

Rehabilitation of knocked out teeth by replantation and autotransplantation – a case report

¹Urmila Chauhan, PG student, Department of Conservative Dentistry and Endodontics, School of Dental Sciences, Krishna Institute of Medical Sciences Deemed to be University, NH4, Pune - Bangalore Highway, Dist. Satara, Agashivnagar, Malkapur, Maharashtra 415539.

²T. M. Mangala, Professor and head of department, Department of Conservative Dentistry and Endodontics, School of Dental Sciences, Krishna Institute of Medical Sciences Deemed to be University, NH4, Pune - Bangalore Highway, Dist. Satara, Agashivnagar, Malkapur, Maharashtra 415539.

³Rushikesh Mahaparale, Reader, Department of Conservative Dentistry and Endodontics, School of Dental Sciences, Krishna Institute of Medical Sciences Deemed to be University, NH4, Pune - Bangalore Highway, Dist. Satara, Agashivnagar, Malkapur, Maharashtra 415539.

⁴Adish Saraf, Lecturer, Department of Conservative Dentistry and Endodontics, School of Dental Sciences, Krishna Institute of Medical Sciences Deemed to be University, NH4, Pune - Bangalore Highway, Dist. Satara, Agashivnagar, Malkapur, Maharashtra 415539.

⁵Sneha Mali, Lecturer, Department of Conservative Dentistry and Endodontics, School of Dental Sciences, Krishna Institute of Medical Sciences Deemed to be University, NH4, Pune - Bangalore Highway, Dist. Satara, Agashivnagar, Malkapur, Maharashtra 415539.

Corresponding Author: Urmila Chauhan, PG student, Department of Conservative Dentistry and Endodontics, School of Dental Sciences, Krishna Institute of Medical Sciences Deemed to be University, NH4, Pune - Bangalore Highway, Dist. Satara, Agashivnagar, Malkapur, Maharashtra 415539.

Citation of this Article: Urmila Chauhan, T. M. Mangala, Rushikesh Mahaparale, Adish Saraf, Sneha Mali , “Rehabilitation of knocked out teeth by replantation and autotransplantation – a case report”, IJDSIR- June - 2020, Vol. – 3, Issue -3, P. No. 319 -325.

Copyright: © 2020, Urmila Chauhan, et al. This is an open access journal and article distributed under the terms of the creative commons attribution noncommercial License. Which allows others to remix, tweak, and build upon the work non commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

Here we describe replantation and autotransplantation as a treatment conducted in a 18-year-old patient following a bicycle accident. 3 teeth were avulsed, maxillary central incisors and left lateral incisor. An avulsed left central incisor was replanted and left lateral incisor was

autotransplanted in alveolar socket of left central incisor and splinted. One week later, it was treated endodontically and calcium hydroxide dressing was placed for 1 week; subsequently, the tooth was obturated with gutta-percha and the esthetic treatment was done during follow-up

periods. Follow up examination showed validity of treatment.

Key words: Avulsion, extraoral dry storage, delayed replantation, autotransplantation, root surface treatment.

Introduction

Dental trauma refers to trauma (injury) to the teeth and/or periodontium (gums, periodontal ligament, alveolar bone), and nearby soft tissues such as the lips, tongue, etc. comprising 5% of all injuries.⁽¹⁾ Tooth avulsion (exarticulation) is characterized as total displacement of the tooth out of its alveolar socket with damage to the periodontal ligament, cementum, alveolar bone, as well as gingival and pulpal tissues and it is seen in 0.5–3% of all dental injuries.^(2,3) Following the World Health Organization's classification system modified by Andersen, avulsion is classified as an injury of periodontal tissues, as well as extrusive, lateral, or intrusive luxation.⁽⁴⁾

The maxillary central incisors are the most frequently avulsed teeth. With a male predilection (male: female = 3:1). It is most commonly observed in young age due to the resilient nature of the bone, periodontium. It frequently involves a single tooth, but multiple avulsions are occasionally encountered.⁽⁴⁾

The recommended treatment for avulsed tooth is immediate replantation. However, it is not always possible due to the patient's concomitant injuries at the time of the accident and lack of knowledge in the management of such injuries.⁽⁵⁾ Management of such injuries requires multidisciplinary approach.

The purpose of this case report is to report the successful management of avulsed teeth by Replantation and autotransplantation.

Case Report

An 18-year-old male patient, reported to our Department of Conservative Dentistry & Endodontics, SDS, KIMSDU

with a chief complaint of knocked out teeth in upper front region. Patient was apparently alright, till he experienced trauma to anterior teeth in a bicycle accident. And there was no history of loss of consciousness or vomiting. Avulsed teeth 11 and 12 were brought by patient to the department, having extraoral dry period of 1 hour.

The patient seemed healthy with no signs and symptoms of cerebral involvement. Extra-oral examination showed soft tissue laceration to lips and left side of the neck.

Intraoral examination of patient revealed avulsion of teeth 11, 12 & 21. There was buccal cortical plate fracture and loss of gingival attachment with 12 region. Examination of lower arch revealed Ellis and Davey's class II fracture with respect to 31 & 41 (figure 1). Radiographic examination of affected area revealed that there was no sign of bone fracture observed with 11 & 21 whereas alveolar bone fracture was observed with 12 region.

OPG of the patient did not reveal any other fracture. Teeth which was brought to us by patient was observed to have mature roots without any fracture to the crown or root.

Patient was explained about the various treatment options. Patient selected the option of saving the natural teeth. Looking at the traumatic condition of the patient, Treatment plan decided was to do the replantation of right central incisor in its original position and autotransplantation of right lateral incisor in alveolar socket of left central incisor, because there was vast damage of alveolar ridge and gingival tissue of right lateral incisor.

The patient as well as parents were explained about the treatment procedure and the expected prognosis and informed consent was taken.

Before starting with procedure, the avulsed teeth were washed with stream of saline to remove contaminants. Then root surface was disinfected with 1% sodium hypochlorite dipped in gauze for 1 minute. After rinsing

thoroughly with saline avulsed teeth were kept in TAP powder mixed with saline for 5 minutes and was than rinsed with saline.

Local anesthesia was administered with lidocaine 2% with 1:100000 epinephrine. Firstly alveolar socket was irrigated with saline and then tooth 11 was replanted and 12 was autotransplanted in alveolar socket of 21 (figure 2). Intraoral periapical radiograph was taken to confirm the position of teeth in socket, occlusion was checked and interdental suture was given using 3-0 black silk to stabilize the replanted, autotransplanted teeth and traumatized soft tissues. Semi-rigid Splinting was done using 0.01" twisted ligature wire and acid etch composite resin technique for 4 weeks. (figure 3)

Extraoral soft tissue lacerations were closed using vicryl 3-0 suture material in simple interrupted pattern after administrating local anesthetic solu-tion and disinfecting the wound.

Post operative instructions were given to the patient to not bite on replanted and autotransplanted teeth, chlorhexidine mouthwash, oral hygiene instructions were given, and soft diet was advised for 1 week.

Antibiotic therapy with doxycycline 100 mg and non steroidal anti-inflammatory drug was prescribed for one week and the tetanus toxoid injection was given.

Patient was recalled for further treatment and follow-up. At 1st week follow-up endodontic access cavity was prepared working length was determined using # 10 K files (Mani) which was confirmed using apex locator (Root ZX mini) and radiograph (figure 4). Chemo-mechanical preparation was done using rotary protaper universal (dentsply, india) upto F4, canals were thoroughly irrigated with 1 % sodium hypochlorite and saline during chemo-mechanical preparation, canals were dried using absorbent paper points and was packed with calcium hydroxide (RC cal prime dental) for 1 week and

chamber was closed with cavit (EMSP). At 2nd week follow up canals were thoroughly irrigated with saline and obturation was done using Gutta percha and AH Plus sealer (figure 5).

Patient was recalled for follow up and further evaluation. Splinting was removed after 4 weeks at this stage gingival inflammation was noted, (figure 6), clinically teeth were in normal position with normal percussion tone and mobility. Radiograph revealed no sign of resorption or periapical osteitis. Looking at the gingival condition Oral prophylaxis was advised and emphasis were given on maintenance of oral hygiene. Vitality test with lower anterior revealed vital tooth with 31 and 41, composite restoration was advised and completed with 31 and 41.

At 3 months follow up satisfactory gingival healing was noted clinically patient was asymptomatic, clinically no sign of gingival inflammation was noted, percussion tone and mobility was observed to be normal, radiographs revealed no sign of resorption.

As the patient was asymptomatic and clinical and radiographic evaluation revealed good prognosis of the replanted teeth, further esthetic treatment was planned to do gingival recontouring with 21, direct composite build up with 21 and 22 followed by prosthetic replacement with 12. Gingival recontouring without osseous reduction was performed with 21 using electrocautery (figure 8) and patient was recalled after 7 days.

After 7 days follow up gingival healing was noted and Impression was made using alginate impression material (Tropicalgin Alginate) of both the arches, cast was made out of it and wax mock-up was done, labial silicon putty index was taken and tried in patient's mouth.

Teeth were cleaned with slurry of pumice and then the shade B2 as selected with VITA shade guide (figure 9).

Direct composite build up was performed using nanohybrid resin composite (Tetric N ceram). Adjacent

teeth were isolated, etching was performed with 37% phosphoric acid (N-etch), after rinsing and drying bonding agent was applied and cured for 10 seconds. First the composite layer was adapted to the putty index with plastic filling instrument and then it was resealed into the patients mouth ensuring its adaptation to the tooth and composite was light cured for 20 seconds.

Build up was done using layering technique. Occlusion of patient was checked and finishing and polishing was done with shofu supersnap polishing kit. (figure 10, 11). Prosthetic replacement was done with 12 using removable partial denture.

At 6 months follow up no sign and symptom were evident clinically. Radiographically slight surface resorption was evident which can be considered as favourable PDL healing reaction. Patient was recalled for further follow-up. During 2 years follow-up period, both the replanted and autotransplanted tooth remained in a stable, functional position but the autotransplanted tooth (21) showed initial replacement resorption.



Figure 3: Stabilization using Twisted Ligature Wire

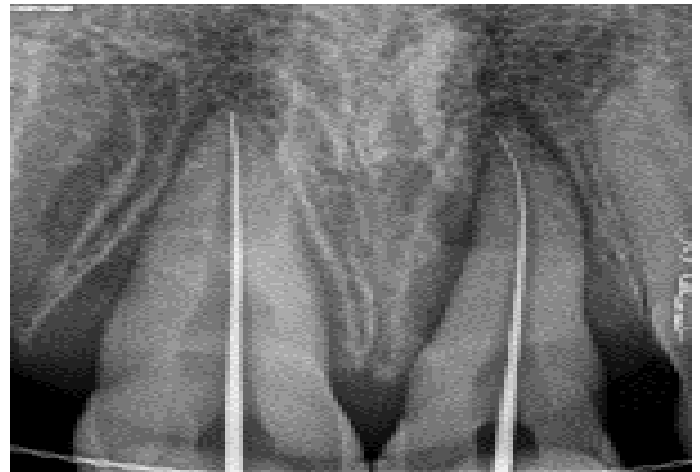


Figure 4: Working Length Determination



Figure 5: Obturation



Figure 1: Pre-Operative Clinical Picture



Figure 2: Replanted 11, Autotransplanted 12



Figure 6: At 1 Month Follow-Up



Figure 7: At 3 Months Follow-Up



Figure 8: Gingival Recontouring with 21



Figure 9: Completed Restoration



Figure 10: Smile of Patient Before and After Esthetic Correction

Discussion

Traumatic avulsion is a serious dental emergency which requires immediate treatment. Although there are

standards and various protocols in avulsion treatment, the success rate depends upon many factors.⁽⁶⁾

Each case of avulsion is unique and it depends upon the extent of trauma, the timing of the treatment provided, the status of the avulsed teeth and the appropriate management of the case.

The ideal treatment option of an avulsed tooth is immediate replantation so that further injury to the periodontal ligament (PDL) cells is prevented and the optimum healing without resorption is succeeded.⁽¹⁾ However, rapid replantation rarely can be done due to factors such as the emotional stress of parents and lack of knowledge of appropriate first-aid measures to manage the problem at the location of the injury.

In these conditions the tooth should be maintained in a suitable media such as Viaspan, HBSS, milk, saline, coconut water, propolis, culture media or saliva until it is replanted by a dentist. Yet, these storage media are not always available at the scene of injury except for saliva.

In this case due to lack of knowledge of patient regarding storage media, extraoral dry period was > 60 minutes. Replantation was carried out considering that, the extra-alveolar period and the type of transporting condition are not necessarily definite contraindications for replantation.⁽⁷⁾

Removal of PDL remnants has been pointed out as an advisable approach, Although both mechanical and chemical procedures have been employed for such purpose, it has been advocated that chemical procedures aid the preservation of the cementum layer, which is more resistant to resorption and should therefore be maintained.⁽¹⁴⁾

In this case Root surface was treated with TAP solution (1mg TAP powder/20ml saline) for 5 minutes, and was demineralized by Doxycycline (triple antibiotic solution) exposing the collagenous matrix of the hard tissues of the

root surface. This matrix acts as substrate for the mesenchymal cells, and also inhibit and reduce the bacterial adhesion. This procedure has also been recommended to expose the collagen fibers of the cementum surface and therefore yield more appropriate conditions for new connective fiber attachment.⁽⁸⁾

Recent research proposed preventing ankylosis by applying to the root surface a medium that favors the regeneration of injured parts of the PDL in delayed replantation of avulsed teeth.

Performed post-replantation and post-transplantation root canal treatment seemed to prevent against inflammatory root resorption, which is a frequent complication after tooth luxation or avulsion caused by pulpal infection.^(9,10)

In adolescents, infraocclusion of replanted tooth can be another complication related to the age of patient,⁽¹¹⁾ however in our case there were no clinical or radiological signs of infra-occlusion.

Transplantation and replantation prevented against alveolar bone loss and solved esthetic and treatment problems of any missing central maxilla incisors in this adolescent patient. Follow-up of 2 years showed the validity of the performed treatment.

Conclusions

Although satisfactory results were observed after following up for 6 months, further clinical and radiographic observations are required. From this case report it can be concluded that Objectives of replantation and autotransplantation can be successfully accomplished by proper pretreatment of the avulsed tooth even if it is done in unfavorable condition. In children for whom growth has not ceased, maintaining the bone for additional years until the child is suitable for permanent restoration can be considered as a viable therapeutic option.

References

1. J. O. Anderson & F. M. Anderson. Textbook of traumatic injuries to the teeth. 4th edition.
2. Lin S, Zuckerman O, Fuss Z, Ashkenazi M. New emphasis in the treatment of dental trauma: avulsion and luxation. *Dent Traumatol.* 2007;23(5):297-303.
3. Soares Ade J, Gomes BP, Zaia AA, Ferraz CC, de Souza-Filho FJ. Relationship between clinical-radiographic evaluation and outcome of teeth replantation. *Dent Traumatol.* 2008;24(2):183-8.
4. Bastone EB, Freer TJ, McNamara TR. Epidemiology of dental trauma: A review of the literature. *Aust Dent J* 2000;45:2-9.
5. Kolli NK, Challa R, Karthik A, Nuvvula S. Delayed replantation of avulsed tooth with 4½ days extraoral time with 18 months follow up. *J NTR Univ Health Sci* 2017;6:136-9.
6. Donaldson M, Kinirons MJ. Factors affecting the onset of resorption in avulsed and replanted incisor teeth in children. *Dent Traumatol* 2001;17:205-9.
7. Kolli NK, Challa R, Karthik A, Nuvvula S. Delayed replantation of avulsed tooth with 4½ days extraoral time with 18 months follow up. *J NTR Univ Health Sci* 2017;6:136-9.
8. Selvig KA, Bjorvatn K, Boogle GC, Wikesjo UM. Effect of stannous fluoride and tetracycline on repair after delayed tooth replantation in dogs. *Scand J Dent Res* 1992;100:200-3.
9. Fuss Z, Tsesis I, Lin S. Root resorption—diagnosis classification and treatment choices based on stimulation factors. *Dent Traumatol* 2003;19:175-82.
10. Malmgren B, Malmgren O. Rate of infraposition of reimplanted ankylosed incisors related to age and growth in children and adolescents. *Dent Traumatol* 2002;18:28-36.

11. de Jesus Soares A, do Prado M, Farias Rocha Lima T, Gomes BP, Augusto Zaia A, José de Souza-Filho F. The multidisciplinary management of avulsed teeth: A case report. *Iran Endod J* 2012;7:203-6.
12. N.Tatjana et al. Tooth auto-transplantation as an alternative treatment option: A literature review. *Dent Res J (Isfahan)* 2013 Jan-Feb; 10(1): 1–6.
13. Huseyin Tezel, Cigdem Atalayin, Gul Kayrak . Replantation after traumatic avulsion. *Eur J Dent.* 2013 Apr-Jun; 7(2): 229–232.
14. Lindskog S, Pierce AM, Blomlöf L, Hammarström L. The role of the necrotic periodontal membrane in cementum resorption and ankylosis. *Endod Dent Traumatol.* 2004;1(3):96–101.
15. Panzarini, S. R., Gulinelli, J. L., Poi, W. R., Sonoda, C. K., Pedrini, D., & Brandini, D. A. (2008). Treatment of root surface in delayed tooth replantation: a review of literature. *Dental Traumatology*, 24(3), 277–282.