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CASE REPORT

A 3-Year Follow-up Case Report of a Successfully treated Perforating Internal Root Resorption using MTA

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ABSTRACT

Internal root resorption is the progressive destruction of intraradicular dentin along the canal wall as a result of clastic activity. Perforating internal root resorption poses a diagnostic and treatment challenge to the clinician. Poor prognosis of such teeth makes extraction a treatment option. Presented herein is a case report of a mandibular second premolar with advanced perforating internal root resorption in the middle third of the root. Advanced diagnostic method, cone-beam computed tomography (CBCT) was used for definitive diagnosis and treatment planning. Sectional obturation with gutta-percha was performed up to the resorptive defect and mineral trioxide aggregate (MTA) was used to fill the resorptive defect and rest of the canal space. At a follow-up of 3 years, the patient was clinically asymptomatic with good bone repair around the resorptive defect.

Keywords: Cone-beam computed tomography, Mineral trioxide aggregate, Perforating internal root resorption.

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INTRODUCTION

Root resorption is a complex phenomenon causing the destruction of dental hard tissues. External root resorption in primary teeth is a normal physiological process, in contrast to pathological root resorption seen in permanent teeth. Root resorption is classified based on the location as internal and external resorption. According to Ne et al[1] and Heithersay,[2] internal root resorption can be further classified as inflammatory and replacement resorption. The former occurs following chronic pulpal inflammation, loss of predentin layer either due to trauma or unknown etiologic factors. The latter type of resorption involves replacement of the tooth structure by the alveolar bone followed by tooth loss.

Internal inflammatory root resorption is a rare occurrence as it involves a complex phenomenon of activation and recruitment of clastic cells followed by its adherence to intraradicular mineralized dentin. The presence of coronal infected necrotic pulp acts as a stimulus for the inflammation of apical pulp leading to the progression of resorption. It is usually an asymptomatic condition and progresses to communicate to the external root surface which is detected by chance on routine radiographic examination. Such advanced lesion pose diagnostic difficulties as it is difficult to differentiate between internal and external resorption. Accurate diagnosis of such lesions influences the treatment decision and predictable outcome.

Conventional radiography is a two-dimensional (2D) imaging technique of a three-dimensional (3D) object. It does not reveal the relevant information required for diagnosis and treatment planning for advanced internal resorptive defect. Advanced diagnostic aid, such as cone-beam computed tomography (CBCT) provides 3D information, transverse and sagittal view which aids in accurate diagnosis. Confirming the diagnosis of perforating internal root resorption, treatment planning with root canal therapy and sealing of the perforation defect is considered. Root canal therapy removes the remaining apical vital tissue and necrotic coronal pulp in the canal. During the procedure, chemomechanical debridement of the canal is assisted with ultrasonic agitation of irrigants for the eradication of bacteria from the inaccessible resorptive areas. However, an *in vivo* study conducted by Burleson et al,[3] showed that bacteria persisted in the canal in spite of ultrasonic instrumentation. Hence, additional disinfection procedure with an antibacterial medicament should be done. Calcium hydroxide is the most commonly used intracanal medicament with antimicrobial property and synergistic effect, in removing organic debris when used in combination with sodium hypochlorite.[4]

The disinfected canal is obturated with gutta-percha and as it does not have the property to flow into the perforative resorption defect; other perforation repair materials are considered for the same. Some of the perforation repair materials are intermediate restorative material, glass ionomer cement, amalgam, geristore,

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composite, mineral trioxide aggregate (MTA). Among the array of perforation repair materials, MTA is a novel biomaterial, which has a proven track record.[5] It is biocompatible, has good sealing ability and releases calcium salts when dissolved in tissue fluid, hence has the potential for osteogenesis and cementogenesis. It can be manipulated in humid environment. It also increases the fracture resistance of the tooth.[6] Timely diagnosis and treatment of advanced internal resorptive lesion restores the function of the tooth. The present article describes a case of perforating internal root resorption involving mandibular second premolar, successfully treated using MTA.

CASE REPORT

A 33-year-old male patient complained of food lodgement in relation to lower left second premolar since 1 month. Clinical examination of the same tooth revealed disto-occlusal amalgam restoration with marginal ridge height discrepancy and normal probing depth. Intraoral periapical radiograph revealed radiolucency beneath the restoration indicating secondary caries. Uniform widening of the root canal space was observed from the coronal to middle third of the root, in addition, bone rarefaction was seen to the same level on the mesial aspect (Fig. 1). External root perforation was suspected which was not clear on conventional radiograph. Hence, we opted for CBCT which confirmed the same (Fig. 2).

During the first visit, access opening was performed under rubber dam isolation, canal patency was checked using #10 K-file and pulp tissue was extirpated. Apex locator gave an abrupt reading during working length determination and profuse bleeding was observed even after complete pulp extirpation confirming perforating internal resorption. Working length was determined using radiograph and canal was shaped using crown down method. The root apex was enlarged up to #45 K-flexofile. Cleaning and shaping was performed with alternative use of diluted sodium hypochlorite and ethylenediamine tetraacetic acid (EDTA) (RC HELP, Prime Dental Products) as a lubricant. The irrigant was agitated with ultrasonics to improve the removal of the necrotic debris and reduce the number of microbes from the inaccessible resorptive defect. Later, calcium hydroxide was placed as an intracanal medicament for 30 days and was changed twice during this period. Obturation was performed when the canal was dry and the patient was asymptomatic.

Calcium hydroxide was removed from the canal using ultrasonic tip with alternate use of dilute sodium hypochlorite solution and EDTA. Canal was dried with paper points, apical third of the root was obturated with warm vertical compaction of gutta-percha till the resorptive area and coronal portion was filled with MTA (Proroot MTA, Dentsply) (Fig. 3). Mineral trioxide aggregate carrier was used to carry and fill MTA into the resorptive defect till the orifice of the canal. Moist cotton pellet was placed over MTA to stimulate setting

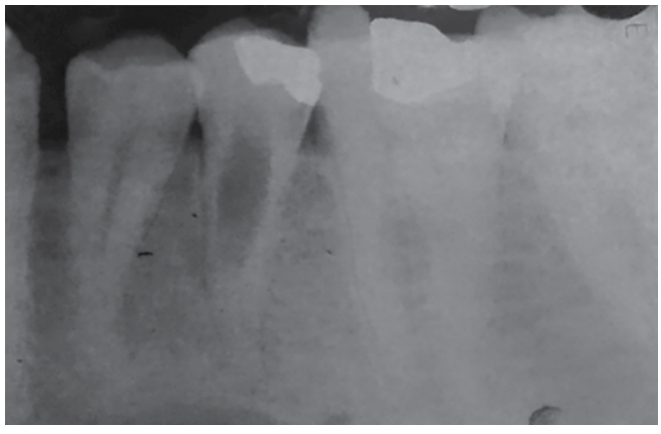

Fig. 1: Intraoral periapical radiograph of mandibular second premolar reveals radiolucency below the amalgam restoration on the distal tooth surface, widened root canal space extending from the coronal to the middle third of the root with adjacent bone rarefaction

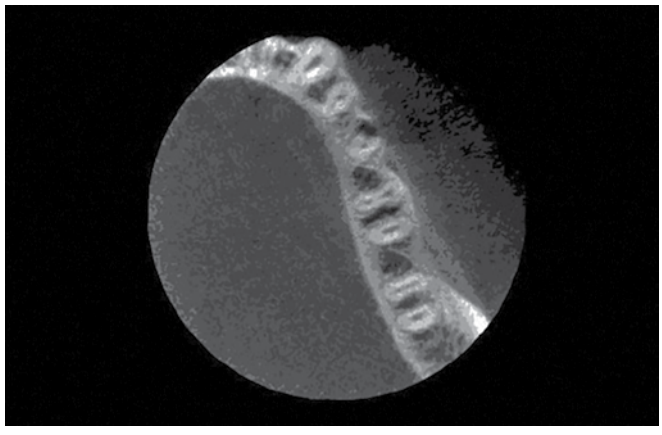

Fig. 2: Axial CBCT slice shows the site of perforating internal root resorption

Fig. 3: Tooth obturated with gutta-percha till the perforation site and the rest of the canal filled with MTA

of the material and access cavity was sealed with cavit. Cavity was reopened after 24 hours to check the set of MTA followed by access closure with light cure composite resin. Later, the tooth received porcelain fused to metal crown as a definitive restoration.

The patient was reviewed periodically. At a 3 years follow-up, he was asymptomatic and CBCT evaluation showed good trabecular bone formation all around the resorptive defect and periapical area (Figs 4 and 5).

DISCUSSION

Internal resorption most commonly occurs in maxillary incisor and observed most frequently among male than female subjects.[7,8] This case report of perforating internal root resorption involved mandibular second premolar, which is a rare occurrence. Improper restoration of the proximal defect of the premolar served as a chronic irritation to the pulp tissue which could have recruited the clastic cells leading to internal resorption. As it was a long standing irritation to the pulp, resorption progressed to perforate the root surface.

Fig. 4: A 3-year follow-up radiograph reveals good bone deposition at the perforation site

Fig. 5: Cone-beam computed tomography, 3D buccal view of the same tooth at 3-year follow-up

Perforating internal root resorption is a complicated and challenging entity for diagnosis and treatment planning. The prognosis for such tooth is fair due to weakened tooth structure and possible periodontal involvement.[9] Timely diagnosis helps in better management of such teeth. In the present case, intraoral periapical radiograph could not detect the perforation of the root surface as it lacks early detection of pathosis in cancellous bone because of the density of cortical plates and the influence of the superimposition of anatomic structures.[10] Cone-beam computed tomography was an invaluable tool in decision-making process as the data obtained provided the 3D image of the resorptive lesion and confirmed the mid-root perforation. Without additional imaging, it would not have been possible to detect the external perforation, solely by using intraoral radiograph.

During endodontic therapy, calcium hydroxide was placed as an intracanal medicament as it exhibits antimicrobial property and disinfects the inaccessible root resorption defects. It disintegrates the remaining tissues in the resorptive defect which is easier to remove by irrigation with sodium hypochlorite.[11] Root resorption occurs at an acidic pH, the alkaline environment created by calcium hydroxide causes reversal of this process and aids in hard tissue deposition.[12] Obturation of the root canal was performed using hybrid technique with gutta-percha and MTA. Mineral trioxide aggregate is well-tolerated by the periapical tissues and aids in complete regeneration of periodontium.[13-19]

A 3-year follow-up, CBCT evaluation showed good healing at the perforation site. This could be attributed to the properties of MTA and CBCT, a 3D imaging technique for diagnosis.

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