at any one time.[5]

For this reason, accidental avulsion of tooth is a true emergency since timely attention to re-implantation could save many teeth.[3]Emergency management of accidentally avulsed tooth is spectacular but unfortunately has a low range of success ratio compared with routine endodontic therapy. However, one should consider the avulsed tooth as a foreign body when it is replaced and is therefore subjected to all functions of the body that may be employed to counteract such intruders. So, re-implantation success should not be compared with other type of endodontic therapy in which the treated tooth remains in its alveolar housing and benefited by the periodontal attachment.[6] Although lower success rate, the procedure is beneficial to retain alveolar bone and

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tooth-to-tooth relationship for a period of time. Additionally, shortly after accident it might be difficult to prepare adjacent teeth as abutment for fixed partial denture. Because in youngsters the pulp canal size is commonly large .So, the precious time has been gained to allow for diminution of the pulp canal size of abutments which will permit future fixed prosthesis.[3,7]

Case Report:

A 8-year-old boy came to the department of Conservative Dentistry and Endodontics, Faculty of Dentistry, BSMMU with the complaint of accidental missing of one of his upper anterior tooth during playing. The patient's medical history was not contributory and had history of tetanus immunization. He had come after 24 hours of the accident with the missed tooth on his hand which was immersed within normal saline. On clinical examination, he had missing left central incisor and the gum tissue was lacerated there Fig.-1. On OPG examination, there was no other dental or bony damage in his mouth but the area was tender on palpation. After discussion of all the treatment options with the patient's guardian, it was decided to re-implant the tooth within the socket after appropriate endodontic preparation. A proper access cavity was prepared outside the mouth by holding the tooth only by crown with the help of a piece of gauze. Extirpation of pulp tissue was done and normal saline was used for irrigation of the root canal. Endodontic preparation was completed by hand protaper instruments in standardized technique. Canal was then obturated and retrograde filling was done by glass ionomer filling to prevent any peri apical leakage.

Fig.-1: *Pre-operative view*

The traumatized socket was inspected for any bone and tooth fragments. As the blood clot was present, gentle irrigation with normal saline was done. A straight elevator was introduced into the socket for repositioning of the bone into its normal position as there might be chance of bone collapse.

Root filled avulsed tooth was then replanted carefully into the prepared socket by holding it with the fingers to avoid contact with the root [Fig.-2(b)]. Complete re-implantation was determined by comparing the incisal edge of replanted incisor with the incisal edge of the adjacent incisor.

After re-implantation, facial and lingual soft tissues covering the alveolar bone was compressed with the fingers. The replanted tooth was in slightly rotated

Fig.-2: *(a) Placement of endodontically treated avulsed tooth in the socket, (b) Immediately after re-implantation.*

position but the guardian told that before avulsion the childs original tooth was in the same position so it was accepted by the guardian [Fig.-2(b)]. The re-implanted tooth and each adjacent two teeth then acid-etched and light cured along with a orthodontic wire to form a functional splint. [Fig.-3, OPG-1&Radiograph-1]. To ensure complete placement of the reimplanted tooth within the socket, the patient was asked to bite gently and the occlusion found normal. The immobilization was done by that functional splint for 3 weeks as it was extremely mobile.

Patient was adviced to take soft food, not to bite with the tooth and maintain proper oral hygiene for one week. Chlorhexedine mouth wash advised while the splint was in place. Antibiotic Cephradine (500 mg) was prescribed 6 hourly for 7 days to negate bacterial contamination or rapidly progressing root resorption. Anti-inflammatory drugs was also been prescribed. The patient came at recall visit after 7 days of replantation for evaluation of healing process. Then superficial scaling was done and the light cure filling was polished as he had complained about rough feeling by lips [Fig.-4(a)]. After 3 weeks of replantation patient was available for second recall visit. The tooth was assessed clinically and radiographically but did not find any pathology and the tooth was not mobile at that stage, so we removed the splint.

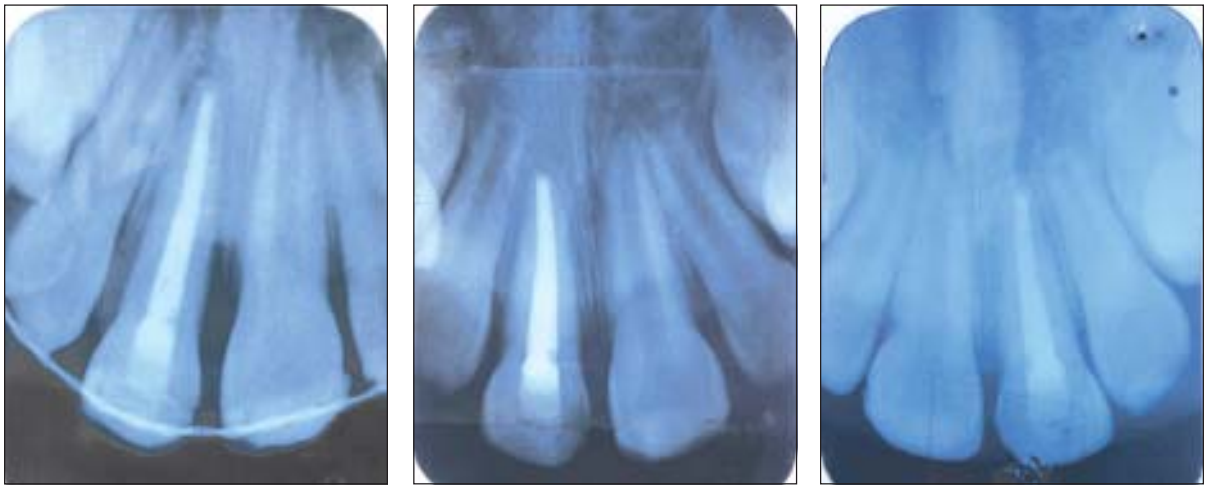
After 6 months, there was evidence of apical bone formation and periodontal area was under healing process with cementum (Radiograph-3). After 1 year, there was increased rate of alveolar bone formation and no sign of tooth resorption [Fig.-4(b)]

Fig.-3: *After functional splint*

Fig.-4: *(a) Follow-up after seven days, (b) Follow-up after one year*

Radiographs:

OPG-1:



Radiograph-1: *immediately after treatment*

Radiograph-2:*Follow-up after six months of fixation*

Radiograph-3:*Follow-up radiograph after one year*

Discussion:

Prognosis of re-implantation of the permanent dentition is primarily dependent upon root development and extra oral dry time[8]. The root has the best prognosis if replanted immediately. If the tooth cannot be re-implanted within 5 minutes, it should be stored in a medium that will help to maintain the vitality of the periodontal ligament fibre.[9-11]If the extra-oral dry time is extended the transport media will be a critical factor for re-implantation. The transport media for avulsed teeth include via span, Hanks Balanced Salt solution (Tissue culture medium), cold milk, saliva (buccal vestibule), physiologic saline or water. Tooth storage in a cell compatible medium for a limited period of time prior to replantation has produced a similar healing result as compared with immediately replanted teeth.[12] The risk of ankylosis increases significantly with an extra oral dry time of 60 minutes because it is unlikely that periodontal cells remain viable when extra-oral dry time is more than 60 minutes.[13] In this case report, although the extra-oral time of avulsed tooth was 24 hours, being emerged in normal saline and management by proper technique, the tooth was re-implanted successfully within the

socket. The case was periodically examined up to 12 months and during the time tooth mobility, periodontal status, occlusal balance and pain on percussion was assessed and after 12 months the patient was perfectly all right with the replanted tooth both functionally and aesthetically. The long term prognosis for re-implantation was poor, but the recent studies found significant increase in success rate.[14, 15] Further studies in university of North Carolina verified that the longer the period between the traumatic extraction and re-insertion, the greater is the chance of failure.[16] Therefore the technique for re-implantation should follow the standard protocol within a shorter period of time. If the time is more than 15 minutes, the tooth should be taken quickly to the dental office, hopefully in a suitable transport media, where a dentist is able to re-implant it.[11]

A study by Sherman indicated that the presence of the original periodontal ligament on the root surface of re-implanted teeth improved the prospect for secondary cementum deposition and root resorption repair. When the original periodontal ligament was scraped and the tooth re-implanted with absorbable surgical sponge, root resorption was more extensive and progressive and a greater degree of ankylosis took place compared with the non-scraped replants.[17] Two undesirable conditions may occur to re-implanted teeth- tooth resorption and or ankylosis. For this reason we should take follow-up regularly at six months interval while radiographs would reveal the resorption process. Resorption can be seen radio graphically on the lateral surface of root, in irregular bays. In ankylosis tooth fail to passive eruption therefore, eventually appear shorter than the adjacent tooth.[5] The long-term prognosis for re-implantation was thought to be poor but the recent studies found a significant increase in the success rate. So, we should develop awareness among the general people as well as dental professionals about the management of avulsed tooth. As extra oral time and transporting media is of crucial importance to survival of the tooth, general people should get the message of urgency of arrival at the dental office with the avulsed tooth/teeth as early as possible.[18]

Conclusion:

As the patient was in growing stage it was wise to attempted for re-implantation. Although it was thought that there is low success rate of re-implantation when the extra oral time after accidental avulsion is more than 60 minutes. But in my case report, the tooth was properly re-implanted after 24 hours of avulsion. After 12 months follow-up, none of the features of resorption and ankylosis were evident so, we can conclude the case as successful.

References:

1. Oikarinen KD,Salonen MAM Introduction of four custom made protectors constructed of single and double layers for activities in contact sports, Endod Dent Traumatol 1993;9:19
2. Rabie G. Strengthening and restoration of immature teeth with an acid-etch resin technique Endod Dent Traumatol 1988; 4:99
3. Andreasen JO. Periodontal healing after replantation of traumatically avulsed human teeth: Assessment by mobility testing and radiography. Acta Odontol Scand. 1975; 335: 325-335.
4. Bastone EB, Freer TJ, Mc Namara JR. Epidemiology of dental trauma: a review of the literature. Aus Dent J 2004;45:2
5. Flores MT, Andreasen JO,Bakland lk et al. Guidelines for avulsion and management of traumatic dental injuries. Dent Traumatol. 2001; 17:193-198.
6. Franklin S. Weine.Endodontic therapy Mosby, Inc, 6th edition. Philadelphia, USA 2004; Chap 3: 85-91.
7. Andreasen JO, Kristerson L. The effect of limited drying or removal of the periodontal ligament. Periodontal healing after replantation of mature permanent incisors in monkeys. Acta Odontol Scand. 1981; 39:1-13.
8 .John I. Ingle,Leif K. Bakland, J.Craig Baumgartner. Ingle's Endodontics BC Dacker Inc, Hamilton, Ontario. 2008; Chap.36: 1348
9. Roberts G, Scally C, Shotts R. Dental emergiencies .BMJ 2000; Chap10, 559-562.
10. American Academy Pediatric Dentistry, Pediatric Dental Trauma Card-Primary teeth, permanent teeth. Chicago III: American Academy of Pediatric Dentistry: 2002:2.
11. American Academy Pediatric Dentistry. Decision tree for an avulsed tooth. Pediatr. Dent 2007:29 (suppl): 264.
12. Pow Y, Filippi A, Kirschen H. Results after replantation of avulsed permanent teeth. Periodontal healing and the role of physiologic storage and antiresorptive-regenerative therapy. Dental traumatol 2005:21 (2): 93-101.

13. Trope M. Clinical management of the avulsed tooth:Present strategies and future direction. Dental Traumatol 2002; 18(1):1-11.

14. Breivik M, Kram E. Histomeric study of root resorption of human premolars following experimental reimplantation. European Journal of Oral Science. 1987; 95:273-80.

15. Andreasen JO. Andreasen F.M. Textbook and color atlas of traumatic injuries to the teeth . Munksgaard,Copenhagen , 3rd edition. Mosby, 1974, Chap10, 383-419.

16. Andreasen JO. Etiology and pathogenesis of traumatic dental injuries: a clinical study of 1298 cases. Scand J Dent Res.1970;78:329

17. Phillip Sherman Jr. Intentional Replantation of Teeth in Dogs and Monkeys JDR 1968; 47(6): 1066-1071

18. Andreasen JO, Borun MK, Jackosen HL. Andreasen FM. Replantation of 400 avulsed permanent incisors:IV Factors related to periodontal ligament healing. Endod. Dent. Traumatol. 1995; 11:76-89.