Use of Mineral Trioxide Aggregate in the Treatment of Invasive Cervical Resorption: A Case Report

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Abstract

Introduction: Guided tissue regeneration (GTR) is a successful treatment procedure of periodontal reconstructive surgery. Adverse effects can be observed after GTR procedure, but external root resorption is rarely reported at clinical studies. Invasive cervical resorption is a clinical term used to describe a relatively uncommon, insidious, and often aggressive form of external root resorption. **Methods:** The present case demonstrates an invasive cervical resorption that is a potential late complication of GTR in a maxillary canine of a 59-year-old male patient. After the surgical intervention and root canal treatment, the resorption was subsequently sealed with mineral trioxide aggregate. **Results:** The 1-year follow-up demonstrates no pathologic changes on clinical and radiographic examination. **Conclusions:** This case report presents a treatment strategy that might improve the healing outcomes for patients with invasive cervical resorption. *(J Endod 2010;36:160–163)*

Key Words

External root resorption, guided tissue regeneration, invasive cervical resorption, mineral trioxide aggregate

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External root resorption is a progressive and destructive loss of tooth structure, initiated by a mineralized or denuded area of the root surface (1). Invasive cervical resorption is a clinical term used to describe a relatively uncommon, insidious, and often aggressive form of external root resorption (2). Potential predisposing factors for invasive cervical root resorption are internal bleaching, orthodontic tooth movement, traumatic injuries, orthognathic and dentoalveolar surgery, and periodontal treatment (1–4).

Guided tissue regeneration (GTR) is a well-documented periodontal regenerative surgical technique that involves placement of a membrane between the root surface and the mucoperiosteal flap. This technique favors the periodontal ligament and bone cells to repopulate at this area (5). Preventing apical migration of the epithelium with GTR is a risk factor for root resorption, which means that cells from bone and gingival connective tissue might repopulate the root surface before periodontal ligament cells (6). The resorptive process does not penetrate into the pulp space because of the protective layer of predentin, but rather it spreads around the root in an irregular form. With time, the process might penetrate into the root canal (7).

Different approaches have been suggested for the treatment of invasive cervical root resorption. Most effective therapy is to expose the resorption lacuna orthodontically or surgically to remove the granulomatous tissue (7). Treating invasive cervical resorption lesions with a chemical agent, 90% trichloroacetic acid (TCA) after protective application of glycerol to adjacent soft tissues, before the curettage of the lesion is advocated by Heithersay (8). After the chemomechanical debridement of the defect, glass ionomer, light-cured resin composite, amalgam, and mineral trioxide aggregate (MTA) have been recommended to restore the resorption (3, 9). If there is a perforation into the root canal, endodontic treatment must be performed (1, 7).

MTA has many favorable properties including a good sealing characteristic, biocompatibility, bactericidal effect, radiopacity, and ability to set up in the presence of blood (10–12). Root-end fillings (10), pulp capping (13, 14), apical filling of teeth with open apices, apexification therapy (15–17), repair of root (10, 18), and furcal perforations (19) are the indications for the use of MTA. Perforated roots treated with MTA showed a noninflammatory tissue layer (20) and less leakage when compared with perforations repaired with amalgam, intermediate restorative material, zinc oxide–eugenol, and SuperEBA by using both dye and bacteria leakage methods (10, 11, 20, 21). In addition, newly formed cementum coverage occurred with MTA is unique and had not been demonstrated with any other material (22).

This case report presents the treatment of an invasive cervical resorption, which is a possible late complication of GTR procedure in the maxillary left canine, with MTA.

Case Report

A 59-year-old male patient to whom GTR treatment was applied in our Periodontology Clinic 10 years ago presented to the Department of Endodontics with a complaint of pain in the maxillary left canine region. Medical history of the patient was noncontributory. The documents of clinical examination done 10 years ago revealed that maxillary left canine had mild mobility and 7-mm probing depth on buccal surface, with the mean value of 2 for gingival index (23). Scaling, root planing, and GTR were applied with a nonresorbable membrane to the area of maxillary left canine. Clinical examination demonstrated that the maxillary left canine was sensitive to percussion and also

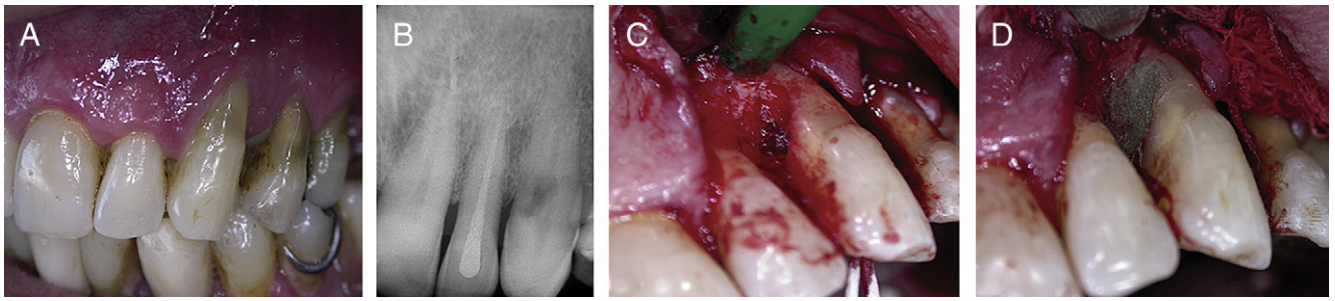

Figure 1. (*A*) The labial surface of the patient's maxillary left canine. (*B*) Radiographic assessment of the left canine. (*C*) Intrasurgical view after removing the granulation tissue. (*D*) Repair of defect with MTA.

showed mild mobility with normal probing depth (Fig. 1*A*). Periapical radiographs showed an external root resorption on the cervical third of the root of maxillary left canine, which was in relation with the root canal, lamina dura was intact, and there was no widening of the periodontal ligament space (Fig. 1*B*). Because electrical pulpal test revealed that this tooth was devital, a diagnosis of acute apical periodontitis with the maxillary left canine was made.

After the patient was informed of treatment plan, possible discomforts, and potential risks before giving his consent to the treatment, local infiltration anesthesia was performed on both the vestibular and palatal mucosa (Ultracain D-S Forte; Aventis, Istanbul, Turkey). An intrasulcular incision was made from the mesial surface of maxillary left lateral to the distal surface of maxillary left first premolar; both buccal and palatal full-thickness mucoperiosteal flaps were elevated. Granulomatous tissue within the defect area and the dentogingival epithelium from the inner surface of the flap were carefully removed by 4R/4L curette (Hu-Friedy, Chicago, IL). Because it was diagnosed by radiographic examination, the defect was in relation with the root canal clinically. The root surface was thoroughly scaled and planed with 1/2 Gracey curette (Hu-Friedy) and round bur (Fig. 1*C*). The area was rinsed with sterile saline solution. After the surgical field was cleaned, the flap was placed back, and maxillary left canine was isolated with rubber dam. The access cavity was shaped with a round diamond bur. Canal was prepared to size 40 by using K-files (Diadent, Grenoble, France). The root canal was irrigated between each file with 2% chlorhexidine and sterile saline by using a long needle alternatively. A size 40 master cone radiograph was taken, and the root canal was filled with gutta-percha cones and AH-26 sealer (Dentsply, Konstanz, Germany) by using lateral condensation technique at the same appointment. After the removal of rubber dam, the flap was re-reflected, and the defect area was rinsed with sterile saline solution. The resorption site was subsequently sealed with MTA (Angelus, Londrina, Brazil) (Figs. 1*D*, 2*A*). The flap was repositioned without tension and sutured interproximally with nonabsorbable sutures (Silk; Dogsan, Turkey). This also prevented communication between MTA and oral environment. The access cavity was restored with a composite (Clearfil Majesty; Kuraray, Osaka, Japan). After the surgery, the patient was prescribed amoxicillin 1 g twice a day for 1 week and 0.2% chlorhexidine mouthwash 15 mL twice a day for 2 weeks. Because the healing had been uneventful, the desired gingival contour was achieved; the patient was symptom free 1 week after the surgery, and the sutures were removed.

At 1-year follow-up, periodontal status of related tooth demonstrated mild mobility with normal probing depth, no gingival recession, and no loss of clinical attachment. There was no relation between the sulcus and the MTA because of the reattachment. In the radiographic examination the related tooth and surrounding tissues showed no pathologic changes (Fig. 2*B*, *C*).

Discussion

Many different predisposing factors have been reported for invasive cervical resorption. However, in this case, dental history revealed only periodontal regenerative treatment as one of these predisposing factors. Although the objective of periodontal treatment is regenerative, preventive, or conservative; root surface resorption, ankylosis, and alveolar bone resorption are the potential adverse effects of the treatment (7). In contrast, root resorption has been reported rarely in association with GTR (24, 25). Therefore, a direct causal relationship between the previous periodontal therapy and the occurrence of internal cervical resorption cannot be made, but the authors think that the potential reason for this resorption is the GTR treatment performed 10 years ago.

Root lesions caused by external root resorption have been treated with different techniques and materials. In this case, after resorption lacuna was exposed surgically, the root canal treatment was subsequently performed because the root resorption was in relation with the root canal. Smidt et al (26) presented a successful treatment by using an interdisciplinary approach with orthodontic root extrusion, endodontic treatment, and restorative means. Hiremath et al (27) used glass ionomer cement for the treatment of invasive cervical resorption and found the tooth symptomless but could not follow up after 6 months. Surgical treatment of varying degrees of invasive cervical resorption has generally involved periodontal flap reflection, curettage, restoration of the defect with amalgam, composite resin, or glass ionomer cement, and repositioning the flap to its original position. Periodontal reattachment cannot be expected with amalgam or composite resin and is unlikely with glass ionomer cement, but there is experimental evidence to suggest that this might be possible if MTA is used in this situation (8). However, in the areas that will have constant contact with the oral flora, the MTA will be continuously contaminated. The development of subgingival plaque could be promoted as a result of the rough surface of MTA. Because MTA is not a hard material, it could be partially scraped off during mechanical cleaning of the root surface (20). Because MTA has no constant contact with the oral flora in this case, MTA was used because of its reported ability to provide a biocompatible surface for the possible adhesion/attachment of bone and cementum (8, 22). In addition, MTA inhibits the activity of bacteria (12, 28), is not affected in the presence of moisture and blood, and also is able to harden and form a barrier because of its hydrophilic characteristic (29). Moisture in the surrounding tissue acts as an activator of a chemical reaction in this material (10). In previous studies, MTA was successfully used as a barrier between the root canal space and the periodontal tissue in cases of root perforation in dogs (18, 19) and humans (30). The use of MTA as a repair material demonstrated favorable healing in the series

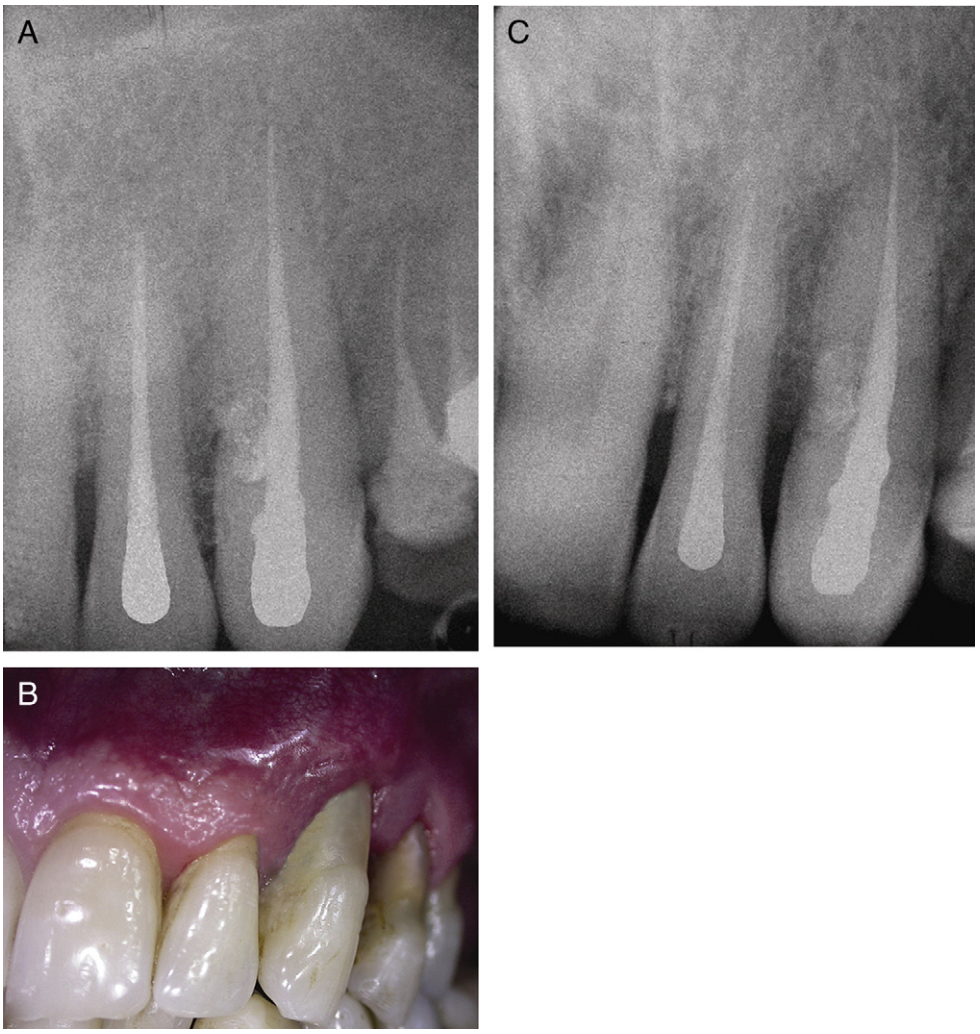

Figure 2. (*A*) Radiograph after obturation of the canal and filling defect with MTA. (*B*) Clinical situation after 1 year. (*C*) Radiographic follow-up after 1 year.

of cases with invasive cervical resorption (3, 31, 32), root (7, 11, 33) and furcal perforations (19, 28, 30). Consistent with this case report, White and Bryant (9) reported an increase in radiodense crestal bone when MTA was used in combination with GTR to fill an external root resorption associated with a bony defect. In the present case, left maxillary canine with external root resorption has not been extracted and histologic evaluation has not been done because the treatment outcomes were predictable. No interpretation was made about histologic condition of MTA and surrounding bone in this case; however, in 2009 Perinpanayagam and Al-Rabeah (34) showed that MTA surfaces support osteoblast cell attachment that is essential for osteogenesis, and Hakki et al (35) demonstrated that MTA does not have a negative effect on the viability and morphology of cementoblasts and induced biomineralization of cementoblasts.

Although Heithersay (8) recommended 90% TCA for the chemical debridement of the defect, TCA was not used in this case, because the isolation of the surrounding tissues in the surgical area could not be maintained as a result of the localization of the defect.

Conclusion

Although this case report presents a favorable clinical outcome, further studies are necessary to provide more information about the use of MTA for the treatment of invasive cervical resorption.

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