

Intentional Replantation: An Updated Protocols in Endodontic Retreatment

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Summary

Intentional replantation (IR) is a concept that has been known for over a thousand years, it is defined by Grossman (1966) as an atraumatic extraction of a tooth and its reinsertion into its socket immediately after endodontic treatment and apical repair is done extra-orally. Some authors consider intentional replantation to be a last option; whereas others consider it as another treatment modality. However, in cases where a dental implant, nonsurgical retreatment or surgical treatment is not possible, intentional replantation may be a viable treatment option. Recent case reports have demonstrated that with good case selection, intentional replantation can be a reliable and predictable procedure.

Key Words: Intentional replantation, retrograde preparation and root end resection

Background

The concept of an Intentional replantation (IR) has been known for over a thousand years, it is defined by Grossman (1966) as an atraumatic extraction of a tooth and its reinsertion into its socket immediately after root canal treatment treatment and apical repair is done extra-orally [1-3].

There are many indications to perform the replantation such as small mouth opening and trismus where inter-occlusal space is less to perform conventional endodontic treatment, difficult access in the posterior teeth especially in mandibular molars because of greater bone thickness, conventional retreatment is not feasible due to any obstruction in the canal (i.e. posts, separated instruments, impassable ledges or perforation) [8], surgical approach to the apices is not possible due to anatomic limitations in mandibular molars, conventional and surgical treatment has failed and tooth is symptomatic, visibility is inadequate due to uncontrolled hemorrhage, direction of roots and angle of bone, hence root end filing becomes difficult, root perforation and resorptive defects which does not respond to conventional treatment, and accidental avulsion (unintentional replantation) [8].

On the other hand, contraindications of replantation are when the extraction is difficult such as in a particular health condition, tooth is non-restorable, curved and flared root, missing inter-septal bone and if the patient is not willing for treatment [8].

Case selection is the most crucial aspect of replantation. The sensitive portion of the treatment is removal of the tooth atraumatically. Tooth with straight roots is an ideal case. The advantage of performing replantation over length surgical procedure is that it is less complicated. The disadvantage is the risk of tooth fracture and root resorption [9].

Patient's Case Presentation

A 42 – year – old female was referred to dental clinic due to persistent pain and swelling related to tooth #47. She was

informed that the root fillings were short from the previous old root canal treatment. The tooth was treated endodontically and restored with full gold crown 5 years ago (*Figure 1*). Upon clinical examinations, a soft tissue swelling related to the tooth was noticed. The tooth was tender to percussion and mobile (Grade II). The probing depth was more than 10mm pocket surrounding the tooth (*Figure 2*). Based on clinical and radiographic findings, the diagnosis of chronic apical periodontitis associated with C-shaped canal was established. Radiographic examination revealed a 3-rooted mandibular second molar, and all the roots seemed to be fused together with C-shaped canal.

Treatment Modalities

It was concluded that conventional root canal retreatment was not possible because of difficulty in negotiating all root canals and patient's desire to save the gold crown. Hence, intentional replantation was planned. During the day of surgery, patient was given a pre-operative anti-inflammatory drug. With delicate luxation using a lower molar forceps, the tooth was extracted without fracture (*Figure 3*). The roots were fully connected and no any perforation was observed (*Figure 4*).



Figure 1. Pre-operative Lower occlusal view.



Figure 2. Pre-operative pre-apical radiograph of tooth #47.



Figure 3. Atraumatic simple extraction using lower right molar forceps.



Figure 4. Tooth #47 out of socket.

During intentional replantation, the tooth was kept under wet gauze (≤ 15 minutes) for maintaining the PDL cells of the root surface vital. The alveolus was subjected to curettage to remove any inflammatory tissue. The alveolus was irrigated

with sterile saline solution. Using a sterile gauze sponge, the tooth was held by hand on the crown and the roots were blunted using high-speed hand-piece. Root end resection and removal of the resorptive defect was performed extra-orally (*Figure 5*).

Retrograde preparation was made with ultra-sonic tip (*Figure 6*) and MTA was condensed into the prepared tooth (*Figure 7*). The tooth was then gently replanted into its socket (*Figure 8*). A sling suture around the tooth was used as a splint. The occlusion was adjusted on that tooth. The patient was given post-operative oral hygiene instructions and was asked to use an antiseptic mouthwash (0.2% Chlorohexidine). She was also advised to have a soft diet, and not to chew on the surgery site.

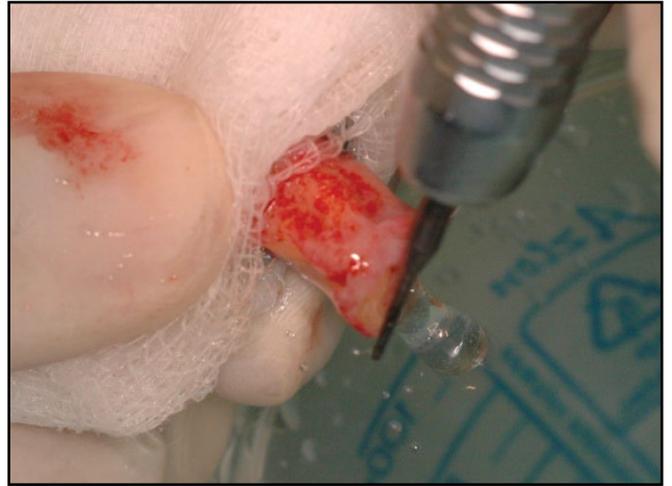


Figure 5. Root end resection.

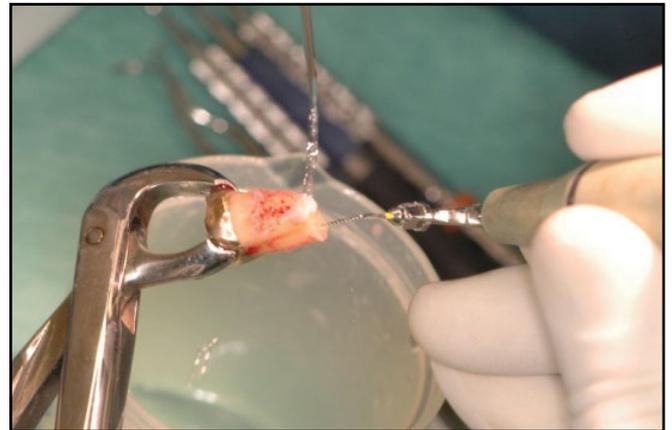


Figure 6. Retrograde preparation.



Figure 7. Retrograde filling.

Outcome and Follow-Up

One month later, the patient reported mild discomfort only. The clinical symptoms completely disappeared and there were no evidence of radiographic changes (*Figure 9*). Six months later, the peri-apical rarefaction shows a marked reduction in size with new PDL formation in inter-radicular area (*Figure 10*). At the 13 months recall visit, the tooth was asymptomatic and a progressive healing of the lesion was evident (*Figure 11*).

Discussion

The preservation of natural dentition is the primary goal of any conservative treatment modality [4]. Although it is not



Figure 8. Post-operative radiograph of tooth #47.



Figure 9. Follow up of tooth #47 at 1 month.



Figure 10. Follow up of tooth #47 after 6 months.



Figure 11. Follow up of tooth #47, One year later.

the primary therapy of choice, intentional replantation as an alternate treatment should not be underestimated, especially when conventional treatment is not applicable [6]. The success of this treatment primarily depend upon the maintenance of aseptic conditions during the intervention, atraumatic extraction, minimal manipulation of the periodontal ligament, short extra-oral time, minimizing occlusal forces following replantation, as well as carefully controlled postoperative patient compliance [7].

Many cases selected for intentional replantation are treated for several different reasons. Intentional replantation may be more suitable for second molars, which are likely to have fused/convergent roots, and for single rooted teeth [2]. However, each case and the operator's ability must be assessed individually [8]. For example, the presence of extensive apical bone loss around lower first molars will invariably allow easier extraction irrespective of the root divergence [8]. Intentional replantation may also impose fewer risks and cause less complication than peri-radicular surgery, e.g. nerve injury, or maxillary sinus access and complications [2].

In this case, the patient came to the clinic presenting an unsatisfactory endodontic treatment, persistent pain, swelling, and sensitivity to percussion and palpation. Intentional replantation was chosen as the treatment option on the basis of the clinical indications are roots of lower second molar are likely to have fused roots, and difficulty in negotiating all canals. Also, the patient refused to undergo a peri-apical surgery because she had to pay a large sum of money to do full gold crown and does not want to lose her tooth. With proper case selection, the procedure is simple and straight forward [9] and there is less chance of damaging vital structures adjacent to the teeth [9]. Extraction of the tooth from its socket was done successfully without causing root fracture or alveolar bone fracture, while trying to preserve the periodontal ligament and not causing too much pressure on the tooth and socket walls.

In this case, the extra-oral time needed was almost 20 minutes for extraction and management of the unusual root morphology. The tooth was kept under wet gauze for maintaining the vital PDL cells. Hammarstrom et al [10] reported that the initial ankylosis did not show when experimental group tooth was treated with the extra-oral (complete dry) time of 15 minutes; therefore fair prognosis of the tooth was expected.

Recently, MTA has been accepted as the material of choice for root-end filling in endodontic surgery [11], but MTA is a technique sensitive material of root end filling for handling in comparison with other materials [12]. Several properties are necessary when choosing a root-end filling material including sealing ability, antibacterial activity, and more importantly cementogenesis. It is thought that subsequent to peri-radicular surgery, mesenchymal cells initiate the healing process by differentiating into mature cells such as osteoblasts, fibroblasts, or cementoblasts thus inducing osseous regeneration and apical attachment healing [13,14].

The advantage of intentional replantation for patients include reduction in clinical time, complications and expense compared to non-surgical endodontic retreatment. Furthermore, with good case selection, the skilled general practitioner may find IR simpler to perform than endodontic retreatment or peri-radicular surgery [8].

Certainly the risks of intentional replantation were considered, acknowledged and conveyed to the patient. Her

desire to save the tooth was made with all these issues in mind, fortunately to date; this procedure resulted in the continued retention of the tooth [9].

Conclusions

Some authors consider intentional replantation to be a last option; whereas others consider it as another treatment modality [9]. However, in cases where a dental implant, nonsurgical retreatment or surgical treatment is not possible, intentional replantation may be a viable treatment option. Recent case reports have demonstrated that with good case selection, intentional replantation can be a reliable and predictable procedure [15-17].

Intentional replantation can have a high success rate with different bio-regenerative materials and be far less expensive than other treatment options. Further long-term follow-up will be provided in order to give us accurate results with respect to intentional replantation.

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