Considerations for Treatment of External Cervical Invasive Resorption  

by Dr. Marco Maiolino

Abstract

Invasive cervical resorption clinically references an uncommon destructive and aggressive form of external tooth resorption. Diagnostically, external cervical invasive resorption (ECIR) lesions may appear as crestal or subgingival decay, or in erupting teeth as invasive coronal resorption, or even apically as invasive radicular resorption.

Numerous descriptors exist for this pathologic process: surface resorption, external inflammatory resorption, external replacement resorption, external cervical resorption, and transient apical breakdown. All are aggressive and problematic in regard to their clinical management. The more complex they become in regard to their location related to the epithelial attachment, the more difficult it becomes to reconstitute the resorptive defect.

Despite the odontoclastic nature of this pathosis, in many instances, there is no need to do root-canal therapy. This course is designed to acquaint the practitioner with the histopathology, diagnosis and treatment of ECIR lesions and enable him or her to differentially diagnose them from other similar lesions that require alternative treatment regimens.

Educational objectives

• Correctly identify and diagnose ECIR
• Understand the histopathology of ECIR
• Learn the most frequent anatomical configurations of ECIR
• Identify the contributing factors that can lead to ECIR
• Learn the four distinct types of ECIR
• Discuss treatment options for ECIR

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Characteristics of ECIR

ECIR typically affects cementum and dentin without affecting the enamel, and can go unobserved until there is an advanced degree of tooth destruction, often without clear symptoms or patient complaint. While the etiology of these lesions is poorly understood, there is sufficient agreement that a prerequisite for the start of resorption is a defect in the cementum/cementoid layer. The invading tissues originate in the PDL, but differ from periodontal tissue in both structure and behavior.

The anatomy of the cementoenamel junction varies. The most frequent morphologic anatomical configurations are composed of three types of tissue interrelations: enamel overlapped by cementum; enamel and cementum edge-to-edge; and a gap, revealing a strip of exposed dentin. Using optical microscopy, a fourth type of cementoenamel junction was observed: cementum overlapped by enamel. Exposed dentin is the entrance portal for the clastic pathology associated with ECIR.

Identification

Numerous predisposing factors have been identified. The most commonly associated factors are trauma, orthodontic treatment, orthognathic and other dentoalveolar surgery, intracoronal bleaching, delayed eruption, interproximal stripping and developmental defects. Periodontal treatment and bruxism can be etiologic vectors as well.

Clinically, there is the typical “pink spot” (Fig. 1), generally located just below the gingival margin, that will bleed if probed. The tooth tests vital and responds normally to thermal tests. Pulpal involvement is evident only in the advanced cases. The radiograph will show a marked radiolucency near the CEJ (Fig. 2). Proximal lesions are easy to observe, whereas vestibular and palatal lesions are harder to identify unless advanced.

The incongruity of a lesion of this type and pulpal vitality may seem controversial, however, the deepest layers of dentin around the root—the predentin—have different anatomical features that preserve them from resorption. This leads to the situation in which the ECIR can go around the root canal without invading it. This is crucial to understanding the treatment of these lesions. What is remarkable is that the pulp has no role in the etiopathology of ECIR that differentiates it from internal resorption.

Cone-beam computed tomography (CBCT) has proved a significant advantage in the diagnosis of ECIR (Figs. 3 & 4). A differential diagnosis with internal resorption can be done using conventional periapical radiographs by shifting the cone and observing if the angle...
change moves the lesion or if it tends to stay in the center. It remains centered with internal resorption, and moves with ECIR.

**Types**

Dr. Geoffrey S. Heithersay has classified four types of ECIR. Class I is a small, invasive, resorptive lesion near the cervical area with shallow penetration into dentin.

Class II is a well-defined, invasive, resorptive lesion that has penetrated close to the coronal pulp chamber but shows little or no extension into radicular dentin.

Class III is a deeper invasion of dentin by resorbing tissue, not only involving the coronal dentin but also extending at least to the coronal third of the root.

Class IV is a large, invasive, resorptive process that has extended beyond the coronal third of the root canal. Careful case selection is essential in order to achieve a positive treatment outcome (Fig. 5).

Heithersay recommends only treating defects categorized as Class I, II and III. The extensive nature of Class IV lesions makes treatment difficult and is associated with a higher risk of failure. As such, teeth with Class IV lesions may be left untreated for as long as they are asymptomatic. Otherwise, extraction is the only viable treatment option.

Heithersay and others recommend topical application of a 90 percent aqueous solution of trichloroacetic acid to the defect to induce progressive coagulation necrosis of the resorptive tissue. The gingiva is protected by both a rubber dam and a cotton roll impregnated with glycerol. The devitalized avascular tissue is curetted from the resorption cavity. Magnification is essential to ensure that the dentinal floor is intact with no communication to the root-canal space. Restoration involved placement of a glass-ionomer cement in the defect, protected by a light-activated, unfilled, bonded resin.

Endodontic treatment may prove necessary with some Class II lesions, and
typically with Class III lesions where pulpal involvement is inevitable. Heithersay has reported a 100 percent success rate with this protocol in the treatment of Class I and Class II ECIR lesions. The success rate in Class III lesions was reported as 77.8 percent, while a positive treatment outcome occurred in only 12.5 percent of teeth in Class IV cases.

The best material to be used in these lesions, considering their subgingival position, has been the subject of intense debate. Glass ionomer cements are a valid choice due to their chemical adherence to tooth structure, biocompatibility, low shrinkage, and fluoride release. Unfortunately, they are brittle, have a low bond strength, and demonstrate microleakage at the cavity-wall interface.

In an attempt to resolve these issues initially, resin modified glass ionomer or hybrid ionomer cements have been developed. The aqueous polyacrylic acid of glass ionomer was replaced with HEMA monomer (hydroxyethyl methacrylate) and a photo-initiator. Further evolution of these materials has resulted in resin ionomer (or compomer) that has non-aqueous monomers and prepolymers in conjunction with inert inorganic and/or organic fillers in combination with photo-initiators and glass-powder formulations. These materials set in two stages: light activation, which allows the polymerizable molecules to interconnect; and after absorbing water from the moist environment of the mouth, an ionic acid-base reaction takes place that cross-links with the established matrix. This enhances the features of the material, giving insolubility in oral fluids, dual setting (auto and photo), better adhesion to teeth, low shrinkage, low thermal expansion, biocompatibility, and fluoride release.

The use of Geristore glass-ionomer Bis-GMA composite base has proven to be the most effective material for sealing ECIR defects. Its resistance to marginal leakage and abrasion, its fluoride-releasing capabilities and its connective tissue biocompatibility make it an ideal restorative choice. Low polymerization shrinkage, low coefficient of thermal expansion and the ability to bond to all surfaces are equally as important.

Case reports

Case I

Resorption was detected in the mid-root of tooth #11 during a recare appointment where the primary focus had been the anterior abutment of a three-unit bridge. Nothing was clinically evident at the time. The patient could not recall a history of trauma or any other predisposing factors. Endodontic testing was normal and periodontal probing elicited no significant pocketing. The diagnosis was ECIR. Treatment options were discussed. The options were to do nothing; extract; surgically expose the lesion and debride and restore without endodontics; or surgical exposure, inclusive of endodontic therapy.

It was decided to surgically expose the defect and treat it without RCT. A full palatal flap was raised and the ECIR identified adjacent to the bony crest. The lesion had a honeycomb appearance that was peeled away with a spoon excavator. A #4 round bur in a slow handpiece was used to debride the lesion, followed by an application of trichloroacetic acid. Once the lesion was debrided and all dark spots removed, the crypt was further renewed with a small round bur. Tenure bond was applied to the dentin, and the lesion restored with Geristore. The flap was repositioned and sutured to place (Figs. 6-8).

Case II

A routine radiograph assessment disclosed a case of palatal resorption on tooth #8. A full-thickness mucoperiosteal flap was raised, isolating the incisal foramen, and the crypt cleared as described in Case I. The defect was then filled with Geristore (Figs. 9-14).

Figure 15 was taken nine months after the procedure, and shows a positive healing response characterized by the adaptation of the soft tissue to the bone and tooth.
Case III

Figure 16 shows tooth #21 with vestibular resorption. Root-canal therapy was done, due to a history of pulpal degeneration with periapical extension. A full-thickness flap was raised, the lesion was treated as previously described, and again, Geristore was used as the restorative material.

The restoration was polished and the flap was passively positioned to cover the exposed root, including the resin ionomer. The flap was rotated around the second bicuspid in order to cover first bicuspid and cuspid to prevent loss of keratinized attached gingiva.

The procedure can be viewed on YouTube at http://youtu.be/HFAJtTa5LZQ.

A three-month check of the case shows optimal tissue response with a normal probing depth of the tooth and acceptable root coverage (Figs. 17-21).

References
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Author Bio

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