Management of Internal Root Resorption with Mineral Trioxide Aggregate as Obturating Material

1Abhinav Kishore, 2Sakshi Singhal, 3Anuraag Gurtu, 4Rashmi Bansal, 5Anurag Singhal, 6Sumit Mohan

ABSTRACT

Endodontic treatment of teeth with internal root resorption represents a clinical challenge. Internal resorption is a rare condition in permanent teeth that poses procedural difficulties for treatment. It is a dental complication caused by dental trauma, surgical procedures, excessive pressure or irritation from bleaching agents that can lead to loss of tooth. A correct diagnosis and an understanding of the etiology and dynamics of the processes involved in tooth resorption is critical for effective management. This paper presents a case having non perforating resorptive defect in the middle 1/3rd of the root of a left maxillary central incisor which was treated nonsurgically with white mineral trioxide aggregate (MTA).

Keywords: Diastema, Internal root resorption, Mineral trioxide aggregate, Obturation, Odontoclast cells.


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INTRODUCTION

Internal resorption is a pathological lesion related to pulpal inflammation and bacterial invasion. It is a resorptive defect of the internal aspect of the root following necrosis of odontoblasts as a result of inflammation. It is caused due to transformation of normal pulp tissue into granulomatous tissue with giant cells, which resorb dentin. Odontoclastic multinuclear cells are responsible for the resorption, which can grow to perforate the root if untreated. The predisposing factors to internal root resorption are trauma, pulpitis, pulpotomy, cracked tooth, tooth transplantation, restorative procedures, invagination, orthodontic treatment and even a herpes zoster viral infection.

Clinically, the condition is usually asymptomatic and detected by routine radiographic examination which reveals a round-to-oval radiolucent enlargement of the pulp space with margins smooth and clearly defined with distortion of the original root canal outline. Pain or discomfort may be the chief complaint if the granulation tissue has been exposed to oral fluids. The granulation tissue can clinically manifest itself as a ‘pink spot’ in cases in which crown dentin destruction is severe. To arrest the odontoclastic activity, endodontic treatment is required. But biomechanical preparation alone cannot remove the odontoclastic cells from the round oval resorptive area, so copious irrigation with 5.25% of sodium hypochlorite is necessary. Thermoplasticized gutta percha technique is advised for obturation of such defects. However, gutta percha does not bond to tooth structure, cannot prevent odontoclastic activity and do not provide strength to the tooth structure. A new biomaterial mineral trioxide aggregate (MTA) can be used for obturation of such defects. It has both bioactive and bimineralization properties, so it bonds to the dentin by formation of hydroxyapatite crystals and its alkaline nature can restrict the activity of odontoclast cells. So it can provide strength, seals the canal better and prevents tooth resorption. The treatment of internal resorption should be initiated as soon as possible to prevent further loss of hard-tissue or an eventual root perforation.

The purpose of this paper is to present a case report on the management of left maxillary central incisor with internal resorption in middle-third using MTA as an obturating material further the esthetic treatment was also given by providing all ceramic crown.

CASE REPORT

A 38-year-old female patient, reported to the Department of Conservative Dentistry and Endodontics with chief complaint of unesthetic prosthesis irr 21 (Fig. 1A). Patient was asymptomatic with noncontributing medical history. She gave history of trauma 6 years ago.

Clinical examination revealed a faulty prosthesis wrt 21 with short clinical crown height and presence of spacing wrt 11, 12 and 21, 22. Tooth 21 was tender on percussion. Radiographic examination revealed an oval radiolucent area within the canal in the middle-third suggestive of internal resorption (Fig. 1B).

After the removal of prosthesis (Fig. 2), cold test was done in 11 and 21. Tooth 21 was nonvital and 11 was vital.
The case was diagnosed as chronic apical periodontitis with internal resorption wrt 21. Endodontic treatment using MTA as the obturating material was planned. An informed oral and written consent was obtained from the patient.

As the crown height was short rubber dam placement was done with the help of wedge. A conventional access cavity was prepared with #2 round bur, beginning from the center of the lingual surface of anatomic crown. The bur was used to penetrate through the enamel and slightly into the dentin (approximately 1 mm). The bur was directed perpendicular to the lingual surface as the external outline opening was created. Then the angle of bur was changed parallel to the long axis of the root. A lingual shoulder was removed to gain access to the lingual wall of the root canal. 30# K-file was placed in the canal and the working length was taken using an apex locator (apex ID) and further confirmed by a periapical radiograph (Fig. 3).

Biomechanical preparation was done with step back technique with apical preparation upto size 50 and step back upto size 70 with K-file. Throughout the procedure, the canal was irrigated by normal saline and 5.25% sodium hypochlorite alternatively.

Calcium hydroxide intracanal medicament (Cal-Excel) was placed for 2 weeks and the access opening was sealed with a temporary dressing (cavit). After 2 weeks, the dressing was removed and the canal was irrigated and dried with paper points. Mineral trioxide aggregate was manipulated according to manufacturer’s instructions and carried into the canal using MTA carrier.

Mineral trioxide aggregate was condensed into the canal by hand condensation using finger pluggers (2 and 3 number). After confirming the placement of MTA at apical third by direct digital radiography, the resorptive area and rest of canal were obturated by MTA (Fig. 4). Then, a moist cotton pellet was placed in the root canal orifice and the chamber was sealed by temporary dressing (cavit). After 72 hours, patient was recalled and postendodontic restoration was completed with composite.

To correct the gingival finish line, gingivectomy was performed using diode laser (Fig. 5). Tooth preparation for all ceramic crown was done. Rubber base impression was taken and die was prepared. All ceramic crowns were fabricated (Figs 6A and B).

The resulting crown with all the requisite translucency and shade matching with the adjacent central incisor (Fig. 7).
Further crown was cemented with the luting glass ionomer cement (GIC), cement (GC Fuji Plus, GC, Alsip, IL) (Fig. 8).

To improve the esthetics between 11 to 12 and 21 to 22 (Figs 9A and B), the diastema closure was done by incremental placement of appropriately shaded composite resin material (Figs 9C and D).

A 5-month follow-up demonstrated clinically asymptomatic and adequately functional tooth, with radiographic signs of healing (Fig. 10).

**DISCUSSION**

Internal (inflammatory) root resorption can be characterized both as a well-known and poorly known disease entity destroying the dental hard-tissue. Internal inflammatory root resorption is an insidious pathologic process, initiated within the pulp space and associated with loss of dentin. It is an oval-shaped enlargement of the root canal space, usually asymptomatic and detectable by radiographs. It can be either transient or progressive.
Internal resorption only occurs when the predentin adjacent to the site of chronic inflammation is lost as a result of trauma or other unknown etiologic factors. Trauma is the most common etiological factor (43%), followed by carious lesions (25%). The condition might go unnoticed until the lesion has advanced significantly, resulting in a perforation or symptoms of acute or chronic apical periodontitis after the entire pulp has undergone necrosis and the pulp space has become infected. Hence, root canal treatment must be initiated as soon as possible once an inflammatory resorptive lesion is detected to prevent further hard-tissue loss and eventual root perforation.

In the present case report, left maxillary central incisor with internal resorption in the middle third of the root, was detected during routine radiographic examination. The treatment was planned, considering the patient’s age, periodontal status, resorption location, absence of perforations, and resistance of remaining root hard-tissue. A nonsurgical endodontic treatment along with reinforcement by bioactive MTA was considered.

The shape of the resorption defect usually makes it inaccessible for direct mechanical instrumentation. So, 5.25% of sodium hypochlorite was used for irrigation of root canal and to remove vital tissue. Calcium hydroxide as an intracanal medicament was used to control the bleeding, maximizes the effect of disinfection procedures, maintains alkalinity, and necrotizes residual pulp tissue. Before obturation with MTA remnants of calcium hydroxide were removed, so that it will not affect the bonding of dentin with MTA.

According to Culbreath et al (2000), the treatment for internal resorption can include several materials, such as gutta percha, zinc oxide eugenol and amalgam alloy. However, these materials do not provide strength to the tooth structure and may be responsible for considerable
tooth discoloration. Mineral trioxide aggregate is a new material that has bioactive and biomineralizing properties. Because of these characteristics, MTA might become a viable alternative treatment option as compared to gutta percha-based materials and sealers. Mineral trioxide aggregate exhibits superior sealability against bacterial microleakage, while demonstrating antibacterial and bioinductive properties that can improve treatment outcomes. Furthermore, the material is sterile, radiopaque, resistant to moisture, and nonshrinking and stimulate mechanisms responsible for the biomineralization.

Biomineralization property of MTA forms hydroxyapatite crystals that helps in bonding with dentin to provide mechanical strength and also has the alkaline nature to restrict the activity of odontoclastic cells responsible for internal resorption.

After endodontic treatment, the periodontal treatment for crown lengthening with lasers was done and then esthetic correction was done by placement of all ceramic crown and closure of diastemas.

When determining the prognosis of an endodontically treated tooth with internal root resorption, the need for radiographic control every 5 months for at least 2 years should be considered. Such fact is due to the possibility of the area involved by the resorption to present a lateral canal, which would allow the continuity of the resorption process and compromise the treatment.

CONCLUSION

On the basis of the review of literature and clinical and radiographic outcomes hereby presented, it can be said that teeth with large internal root resorption should be treated in an attempt to salvage the tooth. The early diagnosis and treatment are very important in order to stop the resorptive process. It is imperative to initiate endodontic treatment as soon as possible to arrest the progression of the resorptive process and to prevent further weakening of tooth structure. Success in management of a case of internal resorption depends on early detection, appropriate treatment planning, removal of inflammatory pulp tissue, reinforcement of weaker tooth structure, and a three-dimensional obturation. Mineral trioxide aggregate can be used successfully for obturation of such defects.

REFERENCES