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ORIGINAL ARTICLE

Outcomes of intentionally replanted molars according to preoperative locations of periapical lesions and the teeth

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KEYWORDS
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Abstract *Background/purpose:* The aims of this retrospective study were to assess the influence of preoperative periapical lesions on the healing of intentionally replanted teeth and compare outcomes of intentional replantation (IR) between maxillary and mandibular molars.
Materials and methods: In this study, we retrospectively analyzed 79 cases in whom the IR procedure was used. The outcome of treatment was classified clinically and radiographically as either success or failure.
Results: The overall success rate of the reviewed IR procedures was 68.7%. The success rate of IR with mandibular molars (78.0%) was significantly higher than that with maxillary molars (41.2%). There was no significant difference between success rates of IR for teeth with and without preoperative periapical lesions (66.7% vs. 72.0%, respectively).
Conclusions: Within the limitations of this study, IR of mandibular molars seemed to provide a higher success rate than that for maxillary molars, regardless of the presence of preoperative periapical lesions.

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Introduction

Conventional root canal treatment is the first choice of treatment when the pulpal and periapical tissues of a tooth are inflamed or infected. However, conventional endodontic treatment procedures are not always available for teeth with severely calcified or curved canals that hinder access of instruments for thorough cleaning and shaping. Even if access of the instrument is possible, preparation or obturation of the canal might be challenging in such cases.[1] In addition, even if nonsurgical treatment is properly done, periapical lesions (PALs) and symptoms may persist. In such cases, the dentist may try to restore the function of the tooth with procedures such as endodontic surgery, intentional replantation (IR), or implant restoration after extracting the tooth.

Endodontic surgery involves elevation of an oral mucosal flap to expose the bone, and reduction of the bone to directly reach the apical region for retrograde cavity preparation and filling.[2] This procedure is usually challenging to perform in molars due to limitations of instrument access or the proximity of anatomical structures, such as the maxillary sinus or inferior alveolar canal. In such circumstances, IR can be an alternative choice.[3,4] IR is defined as the intentional extraction of a tooth and its reinsertion into the socket after extraoral endodontic treatment.[5] Successful maintenance of intentionally replanted teeth has been reported in case series for many years.[6–9] Based on those cases, several factors are recognized as influencing the success rate of IR.[10,11] Although it is widely accepted that the existence of PALs can result in negative effects on the prognosis of periapical surgery,[12] some argue that the genetic make-up alone affects the success rate of surgical endodontic treatment instead of factors such as age, gender, presence of a PAL, or the location of the tooth in the arch.[13]

Recent prospective clinical studies demonstrated that the success rate of periapical surgery using mineral trioxide aggregate (MTA) as the root-end filling material was comparable to other retro-filling materials.[14] However, the relationship between the presence of PALs and the success rate of IR using MTA has not been clarified.

Therefore, the purposes of this study were to assess the influence of preoperative PALs on the healing of teeth treated with IR and compare outcomes of this procedure between maxillary and mandibular molars.

Materials and methods

Data for this study were obtained from charts of patients treated at the Department of Conservative Dentistry, Seoul National University Dental Hospital from January 2005 to December 2007. The study protocol was approved by the Institutional Review Board (IRB No. CRI 08015) of Seoul National University Dental Hospital. Records of all patients were screened retrospectively for IR procedures performed on either maxillary or mandibular molars. In this 3-year period, 79 IR cases met the preliminary inclusion criteria: molars with persistent pain or symptoms that did not respond to nonsurgical retreatment. The existence of PALs on the treated teeth was determined by reviewing charts and radiographs.

Cases were selected according to the following conditions: the patient did not have a systemic disease such as uncontrollable diabetes mellitus that may have had negative effects on the healing process. The supporting structures had to have a sufficient amount of bone to retain the replanted tooth, with at least half of the root surrounded by bone in the preoperative radiograph. A tooth with vertical mobility was excluded from indications for the IR procedure.

The detailed clinical procedure for IR cases was as follows. The tooth was gently intentionally extracted with forceps under local anesthesia. After extraction, the apical area of the tooth was carefully inspected under an operating microscope (OPMI pico; Carl Zeiss, Oberkochen, Germany). Three millimeters of the apical area of the tooth were resected with a high-speed diamond bur, and the granulation tissue attached to the root surface was carefully removed. The root-end cavity was prepared with a No. 330 bur under the microscope, and then the cavity was filled with MTA (Dentsply, Johnson City, TN, USA). The entire procedure was completed within 10 min, and the tooth was placed back into its socket without splinting.

After the IR procedure, the replanted tooth was evaluated once a week for 2 months and then followed up twice a year after the 2-month evaluation. Radiographic and clinical data were collected from the recall visits and evaluated according to the assessment criteria established by Rud et al[15] and Molven et al.[16]

Judgment of success or failure was made by two authors including the operator of each case by reviewing the recorded clinical data and the radiographs. Success was defined as a complete reduction in the periapical radiolucency and a functional tooth with no symptoms. If there was complete resolution of the radiolucency during the follow-up period, the replantation procedure was considered a success. Cases with unresolved PALs or persistent clinical symptoms requiring extraction were considered failures. Cases of a replanted tooth being present in the mouth with incomplete resolution of the PAL or with continuing clinical symptoms were classified as 'incomplete' by the assessment criteria; however, they were considered failures in this study (Fig. 1).

Associations of the existence of PALs and the location of teeth with treatment outcomes were analyzed by a Chi-squared test. The significance level for the analysis was set to $P < 0.05$.

Results

Among the 79 replanted cases, 12 were unavailable because the patients were not present for the recall visit. Of the 67 cases with a recall visit, the age of the patents (41 females and 26 males) ranged from 16 to 71 (mean, 40.2) years. The recall period ranged from 12 to 36 (average, 16) months. Of the 67 recalled cases, 46 teeth were classified as successful for an overall success rate of 68.7%.

Among the 17 replanted maxillary molars, seven teeth (41.2%) were successful, while 39 (78.0%) of 50 replanted mandibular molars were classified as successful. As shown in Table 1, the difference in success rates between the two locations (maxilla vs. mandible) of the replanted teeth was statistically significant ($P < 0.05$).