Dental Trauma Case Report Competition

Treatment of Mandibular Central Incisor with Class III Invasive Cervical Resorption: 10-year follow-up and the role of 3D imaging in ICR diagnosis. Clinical Report.

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Title

Treatment of Mandibular Central Incisor with Class III Invasive Cervical Resorption: 10 years follow and the role of 3D imaging in ICR diagnosis. Clinical Report

Abstract

External cervical resorption post-dental trauma has also been described as invasive cervical resorption (ICR) because of its aggressive nature and describes the loss of dental hard tissue beginning at the cervical region of the root surface as a result of an odontoclastic action.

The treatment of ICR often involves the surgical exposure of the affected root surface in order to remove inflammatory tissue. Restorative materials such as amalgam, glass ionomer, resin-modified glass ionomer cement RMGI and mineral trioxide aggregate have been proposed to fill the resorptive defect. When only minimally sound tooth structure remains, dentists face the dilemma of preserving the affected tooth with multiple treatment procedures, including non-surgical endodontic treatment, post placement, crown lengthening, and complete crown restoration or extracting the tooth and placing a dental implant. A uniform 1.5- to 2-mm vertical axial wall height ferrule improves the long-term survival of a non-surgical endodontically treated tooth.

This clinical report describe the interdisciplinary alternative approach to restoring a tooth # 23 with ICR. Simultaneous Nonsurgical and surgical endodontic root canal treatment together with periodontal surgery was provided for debridement and repair of the ICR.

Direct light-polymerizing resin-modified glass ionomer cement (Geristore; Den-Mat Corporation) and ProRoot MTA (DENTSPLY)

were used to obturate the root canal, repair the defect and preserve tooth structure. The patient was followed-up for 10 years after treatment and had no further complications associated with this tooth; however, after advanced imaging was acquired ICR was present in multiple teeth not previously diagnosed with this condition.

Introduction

External cervical resorption describes the loss of dental hard tissue beginning at the cervical region of the root surface as a result of odontoclastic action.[1]

Because of its aggressive nature, it has also been described as invasive cervical resorption (ICR).[2]

Orthodontic treatment seems to be the most common risk factor for ICR, followed by trauma and intracoronal bleaching.[3]

The treatment of ICR often involves the surgical exposure of the invaded root surface to remove the inflammatory tissue.4 Restorative materials such as amalgam, glass ionomer, RMGI,[5-8] and mineral trioxide aggregate have been proposed to fill the resorptive defect.[9]

When only minimally sound tooth structure is present, clinicians face the dilemma of preserving the affected tooth with multiple treatment procedures, including endodontic treatment, post, crown lengthening, and complete coverage restoration or extracting the tooth and placing a dental implant.[10-15]

Case Description

On May 2009, a 64-year-old, medical oncologist, Caucasian male presented to the Dental Associates Clinic at the University of Louisville School of Dentistry, with discomfort of the mandibular left lateral incisor. He had a history of external root resorption associated with tooth #23. Patient had a history of first orthodontic treatment more than 30 years ago and orthodontic retreatment 5 years prior. Intraoral imaging examination revealed external cervical resorption and symptomatic apical periodontitis (Fig. 1). The radiologic exam showed no evidence of root fracture, and no chronic apical periodontitis

The external cervical resorption was diagnosed as Heithersay class III invasive cervical resorption.[2,3]

The patient expressed a strong desire to preserve the tooth and consented to a treatment plan with both simultaneous root canal treatment and microsurgical endo-periodontal surgery. He understood the advantages and disadvantages of preserving and restoring the affected tooth versus the alternatives of a partial fixed dental prosthesis or a single implant restoration.

The endo-periodontal reparative surgery was performed with local anesthesia. Buccal intrasulcular full thickness flap was raised to remove granulation tissue from the resorptive defect area. A microscope (OPMI pico Dental Microscope; Carl Zeiss) was used at medium magnification throughout the surgery as needed. Cotton swabs soaked with 90% trichloroacetic acid were applied on the dentin in the resorptive defect area for 30 seconds to ensure coagulation necrosis of possible tissue remnants as described by Heithersay.(4) The resorptive defect was debrided with curettes (13/14 Columbia University Curette; Hu-Friedy) and root canal instrumented with rotary instrumentation HyFlexCM,[11] (Coltene, Whaledent.) (Fig. 2)

Apical 1/3 of root canal filled with mineral trioxide aggregate (ProRoot MTA; Dentsply Intl) and resorptive defect and remaining root canal space filled with light polymerizing resin-

modified glass ionomer cement (Geristore; Den-Mat Corporation) then the gum was repositioned and sutured (Fig 3-4).

The patient was scheduled for 3-month dental hygiene recall and was followed-up for 10 years after treatment, without any further complications. (Fig 5-6).

After 10 years, a routine intraoral radiograph demonstrated absence of disease associated with # 23, however, a potential resorption defect associated with # 26 was noted. A small field of view (4x4cm), high resolution (0.08 voxel) Cone Beam Computed Tomography (CBCT) scan of the anterior mandible was acquired using the Accuitomo CBCT scanner (J.Morita Coorp – Kyoto Japan) and later reconstructed using a novelty realistic rendering software Evol-DX(CDT – Sao Paulo Brazil). The CBCT scan demonstrated absence of the buccal cortical plate associated with #23 and presence of mesial, distal and lingual bony walls within normal limits (Fig 7). Tooth # 26, although asymptomatic, demonstrated invasive cervical resorption Heithersay class III, presence of the buccal and lingual cortical plates and absence of apical pathology (Fig 8).

Discussion

The light-polymerizing resin-modified glass ionomer (Geristore; Den-Mat Corp) used has been described by Dragoo [8,9] as an acceptable material for the restoration of subgingival lesions.
Resin-modified glass ionomer also has been documented to repair and seal subgingival perforations with the histologic evidence of an absence of inflammatory cells and presence of fibroblasts adjacent to the material.[7-8] The light-polymerizing resin-modified glass ionomer was placed within 1 mm of the facial alveolar bone crest

to repair the resorptive defect and filling up the root canal, the follow-up periodontal evaluation showed no periodontal pocket greater than 3 mm, or bleeding upon probing. The patient's periodontal health in the current report supports the previous findings.[5-8]

The decision-making process for extracting a tooth is based on an evaluation of multiple risk factors.[12-13]

Nonsurgical and microsurgical endodontic therapy and single tooth implant are both predictable treatments for compromised teeth.[14]

However, the longevity of endodontically treated teeth is directly related to the quality and quantity of the remaining tooth structure.[15]

Heithersay et al [2] reported that the treatment success rate was 77.8% in class III lesions. Although this clinical report demonstrated a short-term success at 3 months, clinical studies are needed to support the treatment option presented.

CBCT imaging is an important diagnostic tool to help clinicians plan and follow up cases of ICR. The European Society of Endodontology and American Association of Endodontists & American Academy of Oral & Maxillofacial Radiology position statements advise that Cone beam computed tomography should be considered for the assessment and/or management of root resorption.[16] Patel et all proposed a new ICR classification based on tridimensional assessment of those lesions. Krishan et al demonstrated that the information gained by CBCT imaging justified the extra radiation dose to the patient in order to better treat and manage ICR cases [17]. The novelty Evol-Dx 3D imaging software allows for realistic rendering of the anatomy and provides clinicians with invaluable cinematographic rendering of the dentition. Both dentists and patients alike can now better understand the size and proposed treatment for this type of lesion. To my knowledge, this is the first time 3D realistic rendering was used to evaluate and diagnose ICR.

Conclusion and clinical implications

This clinical report described a conservative approach to preserve a tooth with a class III invasive cervical resorption.
The endodontic treatment was performed simultaneously with a root canal cleaning through conservative lingual access opening, and microsurgery to repair the resorptive defect with direct light polymerizing resin-modified glass ionomer material .The crown access was restored with composite.
High-resolution, small FOV cone-beam computed tomography reconstructed with realistic 3D rendering was used for the first time to obtain a definitive evidence of the healing of an Invasive Cervical Resorption and to diagnose a new area of ICR type III as Sequela of Dental Trauma. The patient was satisfied with the tooth preservation, and no further complications were noted at the 10 year follow-up. At this time patient does not have any symptoms associated with # 26 and opted to postponed other treatment.

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Figures:

Fig 1

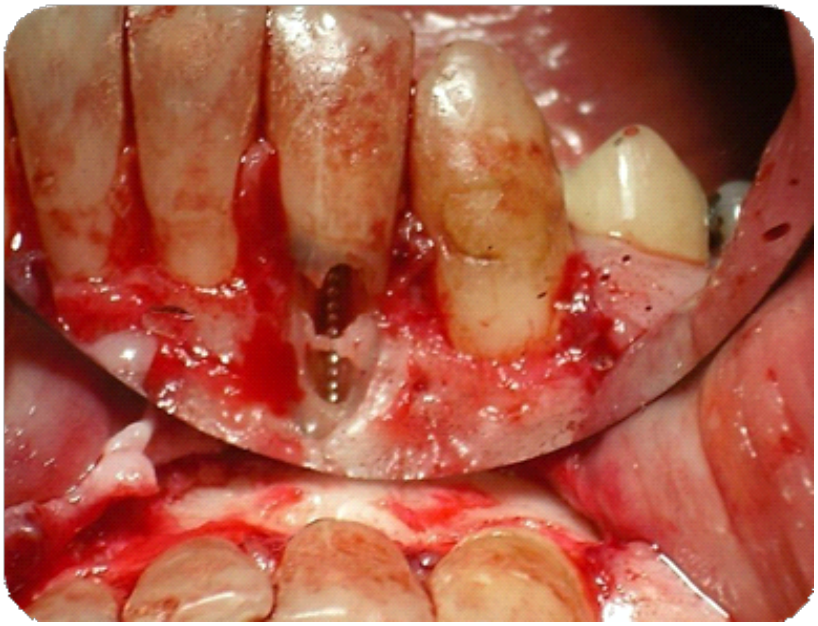

Fig 2

Fig 3

Fig 4

Fig 5

Fig 6

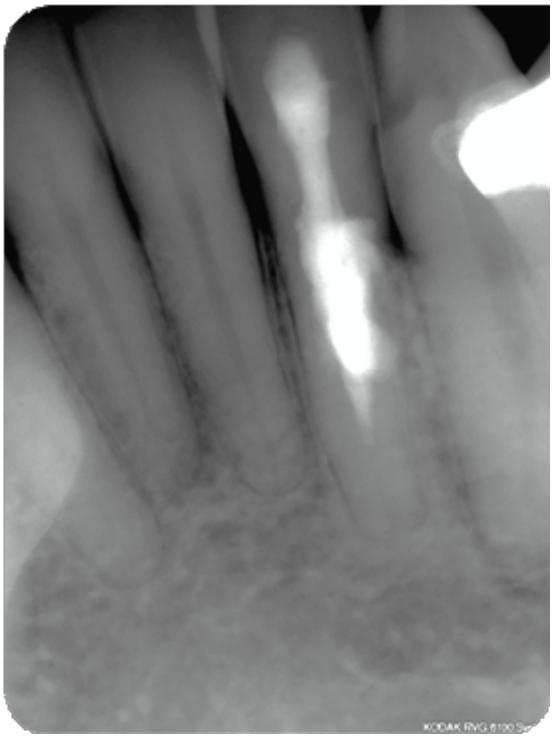

Fig 7

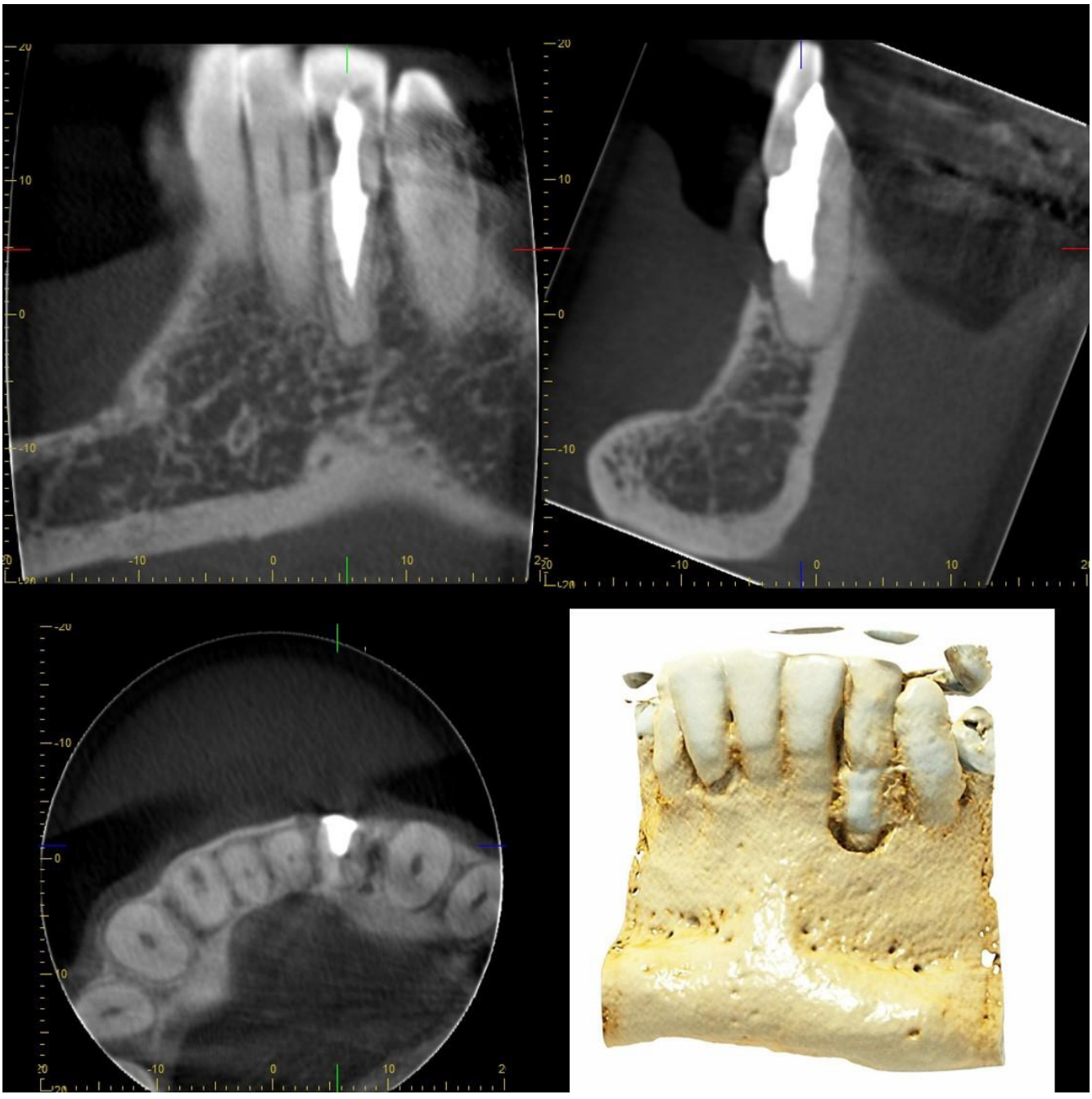

Fig 8