Eight-year follow-up of successful intentional replantation

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Fig. 1_Pulpal diagnosis: necrosis, narrow periodontal pocket 10mm deep, Grade IV mobility.

Fig. 2_A radiograph after six months: same pocket depth, Grade II mobility, plenty of exudate.

Fig. 3_Extracted, apex filled with MTA, no exudate and Grade I+ mobility at the six-month recall.

‘Although the success ratio for intentional replantation is far below that for routine or surgical endodontics, this procedure should be considered an alternative to tooth extraction’

Fig. 4_A radiograph after six weeks showing the healing periapical lesion.

Fig. 5_A radiograph after six months showing no fractures, no alveolar PDL, Grade I mobility.

Fig. 6_A radiograph after six weeks showing the healing periapical lesion.

Introduction

Intentional replantation (IR) is the extraction of a tooth to perform extra-oral root canal therapy, curettage of an apical lesion when present and its replacement in its socket.1,2 Grossman in 1982 defined it as follows: “A purposeful removal of a tooth and its reinsertion into the socket almost immediately after sealing the apical foramina.” He also stated that it is “the act of deliberately removing a tooth and following examination, diagnosis, endodontic manipulation, and repair, returning the tooth to its original socket to correct an apparent clinical or radiographic endodontic failure”1. It is a one-stage treatment that will maintain the natural tooth aesthetics if successful.1

This method was first reported nearly a thousand years ago. In the eleventh century AD, Abulcasis gave the first account of replantation and use of ligatures to splint the replanted tooth.3 Fauchard, in 1712,1 reported an IR performed 15 minutes after extraction. In 1788, Bredmores reported IR of mature and immature teeth.4 In 1878, Woofendale reported IR of diseased teeth.5 In 1878, Hunter believed that boiling the extracted tooth prior to replantation might help to remove the tooth disease.6

In 1890, Scheff7 addressed the role of the periodontal ligament (PDL) in the prognosis of replanted teeth. In 1955, Hammer8 described the importance of leaving an intact PDL on intentionally replanted teeth. He believed that a healthy PDL is essential for reattachment and retention of replanted teeth. He stated “an average 10 years life span could be expected when replantation was accomplished in a technically flawless manner.” In 1961, Loé and Warshaw9 tried to replant teeth immediately to keep the PDL vital. Consequently, ankylosis was not seen; however, all teeth showed resorption repaired with cementum. These results were confirmed by Deeh in 196510 and Edwards in 1966.11 In 1968, Sherman12 showed that normal PDL could be kept vital.

Intentional replantation is specifically indicated:
• When all other endodontic non-surgical and surgical treatments have failed or are deemed impossible to perform
• When the patient is not able to open his or her mouth fully, preventing the performance of non-surgical or peri-radicular surgical endodontic procedures
• In the case of root-canal obstructions
• When there are restorative or perforation root defects in areas that are not accessible via the usual surgical approach without excessive loss of root length or alveolar bone

Contra-indications may include:
• Long, curved roots
• Advanced periodontal diseases that have resulted in poor periodontal support

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, and the extraction of the tooth should be atraumatic to minimise damage to the cementum and the PDL.13,14 The PDL, attached to the root surface be kept moist in saline, Hank’s balanced salt solution, Viaspan or a doxy-cycline solution for the entire time the tooth is outside the socket.

We have documented three clinical cases to exemplify the potential of IR as a viable treatment option in select endodontic cases. The purpose of this article is to report a case of successful IR as an alternative to extraction.15–17

Case report

A 48-year-old woman was referred for evaluation and treatment of a painful mandibular left second molar. The patient described recent severe throbbing pain associated with the left second molar area, extending to the left ear, of three days’ duration. The patient stated that she had had a cavity in tooth 37 (Fig. 1) and her dentist had performed root-canal therapy a few months before her presentation. Upon examination, tenderness to percussion and palpation were noted and sulcus depths around tooth 37 did not exceed 5mm. Radiographic examination revealed an endodontic failure associated with a peri-radicular radiolucency (Fig. 2).

The patient was anaesthetised, and tooth 37 was extracted and received in a sterile gauze sponge saturated with...
saline solution. The wound was packed with sterile gauze and the patient asked to close her teeth together to immobilise the pack. Resection of both the mesial and distal roots was performed by bevelling the root tip with a #702 bur in a straight handpiece. Retro-preparation of the mesial root was accomplished using a #1/2 round bur in a contra-angle handpiece with copious irrigation. An MTA retrograde filling was placed in the root canals (Fig. 5). Once the extra-oral procedure had been completed the socket was irrigated gently with a normal saline solution to remove the clot and the tooth was replanted. No splint was needed.

Six weeks later, the patient was asymptomatic and the replanted tooth was firm in its socket. At the time, the patient was advised to proceed with the final restoration on the replanted molar (Figs. 6-8).

After one year (Fig. 9), three years (Fig. 10), four years (Fig. 11) and eight years (Fig. 12), the patient attended for evalu-

ation and radiographs were taken of the tooth. The radiographs showed no evidence of resorption and the patient was asymptomatic.

Discussion

Intentional replantation is an accepted endodontic procedure in cases in which intra-canal and surgical endodontic treatments are not recommended. Although not frequently used, IR is a treatment option that dentists should consider under these conditions. If the standard protocols during IR are not followed, root resorption and ankylosis may be observed within one month and one to two months, respectively.

Most resorative processes are diagnosed within the first two to three years. However, although rare, new resorptive processes could occur even after five or ten years.17

As various investigators report varying success rates, it is difficult to predict the outcome for IR.

Bender and Rossman evaluated 51 cases with an overall success rate of 80.6 per cent (six recorded failures). Replanted teeth survived from one day to 22 years. A second mandibular molar that failed after three weeks was replanted successfully a second time with no signs of failure after 46 months of follow-up.

Majaronan et al. followed 45 cases of dental trauma for five years, recording complications and responses to treatment. Root resorption was observed in 45 cases (17.24 per cent). Of these, nine were associated with luxation injury (20 per cent) and 56 (80 per cent) with avulsion. The authors identified 50 cases of inflammatory root resorption (18 transient and 12 progressive) and 15 cases of ankylosis and osseous replacement.

Bender and Rossman evaluated two cases of IR and retrograde filling of mandibular second molars. At the five-year recall visit, radiographs showed no evidence of pathological changes.

Nuzzolese et al. state that the success rate of IR at five years reported in the literature ranges from 70 to 91 per cent.

Al-Hezaimi et al. treated a radicular groove that predisposed a 15-year-old girl to a severe periodontal defect with a combination of endodontic, IR and Emdogain (Straumann) therapy. At the one-year follow-up, the patient was comfortable and active healing was evident.

Demiralp et al. evaluated the clinical and radiographic results of IR of periodontally involved teeth after conditioning root surfaces with tetracy-
Cline hydroxide. Thirteen patients (seven women and six men; age range: 35–52 years) with 15 periodontally involved non-salvageable teeth were included in this study. During the replantation procedure, the affected teeth were gently extracted and the granulation tissue, calculus, remaining PDL and necrotic cementum on the root surfaces were removed. Tetracycline hydroxide, at a concentration of 100mg/ml, was applied to the root surfaces in the replantation office when patients presented with root canals that require retreatment due to failure or those that cannot be completed owing to sclerosing of the canals.

Intentional replantation is a treatment alternative that should not be underrated, especially when conventional endodontic or surgical treatment is not possible. This is an excellent treatment with a predictable result. I have performed approximately 50 re-plantations, and have lost only one tooth to date.

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Editorial note: A complete list of references is available from the publisher.