Reliability of two different protocols used for intentional re-implantation of periodontally hopeless teeth

Snehal Prabhakar Deotale, Akhilesh Hemchandra Shewale,1 Deepti Rakesh Gattani,1 Aatif Iqbal Nathani,2 Ankur Mahesh Banode2

Fellow, Laser Dentistry (UNIGE), MDS Periodontology, United Kingdom, 1Department of Periodontology, SDKS Dental College and Hospital, 2MDS Conservative Dentistry and Endodontics, Nagpur, Maharashtra, India

Abstract:
Intentional re-implantation is the careful removal and re-insertion of an endodontically treated tooth performed with an attempt to preserve the natural dentition and patients’ esthetic concerns. Its limited success rate and a possibility to obtain undesirable outcomes such as root resorption and ankylosis of the tooth restrict its clinical use to be attempted only as a last option after routine procedures. A vast array of procedures have been performed till date with inconsistent results due to lack of analogous protocols followed. Regardless of having a controversial background behind its success in periodontally compromised teeth, this procedure raises a hope to avoid unwarranted natural tooth loss. Performing each step with precision governs the success of the treatment. This case report demonstrates two different techniques with an interdisciplinary approach assessed over 1 year each.

Key words:
Ankylosis, intentional re-implantation, interdisciplinary approach, periodontally compromised teeth, root resorption, tooth loss

INTRODUCTION

Intentional re-implantation of a tooth is a procedure which is anticipated to retrieve a hopeless natural tooth in the oral cavity by its extra-/intraoral endodontic manipulation followed by replanting it in the alveolar socket. An effective treatment can help re-establish natural tooth esthetics and maintain equilibrium in the oral cavity. Literature on assessment of long-term effects of intentional re-implantation of periodontally compromised teeth have shown contradictory results since one would expect an eventual tooth loss. Need for a long-term follow-up to evaluate possible undesirable outcomes such as root resorption and ankylosis of the tooth reserves its clinical use to be attempted only as a last option after routine procedures. In spite of a lower success rate than mundane tooth “saving” procedures, the procedure can be adopted as a cost-effective solution for unusual cases. It has also been established recently that, in comparison to restorative modalities such as single tooth implants or customized prostheses, an intentionally re-implanted tooth was an economical option with a survival rate of almost 88%. Till date, there is no consensus on its treatment protocol as it is usually the last resort and is infrequently performed. Various studies have been published using an array of techniques to safeguard the natural tooth. It is believed that performing each step with utmost precision oversees the success of the treatment. In this article, two different methods have been illustrated with an attempt to gain some clarity regarding the outcome of such a rarely performed interdisciplinary treatment strategy.

CASE REPORTS

Case 1
A 36-year-old male patient with noncontributing medical history grieved about his loose lower left front tooth. A detailed clinical examination revealed Grade 2 mobility with deep periodontal pockets with the mandibular left lateral incisor [Figure 1].

How to cite this article: Deotale SP, Shewale AH, Gattani DR, Nathani AI, Banode AM. Reliability of two different protocols used for intentional re-implantation of periodontally hopeless teeth. J Indian Soc Periodontol 2018;22:353-9.
Deotale, et al.: Intentional re-implantation of periodontally hopeless teeth

Figure 1: Preoperative clinical assessment with 32 (Case 1)

Figure 2: Radiographic assessment after endodontic therapy with 32 (Case 1)

Figure 3: Flap reflection (Case 1)

Figure 4: Apicectomy followed by root end filling with MTA of extracted 32 (Case 1)

Figure 5: Debridement of socket (Case 1)

Figure 6: Corticotomy in the socket of 32 (Case 1)

Figure 7: Re-implantation of 32 followed by splinting and demineralized freeze-dried bone allograft graft placement (Case 1)

Figure 8: Flap approximation with interrupted sutures (Case 1)
Figure 9: Radiographic assessment of 32 at 6 months (Case 1)

Figure 10: Radiographic assessment of 32 at 9 months (Case 1)

Figure 11: Clinical assessment at 1-year follow-up visit (Case 1)

Figure 12: Radiographic assessment at 1 year (Case 1)

Figure 13: Preoperative clinical assessment with 11 (Case 2)

Figure 14: Extracted tooth (Case 2)

Figure 15: Extracoronal root canal therapy done with 11 (Case 2)

Figure 16: Debridement of socket (Case 2)
Deotale, et al.: Intentional re-implantation of periodontally hopeless teeth

Figure 17: Re-implantation of 11 followed by splinting, presuture, and demineralized freeze-dried bone allograft bone graft placement (Case 2)

Figure 18: Amnion barrier membrane placed (Case 2)

Figure 19: Radiographic assessment with 11 at 3 months (Case 2)

Figure 20: Radiographic assessment with 11 at 6 months (Case 2)

Figure 21: Radiographic assessment with 11 at 9 months (Case 2)

Figure 22: Clinical assessment with 11 at 1 year (Case 2)

Figure 23: Radiographic assessment with 11 at 1 year (Case 2)

Figure 24: Frontal profile at 1-year follow-up visit (Case 2)
Treatment plan
After conveying the difficulty in preserving his natural tooth and explaining to him the restorative treatment modalities, the patient still wanted us to preserve his natural tooth owing to the expenses of the former. Finally, an attempt to save the natural tooth by performing an intentional re-implantation procedure was planned. All necessary pre- and postoperative treatment procedures/outcomes were explained to the patient, and a written consent was taken. Careful nonsurgical periodontal therapy was performed initially. Owing to the satisfactory stability of 32 due to the underlying granulation tissue, an intraoral root canal therapy was performed 1 week before the surgical procedure [Figure 2]. Four weeks after initial visit, the treatment site showed reduction in the inflammatory component, and hence, the surgery was executed.

Surgical procedure
Under local anesthesia, a full-thickness mucoperiosteal flap was raised beyond the extent of bone loss apical to 32 [Figure 3]. With all atraumatic precautions, extraction of 32 was cautiously performed keeping the beak of the forcep strictly on the crown of the tooth. The tooth was subjected to apicectomy, and a root end filling with mineral trioxide aggregate (MTA) was done [Figure 4]. During the entire procedure, the tooth was kept moist extraorally in a solution of tetracycline and sterile water to uphold decontamination and preserve the vitality of the periodontal ligament cells for not more than 20 min. Simultaneously, a thorough debridement of the socket and surrounding tissues was carried out [Figure 5]. A centrally directed corticotomy in the tooth socket was made to facilitate tooth placement with a motive to accelerate regeneration process [Figure 6]. The tooth was then re-implanted and fixed with labial and lingual resin-wire splints maintaining its position in the mandibular arch. Presutures were given and the remaining containable socket space was filled with demineralized freeze-dried bone allograft [Figure 7]. Suturing was completed [Figure 8] and a periodontal pack was given to provide additional stability to the re-implanted tooth. Owing to the treatment protocol, the tooth was kept out of occlusion which further facilitated its immovability. The patient was asked to follow an antibiotic regimen (amoxicillin 500 mg, BID for 5 days) and use of analgesic if and when required. Postoperative instructions included the use of 0.2% chlorhexidine mouthwash for 14 days and interdental brushing aid to maintain optimum oral hygiene at re-implantation site. Furthermore, the patient was asked to avoid consuming hard foodstuffs for the first 3 months until primary stability was achieved.

Regular follow-up visits included clinical evaluation at 1, 3 months and radiographic assessment at 6, 9 months [Figures 9 and 10]. At the 9-month visit, owing to slight improvement in tooth mobility, the lingual splint was removed whereas the labial splint was retained up to 1-year visit. A progressive improvement in the reduction in the probing pocket depth along with mild marginal gingival recession was observed at the end of 1 year [Figure 11]. Evidence of fractional radiographic bone fill was noted with 32 with no signs of root resorption or periapical pathosis at the 1-year follow-up visit [Figure 12].

Case 2
A 35-year-old systemically healthy female patient reported with a complaint of loose upper front tooth due to a history of a road accident. She wanted to get this tooth fixed before attending a family function in a few days. On a detailed clinical examination, it was noted that her labially placed maxillary right central incisor was Grade 3 mobile along with an overall probing pocket depth of 10 mm [Figure 13].

Treatment plan
The hopeless prognosis with 11 required an immediate extraction and the same was conveyed to the patient. However, she was unwilling to undergo any restorative treatment postextraction and wanted to retain her natural tooth. Weighing the pros and cons of the case, a treatment plan for intentional re-implantation was opted for. A written informed consent was taken from the patient.

Surgical procedure
A full-thickness mucoperiosteal flap was raised under local anesthesia and 11 was atraumatically extracted similarly to as described before. Within 20 min, the tooth was root planed and an extraoral root canal therapy was performed [Figures 14 and 15]. The tooth was constantly kept in tetracycline solution in the extraoral phase. Concurrently, the tooth socket was debrided [Figure 16]. The tooth which was pathologically migrated previously was then centrally placed in its socket and fixed with the help of labial and palatal splints. Presuturing followed by bone grafting [Figure 17] and barrier membrane placement was done [Figure 18]. After successfully flap approximation, a periodontal pack was placed over the replanted tooth. Postoperative instructions were given to the patient similar to as in the previous case, and an antibiotic regimen (amoxicillin 500 mg, BID for 5 days) was advised.

Clinical and radiographic monitoring of the patient was performed at 3-, 6-, 9-month and 1 year follow-up visits [Figures 19-21]. As an evident improvement in the stability of the tooth was noted at 9 months, the intraoral splints were removed. An overall betterment of clinical parameters with some gingival recession and improved stability with 11 could be appreciated at 1 year [Figure 22]. Satisfactory bone fill and absence of root resorption were noted on the radiograph at the 1-year visit [Figure 23]. Furthermore, the patient did not complain of any discomfort after removal of splints and was satisfied with the esthetic outcome [Figure 24].

DISCUSSION
Patients’ needs and satisfaction are of prime importance to the clinician. Sometimes, there arises a tricky situation for an operator where the latter has to maintain a balance between the demographics of the case and the patients’ mentality. A remedy for such thought-provoking circumstances in dentistry is the use of treatment techniques such as intentional re-implantation. While it has received criticism over the years for having a limited success rate, especially in periodontally negotiated teeth with hopeless prognosis, today we have scarce but significant literature that opposes our conventional thought process. Based on long-term evidence with a variety of techniques that can be applied to carry out the procedure,
two cases using an interdisciplinary approach were performed with 1-year follow-up each.

To obtain optimum results using this technique for a tooth with a weakened periodontium, two outcomes should be anticipated root resorption and ankylosis. To prevent the same, manipulation of several factors is obligatory.[13] The extraoral time of the extracted tooth before re-insertion is of utmost importance to preserve the vitality of the periodontal ligament cells to initiate regeneration. An extraoral time not exceeding 20 min is said to promote healing.[12,14] In both cases, an extraoral time of not more than 20 min was surpassed to perform the endodontic therapy.

The need to perform atraumatic extraction without breaking the walls of the socket facilitates regenerative process. This can be achieved by restricting the placement of extraction forceps on the crown of the concerned tooth.[10] Care was taken to follow this technique in both cases. The ambiguity for performing endodontic therapy in literature was dealt differently in both the cases depending on intraoral stability of the tooth before re-implantation.[6] In spite of the residual viable periodontal ligament cells being of utmost importance, Mahajan and Sidhu stated that removal of necrotic periodontal ligament remains, helped to curb the pathogenic microflora and raise the success rate of re-implantation.[11] Root planing showed the ability of the cementum to withstand resorptive process which was otherwise stimulated by remnants of necrotic periodontal ligament. Hence, the removal of necrotic periodontal ligament debris from the root surface significantly decelerated tooth resorption post-re-implantation.[12]

Since both cases involved periodontally compromised teeth, socket debridement was performed. Furthermore, root surface biomodification minimizes the chances of tooth resorption or ankylosis, and hence, in both cases, tetracycline was used for the same.[2] Apicectomy followed by retrograde filling has been advocated by most clinicians, but Sherman sternly believed that it would lead to root resorption.[12,23] Owing to the difference in opinion, both techniques were attempted in our cases. In addition, in an attempt to promote osteoinduction process, a corticotomy similar to that for implant placement followed by bone grafting was found to be beneficial and hence was performed in the first case.[6]

The role of type and duration of splinting on the healing of a replanted tooth has been an unavoidable topic for debate ever since the advent of this technique. Although it has been forecasted quite rightly that long-term splinting can cause root resorption or ankylosis, shortening the duration has not had any proven benefits.[14] Similarly, although the prognosis of different splint types has no effect on periodontal healing, it should be borne in mind to fabricate a splint that allows physiologic tooth movement.[15] In a case report by Demiralp, no radiographic signs of ankylosis or root resorption were seen along with significant bone fill by splinting the re-implanted tooth up to 3 months.[4] Demir et al. performed splinting of re-implanted tooth with adjacent teeth using composite resin which was retained up to 12 months. They observed that the preoperative radiolucency surrounding the tooth was replaced completely by circumferential bone fill.[16] A similar protocol with splint retention for 14 months was performed by Nagappa in one of his cases, exhibiting an improved radiographic status at 14 months with no signs of periapical pathosis.[8] Owing to an existing weakened periodontium with a large bone defect and limited improvement in tooth mobility, in the first case, we retained the intraoral splinting for up to 1 year. In contrast, by 9 months, the re-implanted central incisor in the second case was relatively firm, and by 12 months, the previously Grade 3 mobile tooth now had mobility within physiologic limits. With respect to the radiographic bone fill, slight restoration of defect was noted with the first case whereas the second case showed significant repair.

Postoperatively, no advert findings such as root resorption, excessive mobility, or disproportionate clinical crown-root ratio that could give way to esthetic concerns were noted in both cases. Furthermore, both patients were satisfied because their needs of retaining the natural tooth, financial and time constraints to opt for other certainly efficacious restorative procedures, and esthetics were very well taken care of by the clinician. However, a comparable clinical and radiographic difference in the type and duration of healing can be noted in the two treatment protocols followed. This can be attributed to the differing methodology followed in each as well as the role of local and systemic factors that vary for every individual. Thus, an inference can be drawn to perform “case-specific evidence-based treatment” rather conventional therapy.

CONCLUSION
Intentional re-implantation is a ray of hope for cases that fail to stand up for conventional therapy. It helps to curb patient concerns that are sometimes overlooked in routine procedures. It can also be attempted in periodontally comprised cases with vigilant handling of surrounding tooth structures. Various regenerative strategies can be combined to obtain fruitful outcomes. This report of two cases demonstrates one such effort in the management of teeth with hopeless prognosis with satisfactory patient acceptance.

Declaration of patient consent
The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

REFERENCES
1. Grossman LI. Intentional replantation of teeth. J Am Dent Assoc 1966;72:1111-8.
2. Rouhani A, Javidi B, Habibii M, Jafarzadeh H. Intentional replantation: A procedure as a last resort. J Contemp Dent Prac 2011;12:486-92.
Deotal, et al.: Intentional re-implantation of periodontally hopeless teeth

3. Cho SY, Lee SJ, Kim E. Clinical outcomes after intentional replantation of periodontally involved teeth. J Endod 2017;43:550-5.
4. Demiralp B, Nohutcu RM, Tepe DI, Eratalay K. Intentional replantation for periodontally involved hopeless teeth. Dent Traumatol 2003;19:45-51.
5. Baykara M, Eratalay K. Replantation in cases with advanced periodontal destruction. J Hacettepe Fac Dent 1995;19:124-8.
6. Nagappa G, Aspalli S, Devanoorkar A, Shetty S, Parab P. Intentional replantation of periodontally compromised hopeless tooth. J Indian Soc Periodontol 2013;17:665-9.
7. Mainkar A. A systematic review of the survival of teeth intentionally replanted with a modern technique and cost-effectiveness compared with single-tooth implants. J Endod 2017;43:1963-8.
8. Patel GK, Gujari SK, Annapoorna BM, Veerendra Kumar SC. Management of chronic luxated central incisor with hopeless prognosis. J Indian Soc Periodontol 2013;17:670-5.
9. Becker BD. Intentional replantation techniques: A critical review. J Endod 2018;44:14-21.
10. Peer M. Intentional replantation – A ‘last resort’ treatment or a conventional treatment procedure? Nine case reports. Dent Traumatol 2004;20:48-55.
11. Mahajan SK, Sidhu SS. Periodontal ligament, extra-oral period and use of fluorides in replantation of teeth. Indian J Med Res 1982;75:441-5.
12. Lindskog S, Pierce AM, Blomlof L, Hammarstrom L. The role of the necrotic periodontal membrane in cementum resorption and ankylosis. Endod Dent Traumatol 1985;1:96-101.
13. Sherman P Jr. Intentional replantation of teeth in dogs and monkeys. J Dent Res 1968;47:1066-71.
14. Andreasen JO. The effect of splinting upon periodontal healing after replantation of permanent incisors in monkeys. Acta Odontol Scand 1975;33:313-23.
15. Hinckfuss SE, Messer LB. Splinting duration and periodontal outcomes for replanted avulsed teeth: A systematic review. Dent Traumatol 2009;25:150-7.
16. Demir B, Demiralp B, Guncu GN, Uyanik MO, Caglayan F. Intentional replantation of a hopeless tooth with the combination of platelet rich plasma, bioactive glass graft material and non-resorbable membrane: A case report. Dent Traumatol 2007;23:190-4.