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Case Report

Intentional Replantation of Lower Second Molar with Strip Perforation and Endodontic-Periodontal Lesion, Three-year Follow-Up

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Abstract

Intentional tooth replantation (IR) can be a substitutional treatment option for teeth with guarded prognosis where non-surgical retreatment is impractical and surgical treatment is not possible due to anatomic limitations. This procedure can help to maintain natural tooth dentition to function rather than prosthesis or implant replacements. A 33-year-old female presented for endodontic department in KAMC with persistent chronic apical abscess of a previously root canal-treated mandibular left second molar. A root canal treatment was previously done in the same hospital, four years ago. According to the patient/tooth's situation, intentional replantation was planned using bioceramic cement for retrograde filling. Over three years clinical and radiographic follow-up post-operatively, no sign or symptoms of infection or inflammation were noticed. In addition, radiographic findings showed a periradicular healing.

Keywords: *Intentional Tooth Replantation (IR); Lower Second Molar; Strip Perforation; Endodontic-Periodontal Lesion*

Introduction

Intentional tooth replantation (IR) was defined by Grossman as an atraumatic extraction of the tooth and replant it instantly into the socket after endodontic treatment and apical repair [2]. IR can be a substitutional treatment option for teeth with poor prognosis, due to iatrogenic errors, where non-surgical retreatment is impractical and surgical treatment is not possible due to anatomic limitations (e.g. buccal plate thickness, proximity to anatomical structures, such as the mandibular nerve or maxillary sinus) [1,4].

A number of studies advocated that IR should be considered as a "last resort" for retreatment of very complex cases where conventional surgical or non-surgical treatments are not recommended or have previously failed [2,3]. Other authors believe that IR is an economical and conventional technique, also for less complex cases, because it is easier, more rapid to perform, and with a good outcome [4]. A recent clinical study on intentional replantation reported long-term survival rates of 77% [6].

Contraindications to intentional replantation include: teeth with flared and curved roots that have a high risk of fracture during extraction, non-restorable tooth and vertically fractured teeth [4].

The treatment of teeth with endodontic-periodontal lesion is more challenging because the prognosis can also rely on the degree of periodontal involvement [7]. Moreover, these endo-perio lesions can be induced by iatrogenic errors such as perforations and fractures, which are often difficult to clinically assess and to repair [4]; however, it has not been recommended to perform intentional replantation for teeth with mobility, furcation involvement, or gingival inflammation [3].

This case report presents a mandibular second molar associated with failed RCT and a large periapical lesion with periodontal involvement, due to iatrogenic errors, which was treated successfully with IR using a bioceramic material as a retrograde filling.

Case Report

A healthy 33-year-old female patient presented to the Department of Endodontics at King Abdulaziz medical city, Jeddah with a chief complaint of severe pain related to lower posterior left tooth (pointed at tooth #36) and swelling with a slight discomfort related to the last tooth in the same quadrant (pointed at tooth #37). The patient reported that the swelling had started around two months ago.

RCT for tooth #37 had been done in the same hospital by an endodontist four years ago and pulpectomy for tooth #36 had been done seven months ago. After her medical history was reviewed, an extraoral examination was carried out, showing no remarkable signs. Intraoral examination revealed a moderate swelling located coronally related to tooth #37 (Figure 1) with a deep, narrow, isolated periodontal pocket in the mid-buccal surface of the tooth (10 mm). The tooth received a full porcelain fused to metal crown. The radiographic examination showed a large apical radiolucency related to both teeth #36 and #37 with furcal radiolucency related to tooth #37 (Figure 2-3).

CBCT (iCAT Imaging Sciences International, Hatfield, PA) was taken for further analysis and evaluation of the case. However, no direct sign of vertical root fracture (VRF), missed canal or other causes of failure could be visually detected, even if a periodontal lesion was present in the furcation area (Figure 4). The lesion was bigger in 3D, suggesting a hidden endodontic problem, but images were not able to confirm any precise diagnosis.

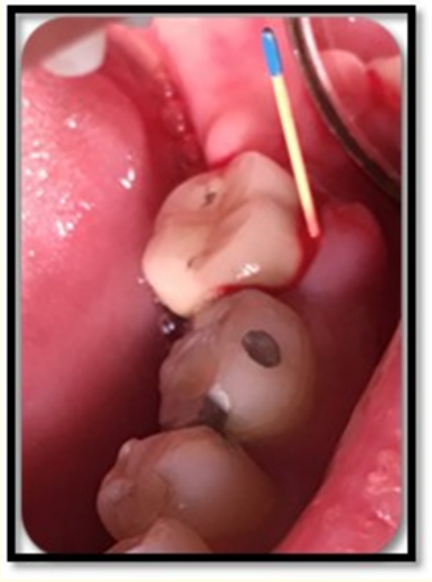

Figure 1

Figure 2

Figure 3: *Preoperative radiographs.*

Regarding tooth #37, the patient was informed of the poor prognosis of a conventional retreatment and was given the following alternative treatment options: extraction and a dental implant, extraction with no replacement, or intentional replantation. The patient rejected the first two treatment options because she wanted to save the crown and was determined to maintain the tooth by any means. The treatment option of intentional replantation with its associated risks and benefits was accepted.

Procedure

One hour before the start of the procedure, the patient rinsed her mouth with chlorhexidine gluconate 0.12% and had 600 mg of ibuprofen. The patient received profound inferior alveolar and lingual nerve block anesthesia with 2% lidocaine containing 1:100,000 epinephrine (Xylocaine® dental adrenaline 20 mg/ml, 1.8 ml/ carpule, DENTSPLY).

The mandibular second molar (tooth #37) was intentionally extracted with gentle luxation using lower molar forceps (Figure 5). The patient was asked to bite gently on a wet gauze while working on the tooth extraorally. The tooth was carefully inspected under an operating microscope (Proergo; ZEISS, Germany). No obvious cracks or fractures were noticed. A strip perforation in distal wall of the mesial root was identified (Figure 6).

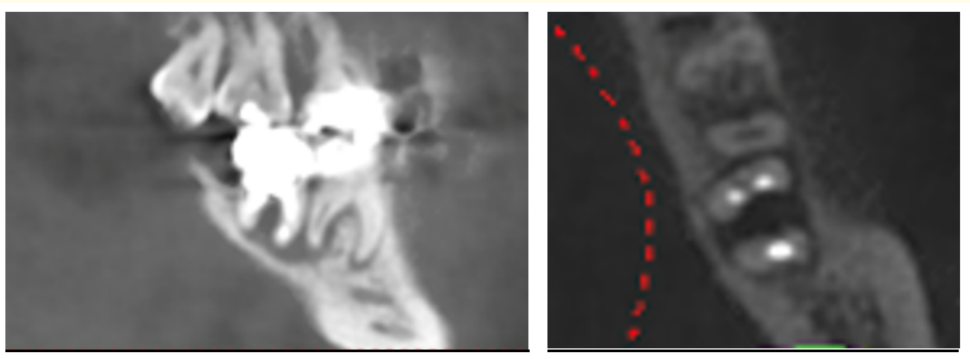

Figure 4: *CBCT images of teeth #36 and 37 before the procedure*

Figure 5: *Extraction of tooth #37*

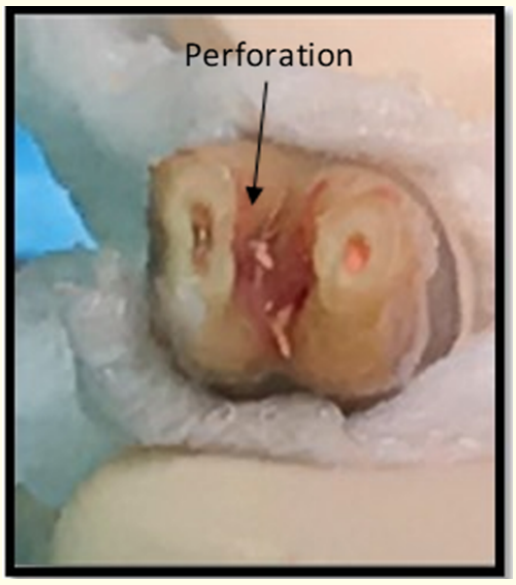

Figure 6: *Strip perforation in mesial root*

The tooth was held with saline-soaked gauze. The apices were resected with high-speed fissure bur under copious saline irrigation (Figure 7). The resected root surface was inspected under high magnification (X20, X26). Root-end cavities were prepared with small round bur to a depth of 3mm and parallel to the long access of the root (Figure 8). The root-end cavities and perforation were sealed with EndoSequence® Root Repair Material (BC RRM-Fast Set Putty™) (Figure 9). The socket was irrigated with sterile saline solution and the tooth was then replanted into its socket 10 minutes after extraction (Figure 10).

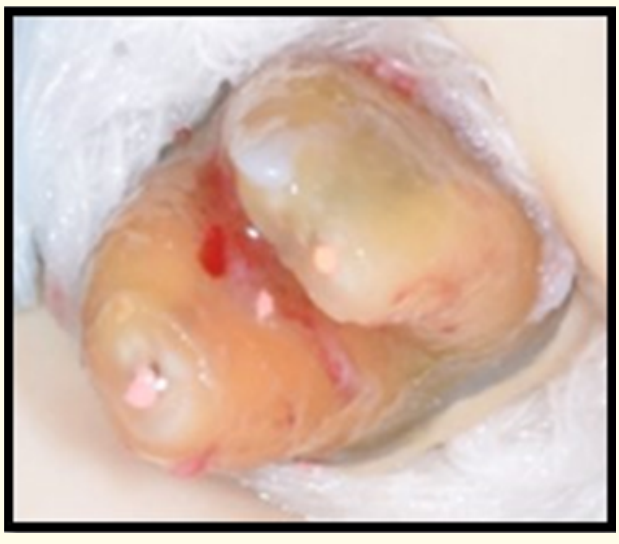

Figure 7: *Root-end resection.*

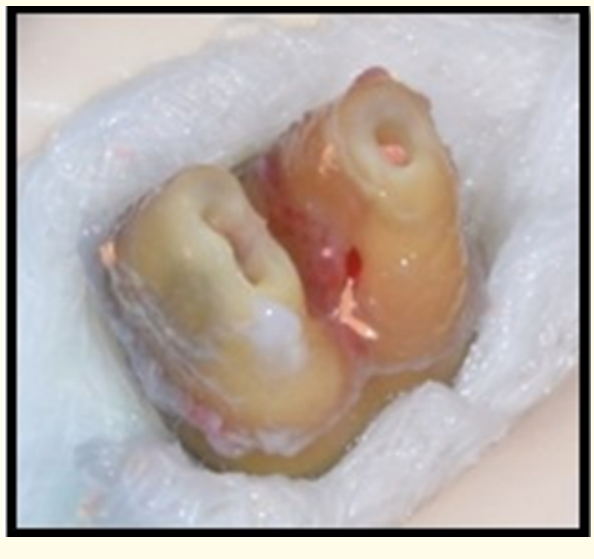

Figure 8: *Root-end preparation.*

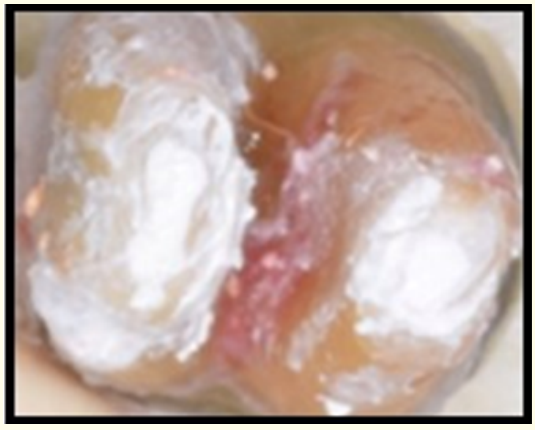

Figure 9: *Root-end filling with bioceramic putty.*

Figure 10: *Return of the tooth to the socket.*

The occlusion was checked and the accurate repositioning was confirmed radiographically (Figure 11). There was initial stability of the tooth so no splint was applied. The patient was given post-operative instructions for a soft diet and avoid sticky foods, candy and chewing gum for two weeks. In addition, the patient was advised about careful routine oral hygiene. 0.12% chlorhexidine gluconate was prescribed for seven days as well as ibuprofen 600 mg every 6h for 48h.

Figure 11: *Post-operative radiograph.*

The patient was recalled one week after the treatment. The tooth was asymptomatic with normal soft tissues. The patient was recalled again three months, six months and 18 months after the surgery. At those periods of follow-up, there were no clinical signs or symptoms of disease, tenderness to percussion or palpation, mobility, and sinus tract formation. The periodontal examination showed normal gingival health and normal probing depth (2 - 3 mm). Radiographic examination showed a marked reduction in size of the lesion with new PDL formation in the periradicular area (Figure 12-13). The patient returned for clinical and radiographic follow-up at three years thereafter. Three years after treatment, the clinical examination revealed the tooth was asymptomatic, percussion was negative, probing depth was no greater than 3mm and complete healing of the periapical lesion was evident (Figure 14).

Figure 12: *Six-month follow-up.*

Figure 13: *18-month follow-up.*

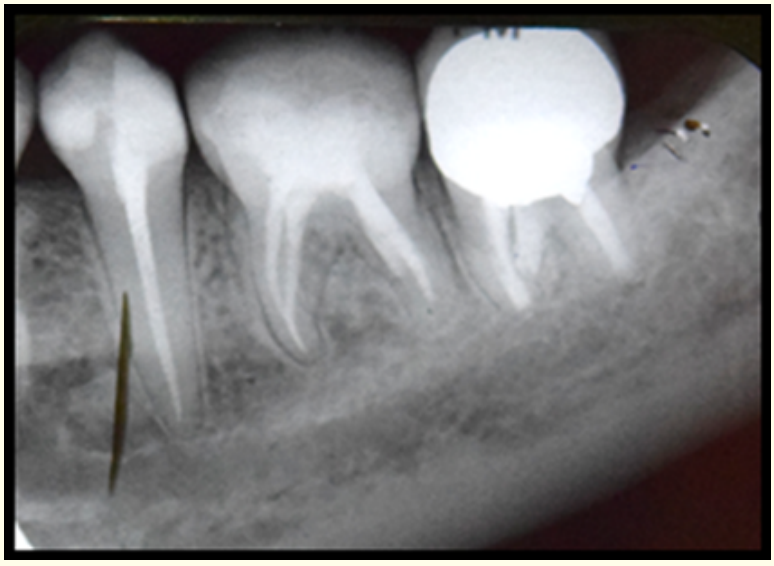

Figure 14: *Three years follow-up.*

Discussion

The maintenance of the natural dentition is the primary goal of any conservative treatment [4]. Although it is not the primary treatment of choice, intentional replantation should be considered as an alternative treatment, especially when conventional treatment is not possible [6].

The success of this treatment primarily depends 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 post-operative patient compliance [7]. In the present case, atraumatic extraction was done, and the procedure was well organized and executed, allowing extra-oral time not exceeding 10 minutes.

Even if intentional replantation was generally not recommended for teeth with periodontal disease [2], Cho., *et al*. reported that periodontal involvement is not an absolute contraindication to intentional replantation; the patient's age and the number of preoperative periodontal pockets with a depth ≥ 6 mm are important factors for the outcome of replantation of a periodontally involved tooth. Some studies show successful results in intentional replantation of teeth that are periodontally involved, at least to short-medium time follow-ups. Lu., *et al*. [9] replanted a periodontally involved and endodontically mistreated mandibular first premolar and reported that the replanted tooth remained functional and asymptomatic for 32 months. Additionally, Demiralp., *et al*. [1], suggested that intentional replantation can be an alternative approach to extraction in cases where advanced periodontal destruction is present and no other treatments could be considered.

The disadvantage of intentional replantation is ankylosis that leads to a replacement resorption [13]. Studies reported that the vitality of the periodontal membrane has an importance in preventing ankylosis. Most authors recommended not to touch the root surfaces of the tooth to be replanted if there is available periodontal ligament attachment [5,8,9]. In the present case, after three years there was no evidence of ankylosis.

Curettage of the socket before replantation is not recommended because slightly damaging the walls of the socket might increase the risk of ankylosis [8]. In the present case, the curettage was not done, and only abundant rinsing was performed with sterile saline to remove any foreign and harmful materials.

The tooth was repaired with a retrograde approach, with root end resection, followed by retrograde preparation and filling. The goal of the retrograde filling was to provide an apical seal to the cavity, preventing growth of microorganisms and their toxins from the canal space into periradicular tissues [14]. IR procedure can also help to repair teeth with procedural errors, such as separated files, overfills of gutta percha and perforation. In this case, bioceramic material was used as retrograde filling and for perforation repair.

Bioceramics are introduced materials in endodontics. Bioceramics are biocompatible ceramic materials. They work as a regenerative scaffold of resorbable lattices. They have the ability to achieve excellent hermetic seal and have a good radiopacity [15,16]. Usually, they have a working time of hours and a setting reaction initiated by moisture. They do not exhibit cytotoxic effects on human gingival fibroblasts [17]. In the present case, EndoSequence® Root Repair Material (fast setting) was used, which has a short setting time of approximately 20 minutes. This decreases the risk of washout of material after replantation and during the initial healing period.

With a three-year follow-up period, the case can be considered successful for retaining periodontally a very compromised/lost tooth, at least for an acceptable period of time. The patient was very satisfied with the successful treatment outcome associated with being infection-free and having no pain.

Conclusion

Intentional replantation is a treatment option which can be considered in the management of failed root canal treatment in teeth with periodontal involvement and mishap repair. It is a conservative treatment that should be considered in order to maintain the natural teeth. Intentional replantation can provide a long-term good result even for mishap repair.

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