

Management of Class-III External Invasive Cervical Resorption Using Biodentin: A Case Report

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ABSTRACT

Background: Tooth Resorption is the loss of hard dental tissue (i.e. cementum, dentin and/or enamel) as a result of odontoclastic action. External Invasive Cervical Resorption (EICR) is an aggressive form of external root resorption which may occur in any tooth in the permanent dentition. This condition is defined as a localized resorptive process that involves the surface of root below epithelial attachment and coronal aspect of the supporting alveolar process, namely the zone of connective tissue attachment. Among the etiologic factors that have been suggested include traumatic injury, orthodontic treatment, intracoronal bleaching, periodontal therapy and idiopathic etiology. Once diagnosed, clinical management is challenging and depends on the degree of involvement of the tissues. This paper presents a case describing the successful surgical management of an aggressive form of EICR in the upper right central incisor using Dental Operating Microscope and Biodentin™ in an attempt to repair the defect. A systematic treatment plan that is executed with the use of modern equipment like Dental Operating Microscope, use of biocompatible materials like Biodentine and operator skill are helpful to achieve a predictable outcome of the treatment.

Keywords: External Invasive Cervical Resorption (EICR), Biodentin, DOM.

INTRODUCTION

Tooth Resorption is the loss of hard dental tissue (i.e. cementum, dentin and/or enamel) as a result of odontoclastic action. Root resorption is desirable in deciduous teeth as it is necessary for their exfoliation. However, it is undesirable in adult teeth as it leads to irreversible damage. It is broadly categorized into External Resorption or Internal Resorption depending on the surface of the tooth where it occurs. External Root Resorption may be further sub-classified into surface resorption, external inflammatory resorption, external cervical resorption, external replacement resorption and transient apical resorption.¹ External Invasive Cervical Resorption (EICR) is an aggressive form of external root resorption which may occur in any tooth in the permanent dentition.^{2, 3, 4} However, it is most commonly detected in maxillary central

incisor teeth. This condition is defined as a localized resorptive process that involves the surface of root below epithelial attachment and coronal aspect of the supporting alveolar process, namely the zone of connective tissue attachment.² Damage to the cementum in that area exposes the dentin to osteoclasts, which, in turn, start to resorb it, creating a space filled with granulation tissue.^{5,6} It is a dynamic process that involves periodontal, dental and in later stages pulpal tissues.³ Among the etiologic factors that have been suggested include traumatic injury, orthodontic treatment, intracoronal bleaching, periodontal therapy and idiopathic etiology.^{7,8,9,10,11,12} Once diagnosed, clinical management is challenging and depends on the degree of involvement of the tissues. This paper presents a case describing the successful surgical

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management of an aggressive form of EICR in the upper right central incisor using Dental Operating Microscope and Biodentin™ in an attempt to repair the defect.



Fig 1: Pre Operative Clinical Picture of Tooth no 11.



Fig 2: IOPAR revealing large radiolucency in relation to tooth no 11.

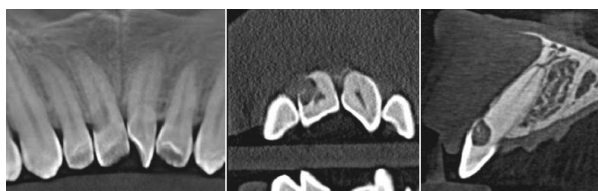


Fig 3: CBCT showing three dimensional extent of the lesion.



Fig 4: Immediate Post Obturation Radiograph.



Fig 5: Granulation tissue exposed.



Fig 6: Granulation tissue removed.



Fig 7: Biodentin placed.

History and Examination:

A 26 year old male patient presented with a chief complains of red discoloration and occasional bleeding in relation to his upper right front teeth for last one month. He also complained of sensitivity to hot and cold food in teeth in the same area. Patient did not have any known significant medical history

relevant for ICR: no history of orthodontic treatment, dental trauma, or bleaching. However, he was undergoing treatment for Irritable Bowel Syndrome.



Fig 8: Six months follow-up IOPAR.



Fig 9: Six months follow-up - Clinical View.

On intraoral examination, pink discoloration was obvious at the distal-cervical aspect of the crown of tooth no 11. (Figure 1) No caries or restorations were detected. Bleeding on probing was present at the affected area. The tooth was sensitive to vertical percussion. Intra Oral Periapical Radiograph revealed a large radiolucency at the distal aspect of tooth no 11 encroaching on the pulp chamber. (Figure 2) Cone Beam Computed Tomography (CBCT) examination confirmed three dimensional extent of a large resorptive defect on the cervical aspect of the tooth. (Figure 3) Based on these findings, a diagnosis of irreversible pulpitis with class-III External Invasive Cervical Resorption was made.

Treatment Planning:

Endodontic treatment of the tooth was planned along with following objectives:

Arrest resorptive process

Restore damaged root surface with biocompatible material

Prevent further resorption

Improve esthetics of tooth

CASE REPORT

Local anaesthesia (Lignox 2%, Indoco Remedies, Gandhinagar, Gujarat) was administered and the tooth was isolated under rubber dam. A traditional access cavity was prepared from the palatal aspect. Working length was achieved and pulp space was prepared using crown down approach. During preparation, the canal was copiously irrigated with 3% Sodium Hypochlorite (Vishal Dentocare, Ahmedabad) and 17% EDTA (Prime Dental Products Limited, India). Calcium Hydroxide Paste (Metapex, Meta Biomed Co Ltd, Korea) was placed as an intracanal medication and access cavity was sealed with Cavit G (3M ESPE, St Paul, MN). On the subsequent visit (3 weeks later) as the patient was completely asymptomatic, the access cavity was reopened, the canal was rinsed thoroughly and calcium hydroxide dressing was removed. The canal was dried with paper points and obturated with Gutta Percha and AH Plus sealer (Dentsply, Maillefer, USA) using continuous wave of condensation method. An immediate post operative radiograph was performed to check the quality of the root canal obturation. (Figure 4)

As the lesion was clinically not accessible a surgical intervention was planned under Dental Operating Microscope. A full thickness flap was raised to expose a large circular resorptive area. (Figure 5) The granulation tissue was removed from the resorptive cavity using large curettes and excavators. Irregular borders of the cavity were smoothed using round bur and airtor. (Figure 6) Biodentin (Septodont, Saint-Maur-des-Fosses, France) was mixed according to the manufacturer's instruction and carried to the defect using MTA carrier. The defect was completely filled with Biodentin and flap was repositioned and sutured back in place. After a period of one month aesthetic correction was achieved by removing superficial

layer of Biodentin to expose the enamel and dentin margin. (Figure 7) The cavity was restored using Composite Resin. (Z350, 3M, USA) Patient was recalled after six months. Clinical and radiographical examinations were satisfactory. (Figure 8,9)

DISCUSSION

It is very important for the clinician to understand the nature of EICR. Successful management requires the knowledge of etiological factors, however, in present case; known etiological factors were not present. As per medical history given by patient, he was undergoing treatment for Immuno Deficiency Disorder and Irritable Bowel Syndrome. Such kind of association between medical condition and Invasive Cervical Resorption has not been reported in literature.

The diagnosis of EICR defects is challenging particularly in its initial stage. It is difficult to locate the resorptive cavity on the proximal surface of the tooth. However, extensively cavitated cervical defects may be diagnosed by direct vision. As in this case the defect was large and was associated with clinical symptoms of prolonged sensitivity to hot and cold food. The patient also complained of bleeding on brushing from the affected area. The bleeding on mechanical stimulation and pink discoloration is the result of presence of highly vascular granulation tissue.^{9, 13}

In addition to routine diagnostic methods, the use of CBCT allows the clinician to confirm the three dimensional extent of the lesion, that will be helpful to establish treatment plan.¹⁴ CBCT overcomes the limitations of Peri Apical Radiograph allowing the defect to be viewed in any plane without superimposition of overlying structures.^{15,16} The importance of CBCT in the management of EICR is also highlighted in the European Society of Endodontology [ESE] position statement,¹⁷ and the joint statement by the American Association of Endodontists & American Academy of Oral & Maxillofacial Radiology [AAE/AAOMR].¹⁸ EICR is classified into four classes according to the extent and severity of the lesion.² The pulp may be unaffected in Class-I and Class-II defects, however some cases of Class-III and class-IV lesions necessitates endodontic intervention. Recently a new classification system for EICR has been

suggested based on CBCT analysis of the lesion. This novel and clinically relevant three-dimensional classification should allow effective and accurate communication of EICR lesions between colleagues. It will also allow the effect of the nature of EICR on the outcome of treatment to be assessed objectively.¹⁹

Various materials have been proposed and tested from time to time to seal the resorptive defects such as Amalgam²⁰, Composite Resin²¹, Glass Ionomer Cement²², Mineral Trioxide Aggregate (MTA)^{23,24} and Biodentine.^{25,26,27} Reattachment of the periodontal fibers on the tooth surfaces restored with Amalgam and Composite cannot be expected and is unlikely with Glass Ionomer Cement.²⁸ More recently Calcium Enriched Mixture (CEM), Bioaggregate, Endosequence Root Repair Material and Endosequence BC sealer are the group of other bioactive materials which have been proposed to restore the resorption cavities.²⁹

In present case, Biodentine was used to seal the defect because of its short setting time of nearly 12 minutes as compared to long setting time of MTA. The push out bond strength of Biodentine is also better as compared to MTA. A favourable feature of Biodentine is also that blood contamination has no effect on the push out bond strength, irrespective of the duration of setting time.³⁰ It's property to release calcium ion and providing the alkaline environment makes it more conducive for osteoblastic activity.^{31, 32}

Elimination of resorptive tissue is effectively performed under microscope. The use of Dental Operative Microscope minimizes tissue damage and consequently decreases postoperative patient discomfort. In present case, surgical intervention was planned because of the cervical extent of the lesion. Magnification allowed better visualization and precise excavation of the granulation tissue as well as predictable placement of the Biodentine followed by final layer of Composite Resin.

CONCLUSION

Successful management of EICR requires early and proper diagnosis using thorough clinical examination and imaging methods like CBCT. A systematic treatment plan that is executed with the use of modern equipments like Dental Operating

Microscope, use of biocompatible materials like Biodentine and operator skill are helpful to achieve a predictable outcome of the treatment.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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