

Upper molar root resection: case report

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ABSTRACT

Introduction: Endodontic surgeries contribute to the resolution of complications resulting from conventional endodontic treatment. Root resection, a type of endodontic surgery, consists of partial root removal followed by canal preparation and filling with adequate material. In case of perforations, mineral trioxide aggregate (MTA) has often been used for retrograde sealing of the root canal, which prevents microorganism infiltration and by-products. Moreover, MTA is a biocompatible material that adheres and adapts to the walls after preparation, it is insoluble in tissue fluids and dimensionally stable.

Methods: This report describes a case of conservative

treatment of tooth #26 whose mesiobuccal canal was perforated during endodontic treatment, with probable change of internal canal anatomy. Mesiobuccal root cervical third resection was recommended. **Results:** At one-year follow-up, root end resection and MTA sealing showed satisfactory clinical and radiographic results. Additionally, the treated tooth was asymptomatic and functional. **Conclusion:** Root resection and sealing using MTA repaired endodontic perforation, suggesting this technique may be used in similar cases with a good chance of success, thus avoiding premature tooth loss.

Keywords: Endodontics. Periodontics. Perforation. Oral fistula.

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Introduction

Endodontic treatment plays an important role in avoiding tooth loss. Root canal system treatment, as well as other treatment modalities, may be unsuccessful, particularly when associated with adverse and unpredicted situations, such as anatomic variations and canal curves and obstructions.¹

Root perforations usually occur by accident during cleaning and shaping, or even during opening and accessing of root canals. Failures in analysis of radiographs, mistakes in surgical planing, lack of file precurving (in case of curved canals), and internal as well as external resorptions may result in complications that are difficult to manage.² The prognosis of root perforations may be affected by several factors, such as location, size, exposure time, degree of contamination, sealing tightness, biocompatibility of material used for perforation sealing, and the possibility of adequate access.³

Of the several surgical options to approach endodontic complications, we list draining of soft and hard tissues, periapical curettage, apicoectomy and conventional retrograde filling, endodontic treatment and simultaneous surgery, retrograde endodontic treatment, partial root resection and tooth hemisection.⁴

Root resection, a type of endodontic surgery, consists of removing the root affected by complications or perforation, followed by cavity preparation and filling of the stump. The material most often used in this type of procedure is mineral trioxide aggregate (MTA) which seals root canal end and prevents microorganism infiltration and byproducts. Moreover, MTA is biocompatible, insoluble in tissues and dimensionally stable, as it adheres and adapts to prepared walls.^{2,5}

This report describes a clinical case of root resection after tooth #26 mesiobuccal root perforation, followed by sealing of the root stump using MTA. Procedures were performed at the Integrated Dental Clinic of a private university.

Case Report

A Caucasian 13-year-old male was referred to the Integrated Dental Clinic for endodontic treatment. Oral examination revealed extensive carious lesion and fistula in the periapical mucosa of tooth #26 (Fig 1), as confirmed by probing the fistula with gutta-percha cone. Radiographs showed an extensive radiolucent area in the periapical region of the tooth and resorption of lamina dura. Diagnosis was asymptomatic apical periodontitis.

During access to canal openings of tooth #26, perforation occurred at the chamber floor close to the opening of the mesiobuccal (MB) canal due to difficulty in locating the canal opening (Fig 2). This is because there was a large amount of reactionary dentin at site. After endodontic treatment of other canals was completed, mesiobuccal canal root was resected (root amputation).

A cone-beam computed tomography (CBCT) scan of tooth #26 was obtained (Fig 3) to plan root resection (MB). Before surgery, the cervical region of mesiobuccal canal was disinfected using 1% sodium hypochlorite, and sealed with MTA (Fig 4).

During surgery, a sulcular full-thickness flap of soft tissue was raised (Fig 5), and mesiobuccal root and perforation were exposed as well as visualized (Fig 6). The root was sectioned perpendicularly at the cervical region using a truncated conical diamond bur (3082) at high speed and under saline solution irrigation. The root structure was completely separated. Subsequently, the root was carefully removed, with all the other bone and root structures being preserved.

The stump was then shaped (Fig 8), the socket was curetted using surgical and periodontal cures, and the region was debrided and irrigated with saline solution. Immediately after that, autogenous bone graft (bone harvested at site during root amputation) was placed in the same region of root defect. Simple interrupted stitches were applied, restoring tissue anatomy (Fig 9). The patient received post-operative instructions as well as a prescription for analgesic (paracetamol, 750 mg, every 8 hours for three days), anti-inflammatory (nimesulide, 110 mg every 12 hours for five days) and antibiotic medications (amoxicillin 500 mg every 8 hours for seven days).

One week later, sutures were removed (Fig 10). Tissue volume was satisfactory, there were no dehiscences, and fistula had disappeared. The patient did not report pain or secretions in the region. Follow-up visits every six months revealed no complications. The patient had no symptoms, and the operated tooth functioned normally. CBCT scan at six months showed no lesions, satisfactory healing and considerable bone repair. One year later, results of imaging examination, periodontal probing, percussion and palpation were all normal (Fig 11 A, B).



Figure 1. Fistula resulting from infection in the area of tooth #26.



Figure 2. Radiograph to confirm perforation at chamber floor close to mesiobuccal canal opening.

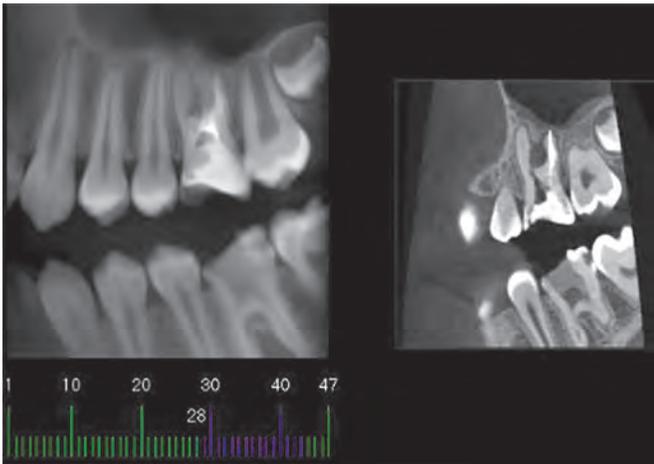


Figure 3. Initial CBCT scan for root resection planning.



Figure 4. Disinfection with 1% sodium hypochlorite and cervical mesiobuccal canal sealing using MTA.



Figure 5. Soft tissue flap.



Figure 6. Mesiobuccal root area.



Figure 7. Mesio Buccal root resection.

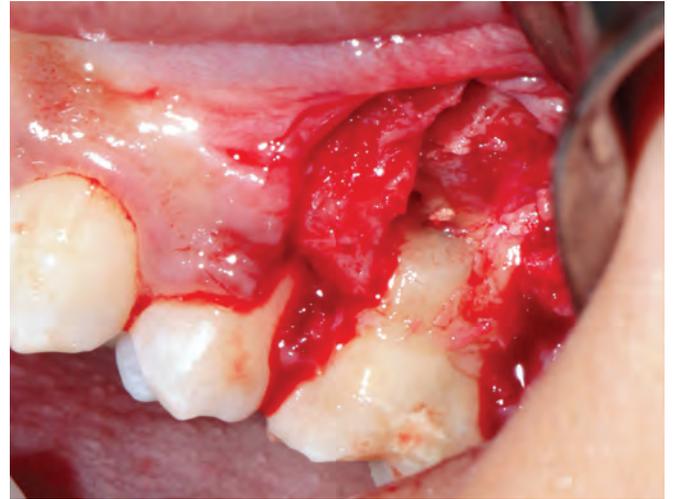


Figure 8. Root stump shaping.



Figure 9. Simple interrupted suture and tissue anatomy fully restored.



Figure 10. Suture removal one week after surgery.

Discussion

Success and failure rates of endodontic surgeries vary greatly. The main purpose of this surgical treatment is to isolate the root canal and, therefore, control bacterial contamination of apical and periapical tissues in order to promote healing. Surgeries should only be performed after conventional endodontic treatment or

retreatment has been unsuccessful, and all prognostic risks and benefits, together with the chances of treatment success, should be taken into consideration.

Anatomical variations of teeth with multiple roots may predispose to surgical complications, such as root perforations, which may compromise the success of endodontic treatment and even lead to tooth loss.⁷

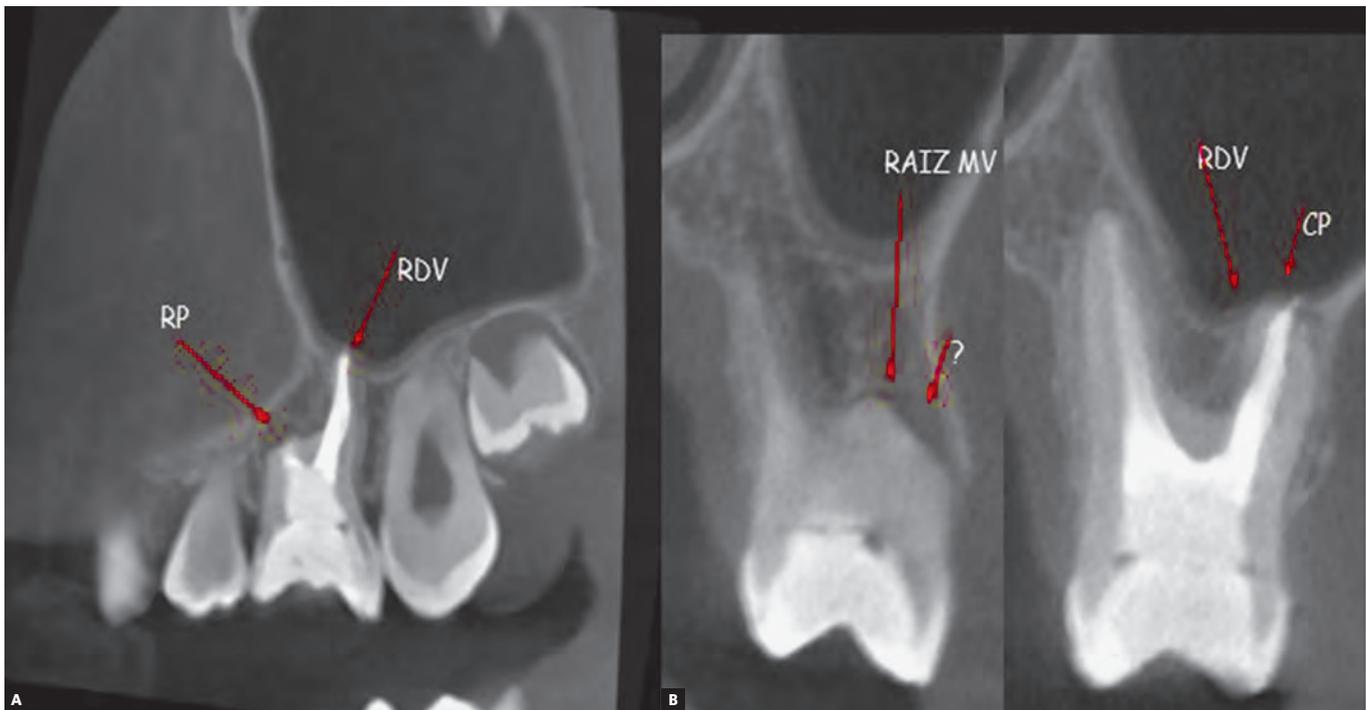


Figure 11. Final CBCT scans show satisfactory healing and bone repair at **A)** 6-month and **B)** year follow-up.

Root resection is a treatment option performed to extend the survival time of teeth with multiple roots and vertical fractures as well as root perforations. This technique was developed to respond to the need to keep a functional tooth in the mouth when prognosis is unclear. Therefore, the purpose of this procedure is to solve the problem of preserving occlusal, functional, esthetic and periodontal harmony.^{7,8}

Root resection is a highly complex endodontic procedure because of anatomical factors. Initial endodontic treatment is essential for endodontic-periodontal lesions treatment success, and healing depends on endodontic conditions.⁹ Endodontic surgery should only be performed after all conventional treatment modalities and retreatment options have been explored, and all cases should be carefully evaluated before a final decision for root resection is made.⁹

The technique of root resection is a viable option for teeth with multiple roots and healthy periodontium that have vertical fractures or perforations. The time since perforation is important, as the lesion should be treated as early as possible.¹⁰

Efficient treatment modalities for endodontic perforations have been investigated for several years. Surgical options have limitations, especially due to the location of perforations. Current trends point to more conservative treatment which depends on several factors, such as perforation diameter, contamination, tight apical sealing and, especially, location.¹¹

Of several studies comparing apical sealing material, eight found successful results for perforations treatment using glass ionomer cements (Ketac-Endo) alone, whereas 12 recommended gutta-percha or amalgam as sealing material. Currently, MTA results are satisfactory in perforations treatment, and this is now the material of choice for the treatment of infraosseous perforations because of its characteristics which promote bone repair.

However, for supraosseous and even subgingival lesions, sealing material such as glass ionomer, compomers and resins are viable options because, differently from MTA, they do not undergo dissolution and do not offer the risk of recontamination. Subgingival perforations sometimes require the association of orthodontic extrusive movements and periodontal remodel-

ing surgeries. In the case described herein, perforation had to be treated by a more aggressive periodontal procedure to have the problem solved.¹²

No endodontic surgery, however, will be successful if the canal is not fully filled, or if it cannot be sealed adequately. Therefore, before surgery is chosen, all treatment options should be explored, and dentists should try to solve the problem first by conventional endodontic treatment.¹³

Conclusion

Tooth #26 mesiobuccal root resection and sealing with MTA in the case described herein had satisfactory clinical results according to CT scans and clinical follow-up. There was no bone resorption in the periapical region, and bone was repairing in the area of root amputation. The treated tooth was kept in the mouth and its primary functions of mastication and esthetics were preserved, which defined treatment success.

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