

## A Review: The Etiology and Diagnosis of Internal Root Resorption (IRR)

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**Abstract:** Internal Resorption Is An Unusual Form Of Tooth Resorption That Begins Centrally Within The Tooth, Apparently Initiated In Most Cases By A Peculiar Inflammation Of The Pulp, It Starts In Either The Pulpal Chamber Or In The Root Canal. Internal Root Resorption Is A Particular Category Of Pulp Disease Result Of The Action Of Clastic Cells Stimulated By Pulpal Inflammation. It Is Further Classified As Either Inflammatory Or Replacement. Root Canal Treatment Is The Treatment Of Internal Root Resorption Through Removing The Granulation Tissue And Blood Supply Of The Clastic Cells. This Review Will Focus On The Internal Root Resorption Of Permanent Dentition.

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### I. Introduction

Resorption Is A Case Correlated To A Physiologic Or A Pathologic Process Causing A Loss Of Dentin, Cementum, And/Or Bone (1). Irr May Occur After Mechanical, Chemical, Orthermal Injury. Irr Is Caused By Transformation Of Normal Pulp Tissue Into Granulomatous Tissues With Giant Cells, Which Resorb Dentin. Irr Is Considered To Be An Inflammatory Process Established By The Association Between A Pulp Aggression, Which Causes A Focal Necrosis Of The Odontoblasts, And A Chronic Inflammatory Process Without Pulp Necrosis (2, 3). The Microorganisms Can Be Present Since The Beginning Of The Inflammatory Process Or Accessing The Pulp When The Necrosis Begins. When The Necrosis Is Present Usually The Communication Of The Pulp Cavity Exists With The Periodontium In The Resorption Area (4). It Is Unknown Whether There Is Any Geographical, Age, Or Sex Related Difference In The Occurrence Of Internal Root Resorption. Thoma Reported Internal Root Resorption In Only One Tooth (5). Irr Was Reported In Eight Out Of 28 Teeth Where Pulpotomy In The Coronal Pulp And Capping With Calcium Hydroxide Had Been Performed (6). The Majority Of Irr Appeared 3 Years Or More After The Autotransplanted Teeth (7). The Diagnosis Of Irr Is Mainly Based On Radiographs, Which Means That A Considerable Amount Of root Canal Wall Dentin Must Be Resorbed To Be Reliably detected In The Radiograph. If Canal Infection Proceeds Rapidly Through The Root Canal, Leading To Necrosis Of The Whole Pulp, The Present Resorption Stops At An Early Stage And Would Remain Undetected Clinically Or Radiographically. Cone Beam Computerized Tomography (Cbct) Is A More Powerful Tool Which Allows An Earlier And More Accurate Diagnosis Of These Lesions (8).

### II. Etiology

Irr Is Established After Necrosis Of Odontoblasts And Is Associated With Chronic Partial Pulp Inflammation And Partial Pulpal Necrosis (9). 3d Imaging Has Shown Irr To Be Circumscribed And Oval Shaped (10). Irr Is Usually Asymptomatic. And Discovered By The Clinical Sign Of A 'Pink Spot' On The Crown (10). Different Factors May Contribute To Cause Resorption Include Trauma, Caries And Restorative Procedures, But Sometimes It Could Be Idiopathic Too. It Is More Often Observed In Males Than In Females And Most Commonly Affected Teeth Are Maxillary Incisors (11). High Temperature During The Cavity Preparation Or Crown Preparation, And Biological Treatment With Calcium Hydroxide And May Lead To Irr (12). Internal Resorption Due To The Location, Divided Into: Type A (Intracoronary Resorption), Type B (Intra-root Resorption), Type C (Resorption With Perforation Of The Canal Wall). And Type D (Perforating The Wall Of A Tooth Crown) (13, 14). Irr Is Usually Asymptomatic. It Is Estimated That Only In 2% Of Cases May Occur Clinical Symptoms (15). Vitality Tests On The Pulp Do Not Deviate From The Norm And May Be Negative In The Case Of The Canal Perforation Ongoing With The Pulp Necrosis. The Vascular Change In The Pulp Produces Hyperemia Increasing Oxygen Tension, And Causing An Acidic Ph Level That Attracts Multinucleated Cells, Odontoclasts And Dentinoclasts (15). Dominance Of Inhibitory Substances Such As Opg

(Osteoprotegerin) As Activators Of Rankl (Receptor Activator Of Factor Kappa B Ligand) Followed By Swelling, Results In The Rupture Of Protective Coatings Allowing The Invasion Of Odontoclasts And Initiating Resorptive Patterns. Connective, Post-Resorptive Activity Tissue Transforms Into Metaplastic Granulation Tissue (16, 17). According To Somerecent Theories Dendric Cells Are Precursors Who Could Convert Into Odontoclaststhat Move To The Sites Of Irritation By Proinflammatory Cytokines And Then Start The Resorbing Process (18). The Pulp Tissue In The Area Of Destruction Is Vascular And Exhibits An Increased Cellularity And Collagenization(19). Progress Of Irr Is Dependent On Two Things: Presence Of Vital Pulp Tissue At/Below The Resorption Area And Partially Or Completely Necrotic Pulp, Coronal To The Site Of Resorption, Thereby Allowing A Constant Entry Of Microorganisms And Its Antigens Into The Root Canal. Microbial Stimulus Is An Essential Factor For The Persistence Of Resorption (20). The Connective Tissue, Following The Resorptive Activity, May Undergo Metaplasia To Form Granulation Tissue (21). The Presence Of A Collateral Blood Supply Through An Accessory Canal From The Periodontal Ligament To The Resorption Site Can Add To Maintaining The Resorptive Process. Internal Inflammatory Root Resorption In Its Most Classical Form Spreads Symmetrically In All Directions Into The Dentin Surrounding The Pulp (20). Wedenberg And Zetterqvist Examined Cases Of Progressive Internal Resorption And Observed That The Normal Pulp Tissue Was Replaced By A Periodontal-Like Connective Tissue With Osteogenic Potential (22).The Replacement Type Of Irr Is Associated With The Deposition Of Mineralized Tissue In The Root Canal Space After The Initial Loss Of Dentin.

### **III. Diagnosis**

Teeth In Which Resorptive Process Reachescervical Area Of The Crown May Have A Pinkish Color, Known As 'Pink Tooth' Resulting From Granulationtissue Ingrowth(23). The Pink Color Is Related To The Highly Vascularizedconnective Tissue Adjacent To The Resorbing Cells. This Color Turns Grey/Dark Grey When The Pulp Becomes Necrotic (24). The Response To Vitality Tests, Thermal And Electrical, Is Positive Until The Lesion Grows Significantly In Size Resulting In A Perforation. The Two-Dimensional Nature Of Conventional Radiographic Imaging Makes The Detection And Differentiation Of The Various Types Of Resorption Challenging. Differential Radiographic Features Of Internal Resorption Can Be Noticed , Such As Enlargement Of Root Canal Which Is Well Demarcated, Enlarged 'Ballooning Area' Of Resorption, Lesion Appears Close To Canal Even If Angulation Of Radiograph Changes, Outline Of Canal Is Distorted, Root Canal And Resorptive Defect Appears Contiguous, And Does Not Involve Bone, So Radiolucency Is Confined Toroot. Bone Resorption Is Seenonly If Lesion Perforates The Root. Cbct Has Been Successfully Used To Evaluate The True Nature And Severity Of Resorption Lesions Indicating That The Clinician Could More Confidently Diagnose And Manage The Defect. The Use Of Cbct Provides A 3-Dimensional Appreciation Of The Resorption Lesion With Axial, Coronal, Parasagittal Views Of The Anatomy. Cbct Gives Information About: Location, Size, And Shape Of The Lesion, Root Wall Thickness, Presence Of An Apical Bone Lesion. A Number Of Case Reports Have Demonstrated That Cbct Can Enhance The Diagnosis Of Resorptive Lesions(17,25). There Has Been An Increase In The Number Of Publications Related To The Use Of Cbct For Diagnosis Of Both Internal And External Lesions Although Many Are Case Reports(26,27).

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