

A 4 YEAR CLINICAL, RADIOGRAPHIC AND CBCT EVALUATION OF REPLANTED AVULSED MAXILLARY CENTRAL INCISOR WITH EXTRA ORAL DRY TIME OF 4 DAYS: A CASE REPORT

Rahul Maria^{1*}, Smita D Dutta², Prashik Parvekar³, Neha Sharma⁴, Pankaj Mishra⁵, Arpit Sharma⁶

¹Professor and Head of Department of Conservative and Endodontics RCDS, Bhopal, MP, INDIA

²Conservative and Endodontics Clinic, Jaipur, INDIA

³Conservative and Endodontics, Indore, INDIA

^{4,6}Department of Conservative and Endodontics, MDCRC, Indore, MP, INDIA

⁶Department of Community Dentistry and Oral Epidemiology, MDCRC, Indore, MP, INDIA

ABSTRACT

Replantation of avulsed permanent mature teeth presents a unique challenge. The dilemma to replant or not to replant continues. The decision is based on many factors such as the extra-oral time lapsed, age, root apex, patient's expectations, available resources, type of storage media etc. however replantation makes excellent provisional esthetic restoration in short term and maintains the arch integrity when outcome is successful in long.

Received on: 22nd-Febr-2016

Revised on: 25th-April-2016

Accepted on: 7th- March-2016

Published on: 4th -June-2016

KEY WORDS

avulsion; re-plantation; delayed extra-oral time, CBCT

*Corresponding author: Email: rahul.maria1234@gmail.com; Tel.: +91 9425125199

INTRODUCTION

Trauma to the oral region occurs frequently. Among all facial injuries, dental injuries are most common of which avulsion occurs in 1-16% of all dental injuries. It is the serious of all dental injuries [1]. Dental avulsion is consequences of injury that results in the complete displacement of a tooth from its alveolar socket and may affect multiple tissues. Trauma to the anterior teeth is the most prevalent with sports and automobile accidents the most frequent cause. Avulsion of permanent teeth occurs at any age, but is most common in young permanent dentition with higher prevalence in males [2]. This is because the root is still not completely formed and the periodontium and bone are very resilient [3]. DTI is an injury that results from an external force, involving the teeth, the alveolar portion of the maxilla or mandible, and the adjacent soft tissues [1 - 5]. When dental avulsion occurs, immediate replantation at the trauma site is the ideal procedure for maintaining the viability of PDL cells. However, immediate replantation is rarely achieved [6]. It presents a unique challenge to the clinician, it is the treatment of choice but it cannot always be carried out immediately [2]. The delayed replant is characterized by the absence of minimum conditions for survival of the cells, with the maintenance of the tooth in ways of storage that does not take care of to the cellular necessities of nutrition, osmolality, pH and temperature [7,8]. As a treatment of the avulsed tooth, replantation is the method which can restore occlusal function and esthetic appearance shortly after injury [9, 10]. Hence this paper presents a case report where the tooth was replanted after 4 days.

CASE REPORT

A 17-year-old male patient, reported to the Department of Conservative Dentistry & Endodontics, Modern Dental College and Research Centre Indore for treatment of avulsed tooth. He had sport injury four day prior to his visit

to the department and his maxillary right permanent central incisor tooth had been avulsed. Patient came with the avulsed tooth kept dry in a polythene bag. Examination of the avulsed teeth revealed that the roots had closed apices and tooth crown was intact. The patient had no relevant medical history. No apparent bleeding was seen from the avulsed tooth socket Left maxillary central incisor and right maxillary lateral incisor showed Ellis class III fractures [Figures-1 and -2]. Periapical radiograph was obtained; no periapical changes were seen with 12 and 21 with no apparent root fracture .Empty 11 socket was seen [Figure-3]. Patient was explained about all the treatment options and their respective pros and cons. Treatment options included replantation, fixed partial denture, and implant for the replacement of missing teeth and restoration of 12 and 21. Patient agreed to treatment. Written consent was taken from the patient's guardian. Endodontic therapy with 11 was done extraorally the tooth was held with gauge piece soaked with 0.2% Chlorhexidine [Figure-4]. Local anesthetic was administered and the blood clot was removed from the socket. Tooth was then replanted into the socket with the help of finger pressure .occlusion was checked with adjacent teeth and also radiographically. The fractured fragment of 12, 22 was removed and pulp was extirpated. The teeth were splinted with a semi rigid arch wire and bonded with composite [Figure-5]. Anti-tetanus toxoid (ATT) was given prophylactically. Antibiotics were prescribed for 7 days and the patient was encouraged to maintain good oral hygiene. The patient was recalled next day for treatment of remaining teeth. After two weeks, the tooth were found to be stabilized and the splint was removed .Endodontic therapy of both the teeth was planned and accomplished. The patient was kept under follow – up for 3 years. No signs of root resorption were seen radiographically during the follow up period when examined clinically, radiographically with CBCT imaging [Figures-6 and -8].



Fig: 1. Avulsed maxillary right central incisor, **Fig: 2.** Ellis class III fracture 12, 21, missing 11, **Fig: 3.** Radiograph showing empty 11 socket, **Fig: 4.** RCT with 11(extra-oral), **Fig: 5.** radiograph showing Replanted 11 RCT of 12 21 and splint, **Fig: 6.** Periodic clinical and radiographic evaluation

DISCUSSION

Evidence strongly emphasizes need for minimizing extra-oral time of avulsed tooth; use of physiologic storage medium with impetus on maintaining vitality of periodontal ligament cells and initiating early endodontic treatment as being key factors in increasing success of replantation procedures [11- 15]. Treatment is directed at avoiding or minimizing the resultant inflammation which occurs as a direct result of two consequences of avulsed tooth namely attachment damage and pulpal infection.

In the present case the extra oral time was 4 days without placement in any storage medium. When a tooth has an extra-oral dry time of more than 60mins, the periodontal ligament is not expected to survive. Pre-treatment of such a tooth, prior to its replanting, will render it more resistant to resorption .If the tooth remained dry for more than 60 minutes with no consideration for preserving the periodontal ligament, the endodontic therapy could be performed extraorally.

In our case patient came four days after the injury with the tooth kept in a polyethene bag due to unawareness. When such events do occur, even if the treatment is delayed, considering the benefits of function, esthetics and physiological impact on patient that might result from the therapy replantation should be attempted .hence, we decide to replant the avulsed tooth in spite of extremely unfavorable conditions. Preparation of the socket was done which consists of removal of obstruction, blood clot and bone fragments if any in order to facilitate the replantation, preparation of socket was performed with the use of curette and irrigation with saline while the assistant was holding the tooth with gauge dipped in 0.2 percent CHX. Root canal treatment was done in conventional manner, there is

consensus in literature that replanted tooth should be endodontically treated because the necrotic pulp and endotoxins affect the PDL through the dentinal tubules and play a decisive role to the resorption process. However, when endodontic treatment is carried out on avulsed teeth, it improves the chances of retention and prevention of replacement resorption [16,17].

Splinting was done with composite and ligature wire as it allows physiologic movement of tooth during healing. It should allow movement of tooth and should have more memory so that the tooth is not moved during healing. Splinting was kept for 4 weeks. The objective of avulse, loose or displaced tooth is to protect the attached apparatus and allow repair and regeneration of periodontal fibers. After splinting the radiograph was taken to verify the position of tooth as post-operative reference in the occlusion was checked. The follow-up was done at regular interval. Resorption (inflammatory, replacement) are usually observed after 1-2 months and surface resorption is observed after 12 months [18, 19].

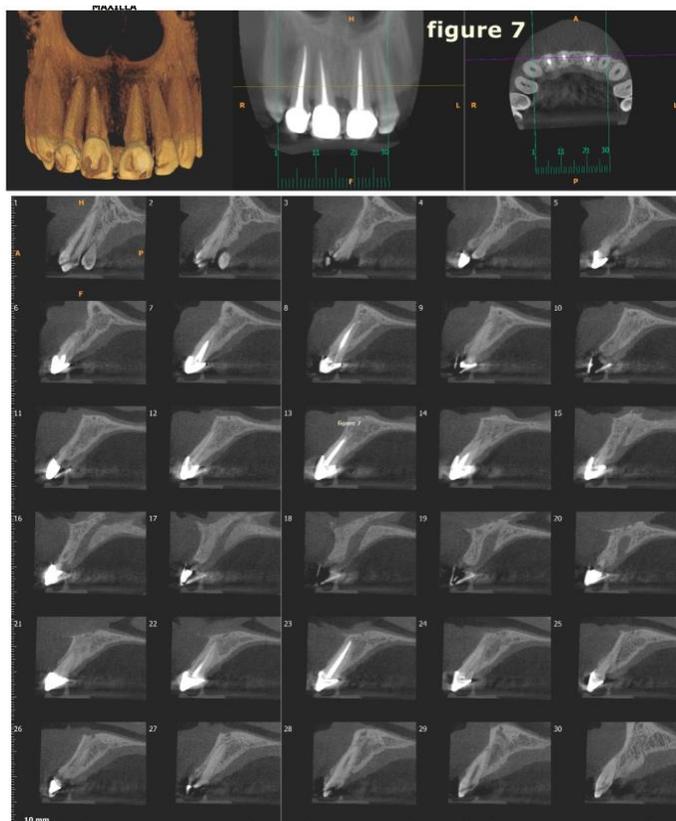


FIG: 7. CBCT section evaluation showing no signs of resorption, **FIG: 8.** CBCT 3D reconstruction

An ankylosed tooth can be diagnosed clinically within 1 month by its percussion sound (high, metallic) and radiographically within 2 months (disappearance of PDL space and invasion of bone into the root). The presence of a high-pitched percussion tone that differs from that from uninjured control teeth has been used as a criterion for the clinical diagnosis of ankylosis [21,22]. However, irrespective of the state of the tooth or time spent out of the mouth, the avulsed tooth that is reimplanted remains the best implant [23].

The outcome of replantation treatment though unpredictable, can be categorized as [24]:

Favorable outcome: Closed apex:

- Asymptomatic,
- Normal mobility,
- Normal percussion sound.

- No radiographic evidence of resorption or peri-radicular osteitis: the lamina dura should appear normal.

Unfavorable outcome: Closed apex:

- Symptomatic,
- Excessive mobility or no mobility (ankylosis) with high-pitched percussion sound,
- Radiographic evidence of resorption (inflammatory, infection-related resorption, or ankylosis-related replacement resorption).
- When ankylosis occurs in a growing patient, infra-position of the tooth is highly likely leading to disturbance in alveolar and facial growth over the short, medium and long term.

Regular follow-up was done and the tooth was checked clinically and radiographically. Conventional radiographs don't provide a true and full representation of the lesion, especially in the buccal lingual direction. They are unable to identify the true extent, location or the portal of entry of a resorptive lesion [25]. Advanced imaging assists in diagnosis the outcomes whether favorable or unfavorable and thereby further modifying the treatment plan. Hence CBCT was taken as it is a reliable and valid method of detecting external inflammatory root resorption and performs significantly better than intraoral peri-apical radiography [26]. Because treatment of resorption can be very complex and unpredictable, accurate imaging is important to the diagnosis and treatment plan. The diagnosis of resorption is usually based upon the radiographic examination [27].

CONCLUSION

With the huge amount of information available in literature, the media and internet, dentists should utilize these resources to make the patients aware that if the avulsed tooth cannot be immediately reimplanted, it should be kept in a proper storage medium [28].

CONFLICT OF INTEREST

There is no conflict of interest amongst the authors.

ACKNOWLEDGEMENT

None.

FINANCIAL DISCLOSURE

We authors report no financial interests or potential conflicts of interest.

REFERENCES

- [1] Flores MT et al[2007] Guidelines for the management of traumatic dental injuries. I. Fractures and luxations of permanent teeth. *Dental Traumatology* ; 23: 66–71.
- [2] Ana Regina Casaroto et al[2010] Study of the effectiveness of propolis extract as a storage medium for avulsed teeth *Dental Traumatology* ; 26: 323–331.
- [3] Sharma NK, Duggal MS.[1994] Replantation in general dental practice. *Br Dent J* ; 176:147–151.
- [4] Gassner R, Tuli T, Hachl O, Moreira R, Ulmer H.[2004] Craniomaxillofacial trauma in children: a review of 3,385 cases with 6,060 injuries in 10 years. *J Oral MaxillofacSurg* ; 62: 399–407.
- [5] Dale RA.[2000]Dentoalveolartrauma.Emerg Med Clin North Am ; 18: 521–538.
- [6] Pileggi R, Dumsha TC, Nor JE. [2002]Assessment of post-traumatic PDL cells viability by a novel collagenase assay. *Dent Traumatol* ;18:186–189.
- [7] Morgado, M. L. et al.,[1992]Reimplantesdentários. Rev. brasil. Odont., v. 11, n. 3, p. 38-44. mai., /jun., 1992.
- [8] Stêvão E. L. et al.[1998] Conduitasclínicasfrenteaoeimplantedentário – Enfoque para o tratamentoendodôntico. *Rev. OdontoCiência*, 13(25):77-88. jun.
- [9] Andreasen JO, Borum MK, Jacobsen HL, AndreasenFM. [1995] Replantation of 400 avulsed permanent incisors. 4. Factors related to periodontal ligament healing. *Endod Dent Traumatol* ; 11:76–89.
- [10] Andreasen JO. [1992]Atlas of Replantation and Transplantation of the Teeth. Philadelphia: Saunders. p. 30, 72–92.
- [11] Pohl Y, Filippi A., Kirschener H.[2005]Results after replantation of avulsed permanent teeth, I. Endodontic considerations. *Dental Traumatology*, April,21(2):p 80-92.
- [12] Pohl Y, Filippi A., Kirschener H.[2005] Results after replantation of avulsed permanent teeth, II. Periodontal healing and the role of physiologic storage and antiresorptive-regenerative therapy. *Dental Traumatology* , April,21(2):p 93-101.
- [13] Andersson L, Bodin I[1990] Avulsed human. teeth replanted within 15 minutes, long-term clinical follow-up study. *Endod Dent Traumatol* 6(1): 37-. 42.
- [14] Chester T. Coccia [1980] A Clinical investigation of root resorption rates in reimplanted young permanent incisors: a five – year study. *Journal of Endodontics* Vol 6 #1, January.

- [15] E. Barrett et al [1997] Survival of avulsed permanent maxillary incisors in children following delayed replantation, *Endodontic Dent Traumatology*, ;13: 269–275.
- [16] Andreasen JO, Borum MK, Jacobsen HL, Andreasen FM. [1995] Replantation of 400 avulsed permanent incisors. 2. Factors related to pulpal healing. *Endodontic Traumatol* ;11:59–68.
- [17] Hinkckfuss SE, Messer LB. [2009] An evidence-based assessment of the clinical guidelines for replanted avulsed teeth. Part I: Timing of pulp extirpation. *Dent Traumatol* ; 25:32–42.
- [18] Krasner P, Rankow HJ. [1995] New philosophy for the treatment of avulsed teeth. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 79:616–623.
- [19] Ize-Iyamu and Saheeb: [2013] Reimplantation of avulsed dry permanent teeth after three days *Nigerian Journal of Clinical Practice*, Jan-Mar 16 (1)
- [20] Dental traumatology: essential diagnosis and treatment planning Leif K. Bakland & Jens Ove Andreasen, [2004] *Endodontic Topics* 7:14–34.
- [21] Andersson L, Blomlof L, Lindskog S, Feiglin B, Hammarstrom L. [1984] Tooth ankylosis: clinical, radiographic and histological assessments. *Int J Oral Surg* 13:423–431.
- [22] Andreasen JO. [1975] Periodontal healing after replantation of traumatically avulsed human teeth, *Acta Odontol Scand.* 33: 55: 325–335.
- [23] Ann R Australas Coll Dent Surg [2000] 15:243–246
- [24] International Association of Dental Traumatology, Dental Trauma Guidelines, Revised 2012.
- [25] Cotton, TP., Geisler, TM., Holden, DT. [2007] Endodontic applications of cone-beam volumetric tomography. *J Endod* 33:1121–1132
- [26] Durack C, Patel, S, Davies, J, Wilson R, Mannocci F. [2011] Diagnostic accuracy of small volume cone beam computed tomography and intraoral periapical radiography for the detection of simulated external inflammatory root resorption. *Int Endod J* 44(2):136–147.
- [27] Andreasen, FM., Sewerin, I., Mandel, U., Andreasen, JO. [1987] Radiographic Assessment of simulated root resorption cavities. *Endodontics and Dental Traumatology* 3:21–27,
- [28] Marion JJC, Manhães FC, Danilussi KY, Duque TM. [2012] Treatment of a lately replanted avulsed permanent tooth: Case report. *Dental Press Endod* Oct-Dec; 2(4):57–64.

ABOUT AUTHORS

Prof. Dr Rahul Maria is professor and head of department, department of conservative dentistry and endodontics, PG director, RCDS Bhopal (M.P.) India

Dr Smita D Dutta is Senior Lecture, Department of Conservative and Endodontics. RCDS, Bhopal, (MP). India

Dr Prashik Parvekar Senior Lecture, Department Of Conservative and Endodontics RCDS, Bhopal, (MP). India

Dr Neha Sharma is Senior Lecture, Department of Conservative and Endodontics. MDCRC, Indore, (MP). India

Dr pankaj mishra is Senior Lecture, Department of Conservative and Endodontics. RCDS, Bhopal, (MP). India

Dr Srjit Sharma is Senior Lecture, Department of Community Dentistry and Oral epidemiology, MDCRC, Indore, (MP). India