

Endodontic management of invasive cervical resorption: A case report

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Abstract

Dental Resorption is a challenge to dentists due to the complexity of the process. Invasive cervical resorption of the tooth is a rare and uncommon phenomenon and if not treated may lead to loss of tooth structure. Successful management of Invasive cervical resorption depends on the location, size, accessibility and structural integrity of the tooth and periodontium after treatment. The present case demonstrates invasive cervical root resorption with surgical approach using biocompatible restorative material.

Keywords: Invasive cervical resorption, Fibre reinforced composite, EndoSequence

Introduction

Invasive cervical resorption(ICR) is a relatively rare, insidious, and aggressive form of localized external tooth resorption that involves the surface of root below epithelial attachment and coronal to supporting alveolar process.¹ The term ‘ICR’ was coined by Heithersay. Heithersay classified ICR depending on the amount of invasion.²

Class 1: A small invasive resorptive lesion near the cervical area with shallow penetration into the dentin

Class 2: A well-defined invasive resorptive lesion that has penetrated close to the coronal pulp chamber but shows little or no extension into the radicular dentin

Class 3: A deeper invasion of dentin by resorbing tissue not only involving the coronal dentin but also extending into the coronal third of the root

Class 4: A large, invasive resorptive process that has extended beyond the coronal third of the root

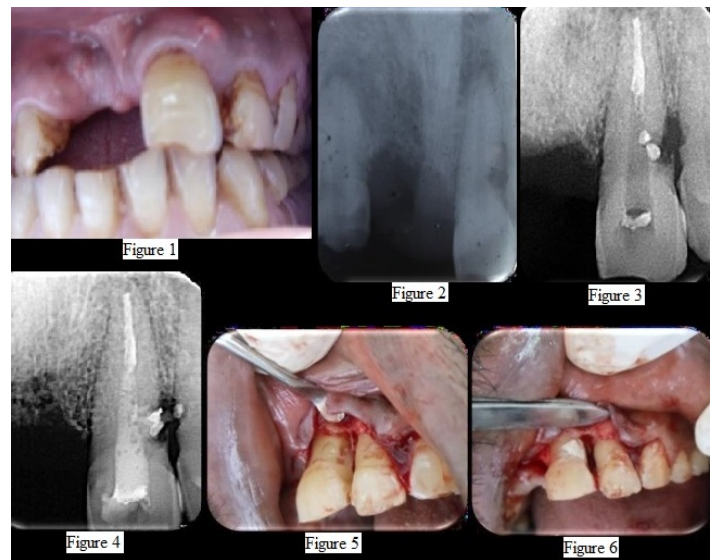
The diagnosis of ICR is done by radiographic images. Lesions vary in the shape from well-delineated radiolucencies with irregular borders, and on clinical examination, they are painless with a small root defect in the cervical region. Histopathologically, the resorbed area shows highly vascular fibrous tissue with multinucleated osteoclastic cells adjacent to the dentin surface.³ The main treatment goal for ICR includes the removal of the granulation tissue and to seal the affected dentinal tubules. This procedure, if necessary, can be achieved by the exposure of the resorption lacuna surgically or orthodontically.

Various materials were available to seal resorptive defect, but the best clinical outcomes can be achieved using bioceramic materials like Mineral trioxide aggregate (MTA) Calcium enriched mixture (CEM) and Biodentine. A new tricalcium silicate material EndoSequence Root Repair Material putty (ERRM, Brasseler USA) has been introduced which is composed of calcium silicates, monobasic calcium phosphate, zirconium oxide, tantalum oxide, proprietary fillers, and thickening agents.⁴ The material is highly mouldable, biocompatible, osteogenic, insoluble, hydrophilic, radiopaque, and aluminum-free. The following case report describes the surgical management of ICR using Endosequence putty.

Case Report

A 41-year-old male patient came to the Department of Conservative Dentistry and Endodontics with discomfort in upper left central incisor. The medical history of the patient was non-contributory. The patient does not recall any history of dental trauma, orthodontic treatment, or bleaching. Intraoral examination revealed the presence of sinus tract on attached gingiva in the labial aspect of the maxillary left central incisor with grade 1 mobility. The periodontal probing depths were physiological at all sites except for the distopalatal surface where the sinus tract [Figure 1] and necrosis material were present. The electric pulp test was negative.

The preoperative IOPA radiographic examination [Figure 2] revealed a small periapical radiolucent lesion & an irregular, large radiolucent area encroaching pulp chamber in the cervical third & middle third of the external root surface at the distal aspect of 21. A diagnosis of pulp necrosis with external ICR was confirmed and root canal therapy followed by surgery for sealing the resorptive defect was planned for 21.



Management

Treatment procedures were explained, and written informed consent was obtained from the patient. The tooth was isolated using rubber-dam, and the root canal was accessed from the palatal surface. After working length determination, chemomechanical preparation was done using K files (Mani.inc, Tochigi, Japan) and irrigation was performed with 0.9% normal saline (Infutech Healthcare LTD, Indore, India) and 5 ml of 3 % NaOCl (Vishal Dentocare Pvt., Ltd., Ahmedabad, Gujarat), later the canal was dried with paper points and medicated with calcium hydroxide (Ammdent, Amrit Chem. & Min. Ag. Mohali, India) and the cavity was sealed with a temporary filling cavifill (3M ESPE). After two weeks, calcium hydroxide was removed, and after full disinfection protocol, obturation was done using the lateral condensation technique. A day later post space preparation was done using peeso reamers [Figure 3], and etching with 36% phosphoric acid is done for 10 seconds. Later thorough washing with water, and brief blot drying followed by two coats of the total-etch bonding agent were applied with the applicator tip, lightly air-dried for 10 seconds, and light-cured for 10 seconds. Following this, root canal space was filled with fiber-reinforced composite (GC everX

Posterior) and compacted into the cavity incrementally [Figure 4] & light-cured for 20 seconds. The overlying 2 mm of the occlusal surface was reconstructed using nanofiller composite.

Immediately after the completion of root canal treatment, reparative surgery was performed. A minimally invasive mucoperiosteal flap was raised. A vertical incision from the mesial surface of the maxillary left central incisor with a continuing sulcular labial incision to the distal surface of the maxillary left lateral incisor was given [Figure 5]. A cotton pellet dipped in a very small quantity of 90% aqueous solution of trichloroacetic acid (TCA) (Organo Biotech Laboratories Pvt Ltd., Mayapuri, Delhi) was applied for 30 seconds with gentle pressure to the resorptive lesion.

Using an excavator instrument, the granulomatous tissue was removed from the exposed resorption lacuna, and filled with EndoSequence root repair material putty [Figure 6]. After radiographic confirmation [Figure 7], the flap was repositioned, sutured [Figure 8], and coe-pack dressing was given. At the first visit one week after treatment, healing was satisfactory, and the sutures were removed. Recall appointments were scheduled at 3, 6, and 12 months. At every recall appointment, the oral hygiene of the patient was checked clinically [Figure 9] & radiologically [Figure 10] and the tooth was asymptomatic, and probing depth was within normal limits, indicating that repair of resorption defect was successful with Endosequence putty.



Discussion

The etiology of ICR is still unknown. It is supposed that ICR requires two phases: injury and stimulation.^{5,6} According to Gold and Hasselgren, there are three environmental factors that contribute to root resorption: they are an absence of protection for the root surface, presence of vascular connective tissue, and an inflammatory stimulus.⁷ Extensive external root resorption is challenging when they cause significant root damage. The use of cone-beam computed tomography (CBCT) helps in determining the exact localization and size of resorption, thereby providing a prompt diagnosis. Even though various treatment options, the basic aim remains the same, i.e., the complete removal of granulation tissue from the resorptive defect. The present case describes invasive cervical resorption of the tooth, showing signs of pulpal and periapical infection that required root canal therapy followed by sealing the resorptive area using a bioceramic formulation by surgical intervention.

In the presented case report, as tooth structure was weekend by resorption and exhibited mobility, root canal therapy followed by post is indicated to reinforce the

remaining tooth structure. EverX Posterior (GC Dental Products Corp., Aichi, Japan) was chosen for the procedure. EverX Posterior is an affordable high-tech material to be used as an alternative treatment for indirect restorations where patients cannot afford other treatment options, like ceramic restoration. Short fibers present in EverX posterior prevent fracture propagation, and also the fracture pattern under load is changed. Fracture toughness of the material is equivalent to dentine.⁸ The use of fiber-reinforced composite not only eliminated the need for a conventional crown, which would have required the removal of additional tooth structure but also served as a coronal reinforcement.

In the presented case report, 90% TCA was used, one advantage of using TCA is that it helps in hemorrhage control and inactivation of adjacent potentially resorptive cells, thereby preventing the tendency for recurrence of this type of resorption.⁹ Materials such as mineral trioxide aggregates (MTA) is considered as treatment choice in terms of biocompatibility. However, due to their long setting time, an alternative material was chosen.¹⁰ Endosequence, a modern bioceramic material, was used to seal the resorptive defect. This newer material is available as a premixed product that is malleable, easy to manipulate, and apply. It contains nanosphere (1×10^{-3} mm in its greatest diameter) particles that allow the material to enter into the dentinal tubules and interact with the moisture present in the dentin, creating a mechanical bond on setting thereby eliminating the potential for shrinkage, rendering the material with exceptional dimensional stability.¹¹

ERRM enables tissue repair and contributes to osteogenesis. Over time it helps in precipitation of apatite crystalline structures, suggesting that the material as bioactive.¹² The pH of the material is 12.7, which is responsible for its antibacterial nature, and the set putty

does not cause any clinically visible color variation, which was a big problem with MTA. In regular visits for a check-up, the patient was completely asymptomatic, and the radiographic examinations showed healing at the resorption site, and periradicular region was satisfactory, suggesting that ERRM putty is the best choice for resorption repair.

Conclusion

With the advent of a bioactive material like ERRM, the scope of clinical dentistry has improved by many folds. The versatile nature of ERRM, makes it possible to be used for root repair. Further long term studies are required to establish the use of ERRM in various areas in conservative dentistry and endodontics.

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