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Intentional Replantation with 23-Minute Extra-Oral Time: A Case Report

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ABSTRACT

Non-surgical retreatment and surgical endodontics are not always applicable. Apicoectomy may be limited by anatomical variations, including buccal bone thickness and proximity to vital structures such as nerves and maxillary sinuses. Intentional replantation is considered as a procedure of last resort when non-surgical, or surgical endodontics is contra-indicated. The treatment described demonstrates intentional replantation to be considered a treatment option to preserve and maintain the tooth.

Keywords: Intentional replantation, Retrograde preparation, Root-end resection

INTRODUCTION

Grossman defines intentional replantation as the purposeful extraction of a posterior tooth to perform the extra-oral endodontic treatment and the tooth's replacement in its socket [1]. Minimizing the extra-oral time to the shortest period possible provides the best long-term prognosis [2]. Atraumatic extraction is a crucial factor for the intentional replantation procedure's success by minimizing the damage to cementum and periodontal ligaments [3]. Specific indications to perform the intentional replantation procedure include limited access to the posterior mandibular molars with conventional apicoectomy procedures because of the buccal bone thickness, high risk of inferior alveolar nerve injury due to its proximity to the mandibular molars apices, root resorptive defects, which does not respond to conventional treatment, endodontic retreatment procedure is not possible due to iatrogenic canal obstruction (i.e., posts, separated instruments, ledges or perforation), [4].

CASE REPORT

A 29-year-old male patient was referred from the primary care clinic due to persistent dull pain at the mandibular right second molar (#47). His medical history was non-contributory, with no allergies. Dental history showed that tooth #47 received non-surgical root canal retreatment. Clinical examination revealed tenderness to percussion, no mobility with 3 mm pocket depth, and no obliteration of the vestibular depth. The radiographic assessment showed apical radiolucency associated with the tooth (#47), widening periodontal ligament space, and extruded gutta-percha beyond the radiographic root apex (Figure 1). Since he had two root canal retreatments without any observable healing in the periapical tissue, the diagnosis is previously treated with symptomatic apical periodontitis. The available treatment options included tooth extraction and dental implant placement, surgical endodontics, or intentional replantation. The surgical endodontics was contraindicated because of proximity to the inferior alveolar canal. Since the patient preferred to save the tooth, the intentional replantation technique was considered, and the patient accepted this option.

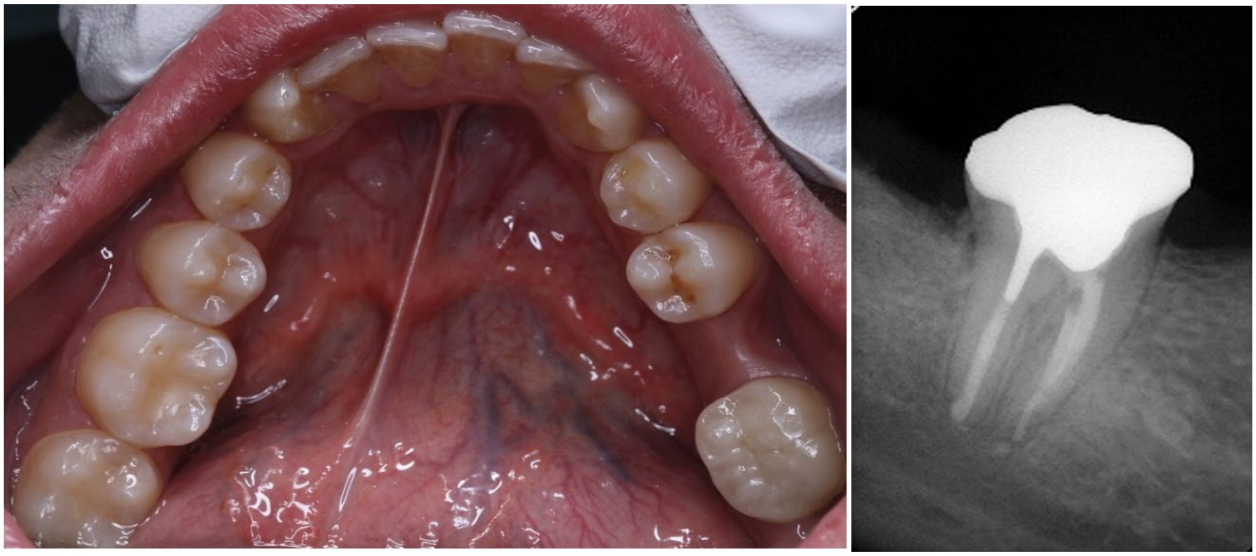

Figure 1 Pre-operative clinical photograph and periapical radiograph, intraoral photo with a mandibular occlusal view showing the symptomatic tooth (#47). periapical radiograph of tooth #47, showing a widening in PDL space, periapical lesion, and extruded gutta-percha beyond the radiographical root apex

RESULTS AND DISCUSSION

A preoperative 600 mg of ibuprofen was given to the patient. The anesthesia was achieved through an inferior alveolar nerve block, lingual nerve block, and buccal infiltration techniques with 2% lidocaine containing 1:100,000 epinephrine. Atraumatic extraction with lower molar forceps (Hu-Friedy, MD4 MEAD Forceps serrated) with no complications was performed (Figure 2). Following the tooth extraction, examination under the microscope (Protegé, Global Surgical Corp., St. Louis, MO) showed no crack. The tooth has mesial and distal roots with three canals (Mesiobuccal, mesiolingual and distal) with apparent 2 mm overextended gutta-percha in the mesiolingual canal. The operator held the tooth crown using sterile gauze soaked in isotonic saline; three millimeters were resected from both roots using a round-end taper diamond bur (American Dental Accessories, Minnesota, and United States of America). The two roots' apices were retro prepared by Newtron P5 XS bled ultrasonic device (ACTEON®, France) removing 3 mm of gutta-percha under sterile saline irrigation. Root canals were dried with absorbent paper points (Dentsply Maillefer, Ballaigues, Switzerland). The spaces left in the canals were sealed with ProRoot™ MTA (Dentsply Maillefer, Ballaigues, Switzerland) (Figure 3). The socket's apical part was carefully inspected, curetted with 12 Miller surgical curette (Hu-Friedy), and irrigated with isotonic saline followed by tooth replantation and a semi-rigid splinting with the adjacent teeth (#44 and #45) (Figure 4). The extra-oral time was approximately twenty-three minutes. The follow-up appointment was scheduled two weeks later, where the tooth was evaluated, the splint was removed, and oral hygiene and gingival status was re-evaluated. The patient had good oral hygiene, and the gingiva showed good healing; the clinical symptoms subsided with no radiographic changes. At four weeks follow-up, no pain upon biting was noticed. At twelve weeks follow-up, the tooth was functioning without any signs or symptoms. At one year follow-up, the radiographic examination revealed complete osseous healing of the periapical radiolucency (Figure 5).

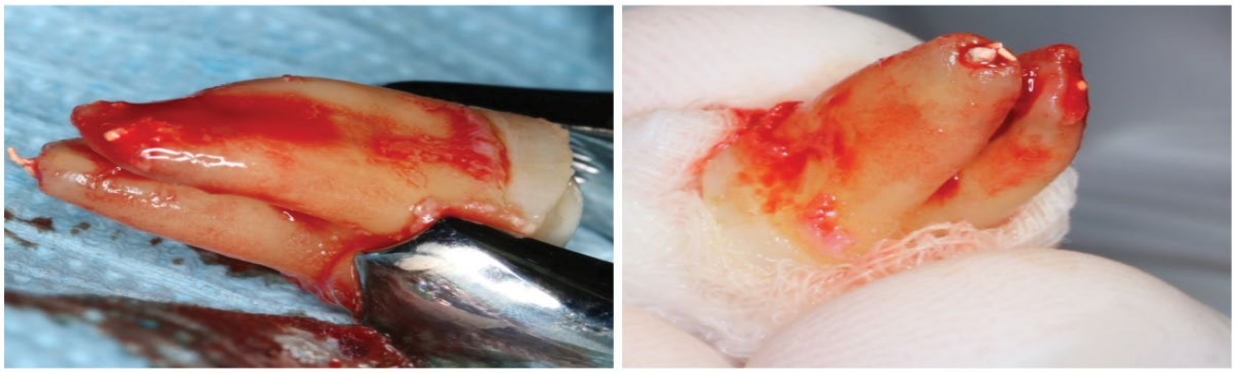

Figure 2 Clinical photographs, showing tooth #47 after extraction and illustrating the handling technique with a sterile gauze saturated with saline and held by the crown after atraumatic extraction with lower molar forceps.

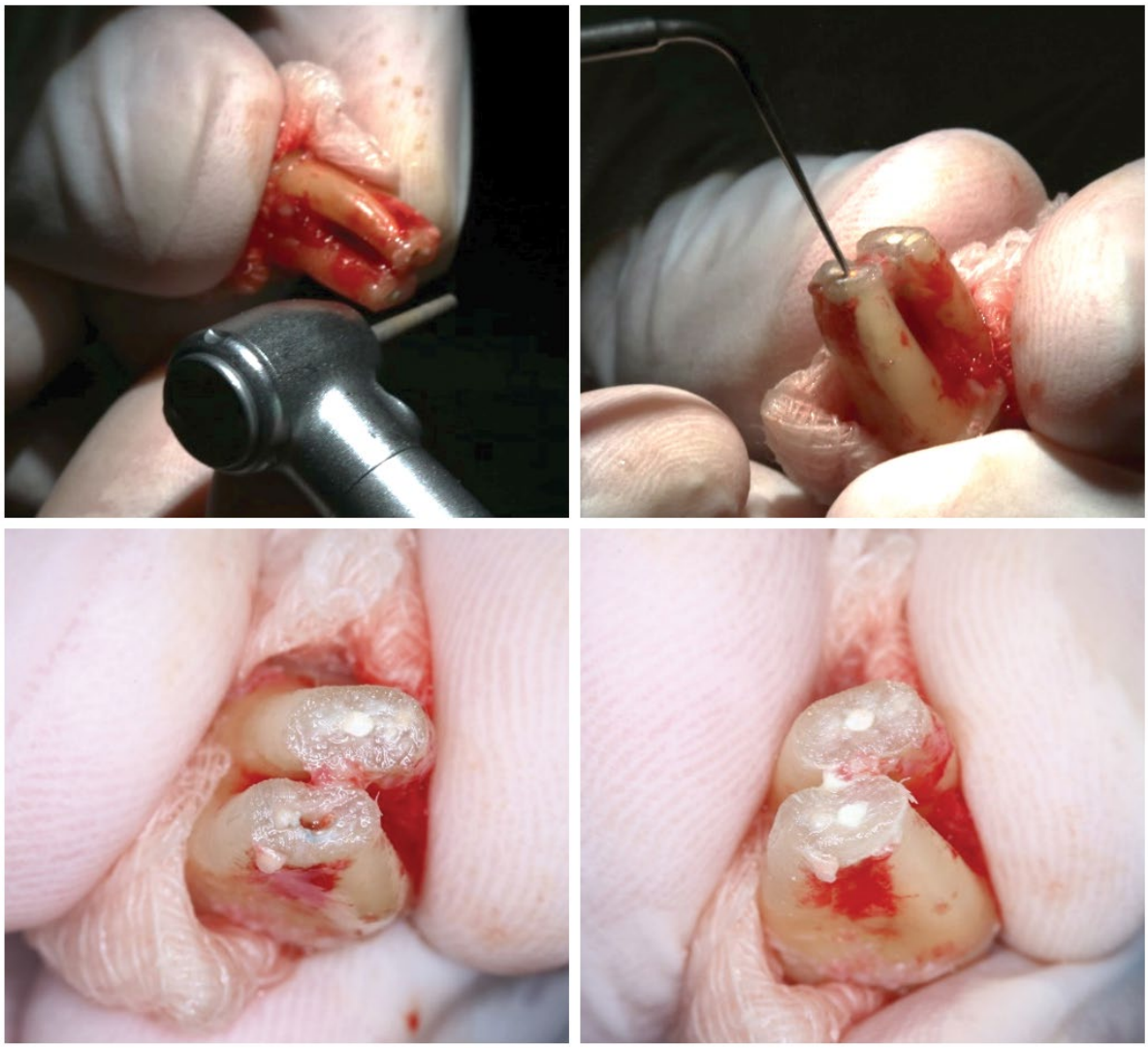

Figure 3 Clinical photographs, showing the root resection and canal preparation steps. 3 mm root resection with round-end taper diamond bur. retrograde cavity preparation by the ultrasonic device. retrograde filling with ProRoot™ MTA (Dentsply Maillefer, Ballaigues, Switzerland)

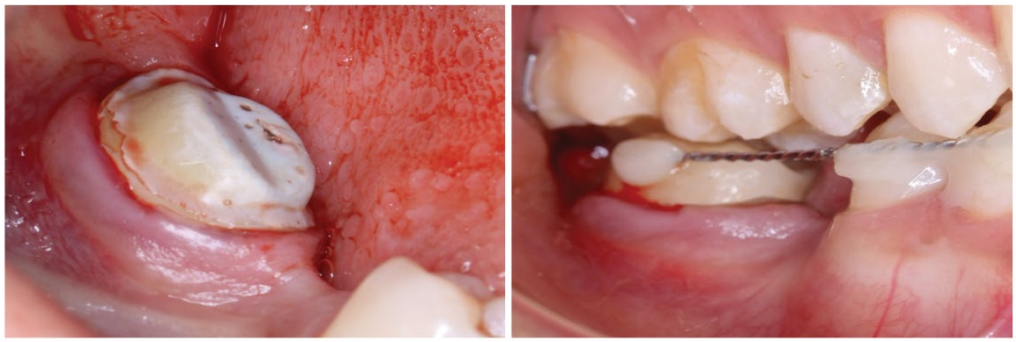

Figure 4 Clinical photographs, showing tooth #47 after replantation and splinting

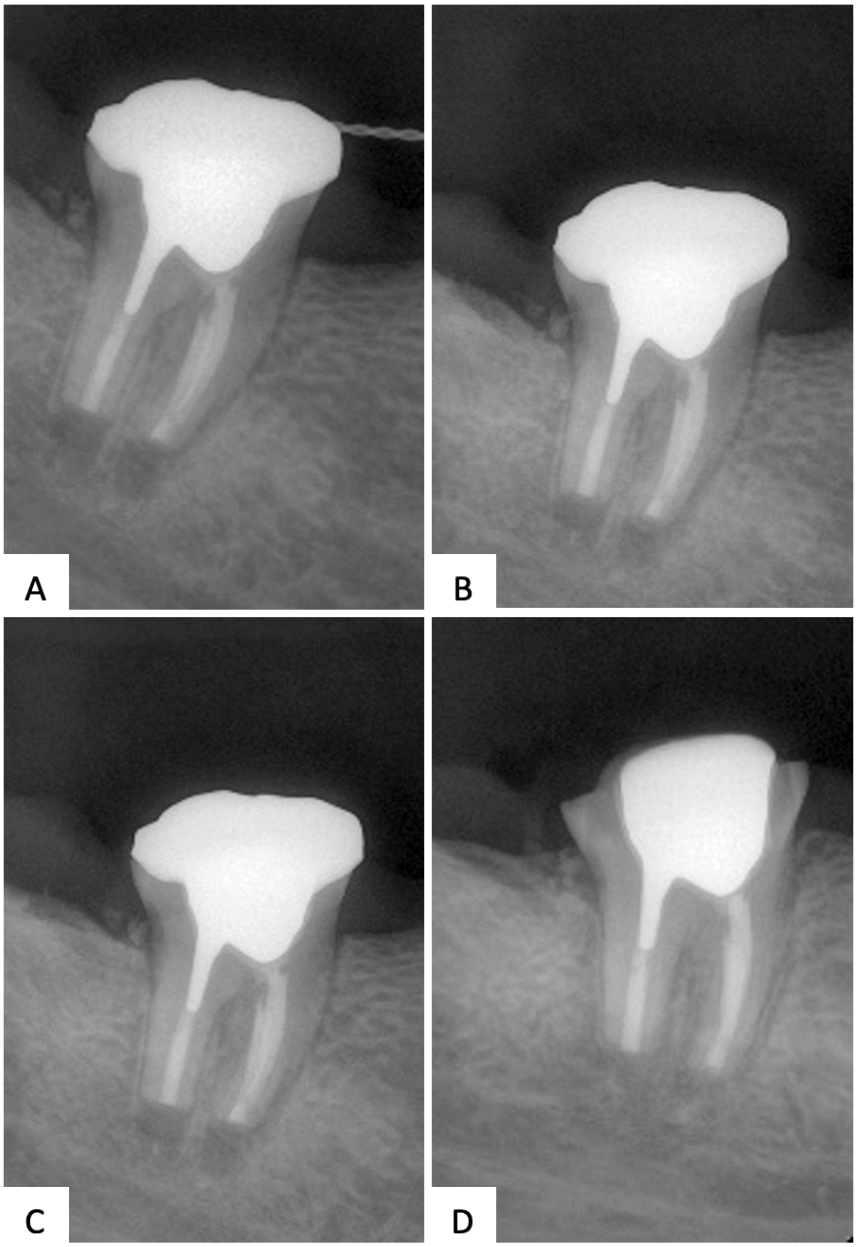

Figure 5 Periapical radiographs of tooth #47 in the postoperative follow-up appointments. A: postoperative periapical radiograph; B: after one-month follow-up; C: after three months follow-up; D: after one-year follow-up

DISCUSSION

Intentional replantation is indicated as the last resort when other endodontic treatment options are not feasible. This procedure's success depends on many factors such as extraction conditions, extra-oral time, handling, periodontal ligament condition, and patient's general health [5]. During the tooth extraction, the extraction forceps beaks should not go beyond the cementoenamel junction while using elevators are contraindicated to preserve cortical bone integrity [6,7]. The use of periotome implicates a little or no trauma to the root surface and periodontal ligament and decreases the root fracture [8]. Choi et al., reported the use of physics forceps as a reliable extraction instrument [9]. A new technique of using orthodontic extrusion 2 to 3 weeks before the extraction can increase the periodontal ligament volume permitting an extraction with a low risk of tooth fracture [10].

Performing a routine endodontic treatment before the tooth extraction can reduce the extra-oral time; in our case, the extra-oral time was 23-minutes; according to Kratchman, the extra-oral time should not exceed 10 minutes [11]. Cho et al., considered an extra-oral time greater than 15 minutes increases ankylosis occurrence [12]. Pohl et al., reported that if extraoral time is greater than 15 minutes for replanted teeth, root resorption is expected to occur, and the risk of complications is 1.7-fold increased, thus reducing the survival rate of the replanted tooth [13]. During the replantation procedure, the surface root may get damaged, raising the risk of postoperative complications. As reported by Andreasen et al., ankylosis comes about when more than 9 mm^2 of the surface root is damaged [14]. When periodontal ligaments' vitality is preserved by adequately managing the extra-oral time and storage conditions, favorable healing occurs. The periodontal ligament's complete regeneration along the root surface takes about 7 to 10 days [15].

Commonly used root-end filling materials are Super EBA, GIC, composite, and MTA. MTA's sealing ability and marginal adaptation have proven superior and not adversely affected by blood contamination. Besides, MTA promotes new cementum deposition and stimulates osteoblastic adherence to the retro-filled surface [16].

A recent evidence-based literature review indicates that splint type and duration were not significant variables with healing outcomes [17]. It should be performed if indicated, such as in teeth with short roots or lack interseptal bone [16,18]. Other studies show that suture splint appears to be more favorable than wire composite splint. Indeed, suture splinting provides physiological loading on the replanted teeth, which might facilitate periodontal healing [19,20]. The success rate ranges from 50% to 95% [21]. The clinical criteria for success include normal function, no mobility, and healthy periodontium. Also, the periapical radiograph should reveal no apical radiolucency or resorption [22].

CONCLUSION

With careful case selection and suitable training, intentional replantation can have a high success rate and less expensive than other treatment options.

DECLARATION

Conflicts of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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