**Intentional Replantation: A Viable Treatment Option for Bifurcation Perforation: Case Report**

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**Abstract**

Intentional replantation is a procedure in which an intentional tooth extraction is performed followed by reinsertion of the extracted tooth into its own alveolus after doing needful treatment. This case report describes intentional replantation in mandibular left first molar as a treatment approach for perforated bifurcation. At 7 weeks follow up the patient remained asymptomatic, radiograph showed healing and no evidence of root resorption.

**Keywords:** Extraction, Intentional replantation, Perforated bifurcation

**Introduction**

Intentional replantation is defined as the purposeful extraction of a tooth in order to repair a defect or cause of treatment failure and thereafter the return of the tooth to its original socket [1]. Any tooth that can be atraumatically removed in one piece is a potential candidate for intentional replantation.

However, specific indications include: [2,3]

- all other endodontic non-surgical and surgical treatments have failed or are deemed impossible to perform;
- limited mouth opening that prevents the performance of non-surgical or peri-radicular surgical procedures;
- endodontic procedures;
- root-canal obstructions; and
- restorative or perforation root defects that exist in areas that are not accessible via the usual surgical approach without excessive loss of root length or alveolar bone.

Contraindications may include: [2]

- long, curved roots;
- advanced periodontal diseases that have resulted in poor periodontal support and tooth mobility;
- multi-rooted teeth with diverging roots that make extraction and reimplantation impossible; and teeth with non-restorable caries.

In order to provide the best long-term prognosis for a tooth that is to be replanted intentionally, the tooth must be kept out of the socket for the shortest period possible [4], and the extraction of the tooth should be atraumatic to minimise damage to the cementum and the periodontal ligament [5]. The periodontal ligament attached to the root surface should be kept moist in saline, Hank's Buffered Salt Solution (HBSS), Viaspan or Doxycycline solution for the entire time the tooth is outside the socket.

Grossman and other thought [6]: IR should be introduced as a procedure of last resort. IR has been proposed as an alternative to routine extraction by many researchers; however, it should be considered a last resort because the root may be fractured during extraction. It should not be suggested for routine use because its success rate is far below than routine RCT or apical surgery [7].

IR may have some advantages over surgery [8], including:

1. easier procedure
2 - less time consuming
3 - less invasive.

Case

We have documented a clinical case to exemplify the potential of intentional replantation as a viable treatment option in bifurcation perforation case.

A 34-year-old male patient presented with perforated bifurcation, bad treatment and chronic mild pain. On the tooth #36 (Figures 1 and 2). The tooth was badly destroyed and with a little mass of remaining walls. All efforts to retreatment were futile.

Apical surgery was ruled out because accessibility to the mesiolingual root would have been limited.

We decided to replant the tooth intentionally and discussed this treatment option with the patient, who agreed to our proposal.

Once we had obtained adequate anesthesia, the tooth was extracted atraumatically with an extraction forceps. We did not use surgical elevators and took care that the beaks did not go beyond the cemento-enamel junction (CEJ), as this may have damaged the cementum and the periodontal ligament.

Following extraction, we kept the tooth moist by immersing it in Viaspan. With the beaks of the forceps, we held the tooth by its crown, all of the infected tissues were curettaged and we removed any remains that may cause any inflammation or infection later. Thereafter, we performed a 3 mm Class I root-end preparation with an ultrasonic tip, at the apical end of all three canals.

A retrograde filling was done with mineral trioxide aggregate (MTA). The extraction socket was then irrigated with normal saline and gently suctioned to remove blood clots. The tooth was carefully reinserted into its socket and brought into occlusion with digital manipulation and patient bite force. The tooth was stabilized in its socket with a sling suture. The patient was reevaluated after seven days, and the sutures were removed (Figures 3-8).

Figure 1: A clinical image of the #36 before IR.

Figure 2: A radiological image of the #36 before IR.

Figure 3: The tooth outside of its socket.

Figure 4: After endodontic treatment and curettage.

Figure 5: Applying MTA on perforated site.
Discussion

Intentional replantation in dentistry has been performed for more than ten centuries and was used extensively to manage odontalgia. At the eleventh century AD, Abulcasis described the first account of replantation and the use of ligatures to splint the replanted tooth [2]. In 1561, Pare recommended its use when a healthy instead of a diseased tooth was mistakenly extracted. In 1712, Pierre Fauchard replanted a tooth and reported it to be stable on follow-up [2]. Several steps in the replantation were debated, for instance the need for amputation of root apices, immediate or delayed replantation, root-canal obturation before or after replantation, removal or preservation of periodontal ligament cells and the goal of ultimate healing-bony ankylosis or ligament repair.

The success or failure of the intentional replantation depends on vitality of PDL cells [9,10]. These cells can be kept vital while the tooth is out of the socket by keeping the tooth moist and in aseptic condition. The extraoral time is crucial which should be limited to 20 - 30 minutes. Proper planning and team work is the key.

Fredel in 1887 and Scheff in 1890 addressed the role of periodontal ligament cells with regard to external root resorption after replantation [2].

As the replantation technique became increasingly refined, it was used as an easy alternative for failing root-canal treatment and hence evoked sharp criticism for the technique of replantation per se.

There are many reasons for an adverse outcome of a replantation: the tooth can fracture during extraction and may be completely lost; peri-cemental tissues can be damaged, reducing the likelihood of reattachment; infection; external root resorption; and ankylosis. Therefore, it is extremely important to understand that intentional replantation should be the last choice, selected only when all the other options of treatment — non-surgical and surgical — have been exhausted. Replantation can be a treatment of choice in cases in which a surgical approach can be difficult, for example on the lingual root of a mandibular molar, or in cases in which a surgical approach would be very invasive, such as the removal of thick bone from the buccal aspect of a second mandibular molar.

Intentional replantation has a better prognosis when the extra-oral time is kept as short as possible and trauma to the periodontal ligament and cementum is minimized [11]. It is advisable to perform routine endodontic treatment intra-orally before the tooth is extracted to minimize the extra-oral time. It is also suggested that a team of two dentists work in tandem to prevent prolonged treatment time, thus improving the chances of success [2]. The use of elevators should be avoided, and the beaks of the extraction forceps should not go beyond the CEJ. The cortical bone integrity should be maintained, and the tooth should be extracted as atraumatically as possible [12,13].

The medium in which the tooth is kept moist plays an important role. Saline, HBSS, milk, Viaspan, to name a few, are widely used. Viaspan is used for organ transplantation and preservation. Owing to its antioxidant activity, the solution keeps the periodontal ligament moist and reduces the likelihood of surface resorption [3,14].

Extra Oral Time is a very important concern in this procedure and it should be reduced as much as possible. Many researchers believe that 20 to 30 minutes may be considered the maximum extra oral time [15].

We generally use ultrasonic tips to prepare the root-end and
the debridement of the PGG. It conserves the tooth structure and produces significantly less smear layer compared with burs. Commonly used root-end filling materials are amalgam, Intermediate Restorative Material (IRM), Super EBA, GIC, Diaket, composite and MTA. The sealing ability and marginal adaptation of MTA have been proven to be superior and not adversely affected by blood contamination. In addition, MTA promotes deposition of new cementum and stimulates osteoblastic adherence to the retro-filled surface [16-18].

After replantation, the tooth was splinted for 7 days. The splint enabled physiological movement of the tooth to prevent ankylosis. Endodontic treatment was completed one week after replantation in order to prevent inflammatory resorption and ankylosis and to allow splicing of periodontal fibres, which limits the seepage of potentially harmful root-filling materials into the traumatised periodontal ligament [17].

Final restoration of the tooth was sub occlusal to avoid loading and to ensure that proper healing of periodontal ligament took place.

In recent years, several bio-modulators, such as enamel matrix protein [19], hydroxyapatite and platelet rich plasma [20,21], have been used in intentional replantation cases to improve the success rates. Guided tissue-regeneration techniques can also be employed along with these supplements to further improve the likelihood of success.

References
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