

Dental resorption

Dental resorption is the loss of dental hard tissues as a result of clastic (osteoclasts, odontoclasts) activities. It may occur as a physiologic or pathologic phenomenon. Root resorption in the primary dentition is a normal physiologic process except when the resorption occurs prematurely. Unlike bone, which undergoes continuous physiologic remodeling throughout life, root resorption of permanent teeth does not occur naturally. Thus, root resorption in the permanent dentition is a pathologic event and if left untreated, it may result in premature loss of the affected teeth.

Root resorption may be broadly classified into two types **external** and **internal**.

External inflammatory resorption (EIR) affects the surface of the root and is a relatively frequent sequel to dental luxation and avulsion injuries. It is a progressive condition with a potentially precipitous onset, and it is capable of advancing rapidly, such that an entire root surface may be resorbed within a few months if the tooth is left untreated. It also affects teeth diagnosed with chronic periapical periodontitis.

Clinical treatment of EIR is based on effective removal of the causal agent; namely, infected necrotic pulpal tissue in the root canal space. Treatment should be carried out as soon as the resorptive process has been diagnosed. The earlier EIR is diagnosed and treated, the better the prognosis is for the affected tooth. The diagnosis of EIR in clinical situations is based solely on the radiographic demonstration of the process. Traumatic dental injuries (e.g., intrusion, lateral luxation and avulsion) often result in contusion injuries to the periodontal ligament (PDL).

The **pathogenesis** of EIR can be explained as follows. Contusion injuries to the PDL, after a traumatic injury involving the periodontal structures, initiate wound healing, during which osteoclasts and macrophages are attracted to the site of the injury to remove the damaged tissue. The osteoclastic activity then slowly reduces the thickness of the dental tissue by its action.

Clinical Features

The tooth may look normal, but it will not respond positively to vitality testing. In advanced cases, signs of pulpal and/or periapical periodontitis may be present (e.g., discolored tooth, sinus present, and/or tenderness to percussion and/or palpation).

EIR is characterized radiographically by radiolucent, concave excavations along the root surface, with corresponding and associated radiolucency in the adjacent alveolar bone. EIR can have a rapid onset and aggressive progression, such that complete resorption of an entire root can occur within 3 months.

Clinical treatment of EIR is based on effective removal of the causal agent, the infected necrotic pulpal tissue in the root canal space. This arrests the resorption process and creates an environment conducive to hard tissue repair of the damaged root surface.

Calcium hydroxide as a long term temporary root canal treatment is recommended. We change it once a month or two month. Calciumhydroxide can stay in the root canal altogether 6 or more month. The healing is evaluated radiogeaphically.

The earlier the resorption is diagnosed and treated, the better the prognosis is for the affected tooth. Failure to diagnose and treat the condition may result in tooth loss. Long term dressing of the root canal with calcium hydroxide may be beneficial in the treatment of established EIR. In many cases the EIR is extensive, rendering the tooth unsalvageable and requiring extraction.

Healing of EIR is characterized radiographically by cessation of the resorption process, resolution of the radiolucency in the adjacent bone, and reestablishment of the PDL space.



External inflammatory resorption

External replacement resorption (ERR)

The tooth is being resorbed and simultaneously replaced with bone. Trauma – avulsion and replantation is usually in the history. Ankylosis occurs. At the beginning Calcein hydroxide, endo treatment. And observation. Extraction is usually difficult, it is better to wait as long as possible and place the implant afterwards.

External replacement resorption



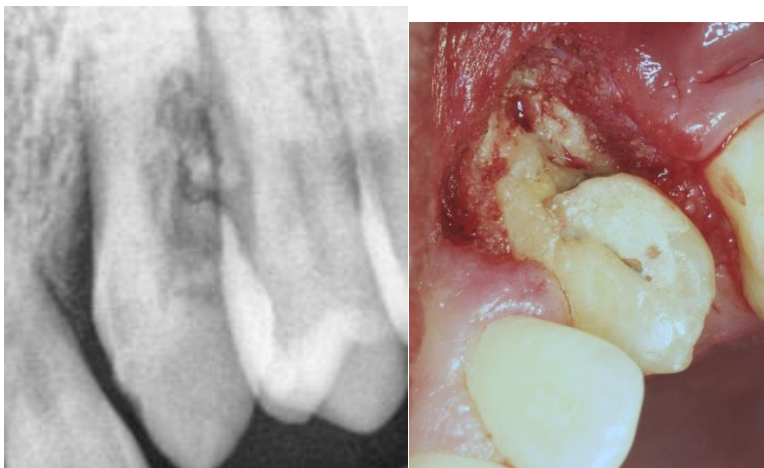
External cervical resorption (ECR) is a form of root resorption that originates on the external root surface but may invade root dentin in any direction. ECR generally develops immediately apical to the epithelial attachment of the tooth. In healthy teeth with a normal periodontal attachment, this is in the tooth's cervical region. The clinical features of ECR are variable.

The process is very often asymptomatic, especially in the earlier stages, and absence of clinical signs and symptoms is very common. The diagnosis is commonly made as a result of a chance radiographic finding.

A pink or red discoloration (fibrovascular granulation tissue occupying the resorptive defect) may develop at the cervical region of the tooth.

The **radiographic appearance** of ECR depends on the location, the extent of invasion. Although lesions with irregular margins are more common, some ECR defects may have smooth and/or well-defined margins. The radiographic features of ECR are very similar to those of internal root resorption.

The fundamental **treatment** objectives in ECR are to excavate the resorptive defect, halt the resorptive process, restore the hard tissue defect with an aesthetic filling material, and prevent and monitor the tooth for recurrence. Endodontic treatment of the affected tooth is necessary when the resorptive process has perforated the root canal wall.



External cervical resorption after the orthodontic treatment.

Internal root resorption (IRR) is a form of root resorption that originates in and affects the root canal wall. Various etiologic factors have been proposed including trauma, caries and

periodontal infections, excessive heat generated during restorative procedures on vital teeth, calcium hydroxide procedures, vital root resections, anachoresis, orthodontic treatment, cracked teeth.

Bacteria may enter the pulp canal through dentinal tubules, carious cavities, cracks, fractures, and lateral canals.

In the absence of a bacterial stimulus, the resorption is transient and may not advance to the stage that can be diagnosed clinically and radiographically. If left untreated, internal resorption may continue until the inflamed connective tissue degenerates, advancing the lesion in an apical direction.

Ultimately, if left untreated, the pulp tissue apical to the resorptive lesion undergoes necrosis and the bacteria infect the entire root canal system, resulting in apical periodontitis.

The **clinical features** of IRR largely depend on the histologic status of the affected pulp and the extent of the hard tissue destruction caused by the resorptive process. Bacterial contamination of vital pulpal tissue may cause an acute inflammatory response, leading to clinical symptoms of pulpitis. With the onset of pulpal necrosis and an established bacterial colonization of the root canal space, clinical signs and symptoms associated with acute or chronic apical periodontitis may develop.

Extensive resorption of the coronal pulp may result in a pink or red discoloration visible through the crown of the affected tooth. This is caused by granulomatous tissue extending into and occupying the resorptive defect.

The diagnosis of any type of root resorption depends on **radiographic demonstration** of its presence.

Once a diagnosis of IRR has been made, the extent of the hard tissue destruction must be assessed, and a clinical decision must be made about the prognosis of the affected tooth. If the affected tooth is salvageable and has a reasonable prognosis, root canal treatment is necessary. As with any infected tooth, the main purpose of the root canal treatment is to remove the intraradicular bacteria and disinfect the root canal space.

The complex anatomic and morphologic features of root canal systems provide unique recesses that may harbor microorganisms in infected teeth. Endodontic instruments and passively delivered irrigants fail to penetrate into these spaces. The use of ultrasonic instruments to aid the penetration of endodontic irrigants has been shown to improve the removal of organic debris and biofilms from the root canal space. As such, an intracanal antibacterial medicament should be used to further reduce the microbial load and improve the disinfection of the root canal space. Calcium hydroxide is an antibacterial, endodontic medicament that has been shown to eradicate bacteria persisting in the root canal space after root canal treatment

Definitely endodontic treatment is indicated. Irrigation – sodium hypochlorite higher concentration due to the dissolving effect, filling using warm gutta-percha (injection).

Differential diagnosis

Internal resorption: the vitality test is usually negative.

The radiogram shows the translucency – within the root canal typically oval. Its position does not change when the other x-ray projection is taken.

Internal resorption: the vitality test is usually negative.

The radiogram shows the translucency to. It could be similar to internal resorption. Its position changes when the other x-ray projection is taken.