

Internal Root Resorption: An Endodontic Challenge

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ABSTRACT

Introduction: Internal resorption, which starts in the pulpal cavity, either in the pulpal chamber or in the root canal, is a very uncommon resorption of dentine that continues to destroy the surrounding dental hard tissues. Other aetiological reasons have been proposed; however trauma or persistent pulpal inflammation are likely to be the initial events in internal root resorption. Treatment for minor internal resorption lesions has a favorable prognosis. However, the prognosis is poor and tooth extraction must be considered if the tooth structure has been significantly compromised and perforation has occurred.

Case Report: A 36-year-old male patient came to the department with a chief complaint of dull pain in lower right back tooth region in the last one month. The clinical examination showed distal caries in tooth no 45. Caries was also present in tooth no 46.

Conclusion: Internal resorption is an uncommon condition with most of the cases being idiopathic. The detection of internal resorption can be done in routine radiographs, while others require advanced diagnostic techniques like dental CT scans for its diagnosis.

Key Words: Internal root resorption, Irrigation, Thermoplastic obturation, Aetiological Reasons, Persistent Pulpal Inflammation, Lower Right Back Tooth Region

INTRODUCTION

Resorption is a condition associated with either physiologic or a pathologic process resulting in a loss of dentin, cementum and/or bone.¹ Resorption can be caused by thermal, mechanical or chemical injuries to the tooth. Resorption can manifest as –Internal or External resorption. Internal resorption is an inflammatory process that initiates in the pulp leading to loss of dentin and possible invasion of cementum.²

Internal root resorption (IRR) is usually detected clinically via routine radiographs. It is seen commonly in the cervical region of the tooth. One method to diagnose internal resorption (vs. external resorption) is to observe whether there is a defined outline of the pulp chamber. If the pulp chamber outline is within the lesion itself, it indicates internal resorption. If the pulp chamber outline is recognizable within a radiolucent halo, then it can be external resorption. CBCT can help in diagnosing IRR (and external root resorption) specially in early stages.²

IRR is typically asymptomatic, but pain may be the chief complaint if the granulation tissue has been exposed to oral fluids. The granulation tissue can clinically present itself as a “pink spot” where the crown dentin destruction is severe. The pink shade is related to the highly vascularized connective tissue adjacent to the resorbing cells and when the pulp becomes necrotic, it turns grey.

Teeth with IRR typically respond normally to pulpal and periapical tests until the lesion grows significantly in size, which can then result in perforation. Once necrosis of the pulpal tissue takes place, then the typical signs and symptoms of an abscessing tooth occur. Vital pulp tissue is required for IRR to take place; therefore, when there is complete pulpal necrosis, the growth of the resorption ceases because the resorbing cells are cut off from the blood supply and nutrients.²

Once diagnosed, treatment considerations and prognosis must be assessed. Since removal of vital tissue ceases progression of the lesion, initiation of endodontic treatment is recommended. However, the prognosis for the long-term

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form and function of the tooth is dependent on the size of the lesion. The American Association of Endodontics (AEE) offers this as a general guide

Pathophysiology (Figure 1 and Figure 2)³

The pathology of internal root resorption is caused by transformation of normal pulp tissue into granulomatous tissues with giant cells that resorb dentin.⁴ This, in turn, resorbs the dentinal walls, advancing from the centre to the periphery. It can be classified into: internal root canal inflammatory resorption and internal root canal replacement resorption.⁵

1. In inflammatory resorption, the resorptive process progresses without adjunctive deposition of hard tissues adjacent to the resorptive sites. The phenomenon is associated with the presence of granulation tissues in the resorbed area and identifiable with routine radiographs as a radiolucent zone centered on the root canal.
2. In replacement resorption, the resorptive activity causes defects in the dentin adjacent to the root canal, with concomitant deposition of bone-like tissue in some regions of the defect. It results in an irregular enlargement of the pulp space with partially/ fully obliterated area of the pulp chamber.

Trauma and pulpal inflammation or infection are two of the major contributory factors in the initiation of internal resorption.⁴ Caliskan et al. reported that in a study done on patients diagnosed with IRR, 43% of the patients had trauma as a common etiological factor followed by carious lesions at 25%.^{4,6}

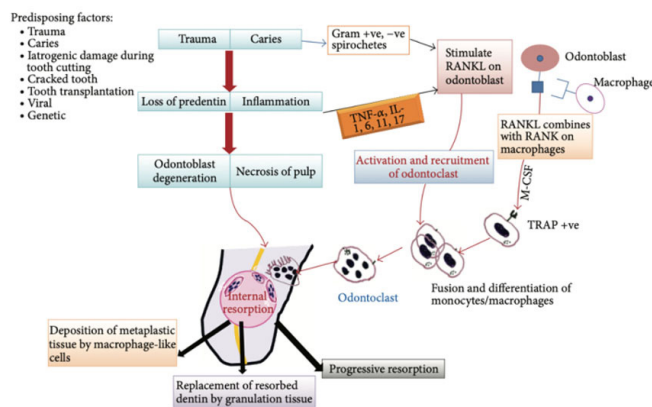


Figure 1: Schematic representation of pathogenesis of internal resorption.

Radiographic Features

The diagnosis of internal resorption is mainly based on radiographs. A large portion of pulpal dentin wall must be resorbed to be detected radiographically. In cases of pulp necrosis, the resorption terminates at an early stage and remains

undetected both clinically and radiographically. The classic radiographic description of internal resorption is described by Gartner et al. as well-defined symmetrical radiolucency of uniform density which balloons out of the pulp chamber or root canal.³

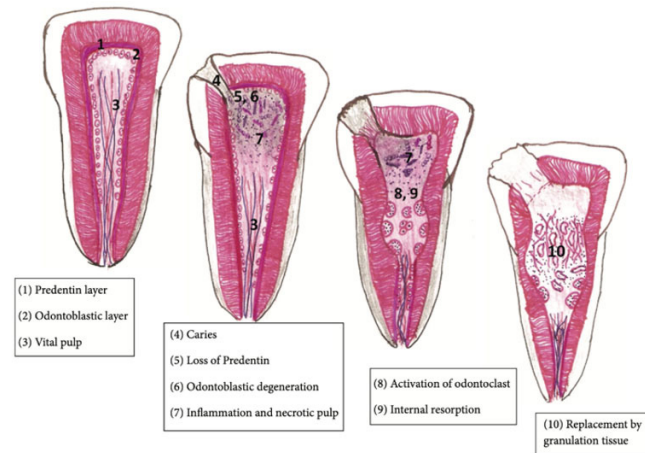


Figure 2: Diagrammatic representation of pathogenesis of internal resorption.

Radiographically internal resorption occurring apically may be difficult to diagnose when the resorptions are of the lower grades as described by Vier and Figueiredo. Resorptive defects on the facial/lingual/palatal aspects can be challenging to diagnose as they are often missed during examination. Newer radiographic techniques, like Tuned aperture computed tomography (TACT), display significant promise to identify resorptions. Another diagnostic sign is the manner in which the pulp “disappears” into the lesion. Lynch and Ahlberg reported a bilateral idiopathic internal resorption where the radiolucent areas were clearly defined, punched-out lesions, where the pulp appeared to disappear into the lesion.³

CASE REPORT

A 36-year-old male patient came to the department with a chief complaint of dull pain in lower right back tooth region in the last one month. The clinical examination showed distal caries in tooth no 45. Caries was also present in tooth no 46. Radiographic examination showed radiolucency in middle third of the root of the second premolar indicative of internal resorption along with radiolucency in the periapical area of same tooth (Figure 3a). There was also widening of periodontal ligament in 46. The diagnosis of necrotic pulp with chronic periapical abscess in 45 and asymptomatic apical periodontitis in 46 was made. It was decided to complete the endodontic therapy for the tooth 45 first.



Figure 3a: Preoperative radiograph #45.



Figure 3b: Working length radiograph #45.



Figure 3c: Master cone radiograph #45.

After rubber dam application, access opening was initiated without local anesthesia since the tooth was non-vital. Working length radiograph was taken wrt 45 (Figure 3b). Cleaning and shaping of 45 was done in the first visit up to F2 Pro-Taper files. Patient was recalled after one week.

In the second visit, master cone was then selected corresponding to the required biomechanical preparation (Figure 3c). Thick consistency of the sealer (AH PLUS) was mixed and properly, applied with master cone into the canal and the resorptive defect followed by obturation of the canal using warm vertical compaction method followed by backfill (system B) (Figure 3d).



Figure 3d: Obturation #45.

DISCUSSION

- Root canal treatment is the only treatment of choice with teeth diagnosed with internal resorption.
- Early detection and a correct differential diagnosis are essential for successful management of internal resorption to prevent over weakening of remaining tooth structure and root perforations.
- Because the resorptive defect is the result of an inflamed pulp and the clastic precursor cells are predominantly recruited through the blood vessels, controlling the process of internal root resorption is conceptually easy, via the blood supply to the resorbing tissues with conventional root canal treatment.

Following are major factors for the diagnosis of internal resorption.

Aetiology: History of trauma, crown preparation or pulpotomy and positive pulp sensitivity test should be ruled out for its diagnosis.

Sensitivity Testing: A negative response is usually obtained, as the coronal pulp has often been removed or is necrotic and the active resorbing cells are more apical in the canal.

Radiology: Internal resorption or those with perforations of root can be distinguished from external resorption by varied radiographic techniques. In teeth with internal resorption, the radiolucent lesion “moves” with the canal when the radiographs are taken at different angulations, whereas in external resorption the radiolucent lesion “moves” outside of the canal. External resorption has an irregular border with an alteration in the adjacent bone, whereas internal resorption has a uniform enlargement of the root canal space with regular bone structure.

The majority of misdiagnosis of resorptive defects is made between subepithelial external and internal resorption. In case of internal resorption, bleeding within the canal should cease quickly on pulp extirpation, as the source of blood supply is from the granulation tissue and apical blood vessels. If bleeding continues and presents even at the second visit, the source of the blood supply is external and treatment for external resorption should be carried out. Any continuation of the resorptive process on recall radiographs even after an effective root canal therapy suggests the possibility of an external resorptive defect being misdiagnosed.⁷

CONCLUSION

Internal resorption is an uncommon condition with most of the cases being idiopathic. The detection of internal resorption can be done in routine radiographs, while others require advanced diagnostic techniques like dental CT scans for its diagnosis. Proper patient history, early diagnosis and appropriate treatment at the correct time prevent tooth loss. The outcome of the treatment is good and depends on the amount of remaining dentin wall thickness. It is important to distinguish between internal and external resorption for appropriate management.

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