

Internal Root Resorption : A Review

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Abstract: Internal resorption is an asymptomatic condition in teeth seen with past history of injury. In the crown it has a clinical observation of pink mark. It is diagnosed by chance on an x-ray examination. Primal detection and resorption treatment improves prognosis of the condition. Resorption can be broadly classified into normal physiological or pathological process associated with extensive damage to hard structures of tooth such as dentin, cementum and bone. Proper diagnosis of resorption and differentiation of resorption from internal and external resorption by radiographic presentation and the correct diagnosis and treatment planning improves the prognosis of the condition. Untreated cases will cause loss or early exfoliation of the afflicted tooth [1].

INTRODUCTION

As stated by the American Association of Endodontists resorption is related with either a physiologic or a pathologic process bringing about loss of hard dental tissues such as dentin, cementum, or bone [1]. Unlike the primary teeth, seldom occurs in the permanent teeth except stimulated by a pathological process. Chronic pulpal infections, infections of periodontal structure, traumatic injuries, and orthodontic tooth movement are associated with pathologic resorption [1]. If resorption is left untreated, it will result in loss of the afflicted tooth [2].

Classification of root resorption into external or internal resorption is based on the extent of resorption in relation to the root surface [2]. It is a pathological condition of the prolonged inflammation by bacterial stimulation in the coronal pulp space stimulating to the surrounding dentin [3]. Differentiation of external resorption from internal is by its radiographic appearance. Resorptive radiolucencies are superimposed over the canal in the root. Clinicians are concerned about the diagnosis and treatment of the internal resorption [3].

The aim of the article is to review the etiology, pathogenesis, diagnosis and treatment planning of the internal root resorption.

Andreasen classification of tooth resorption into [3]:

- Internal
- Inflammatory
- Replacement
- External

- Surface
- Inflammatory
- Replacement

Lindskog classification of root resorption [4] (Fig. 1) :

1. Trauma induced tooth resorption.
2. Infection induced tooth resorption.
3. Hyperplastic invasive tooth resorption.

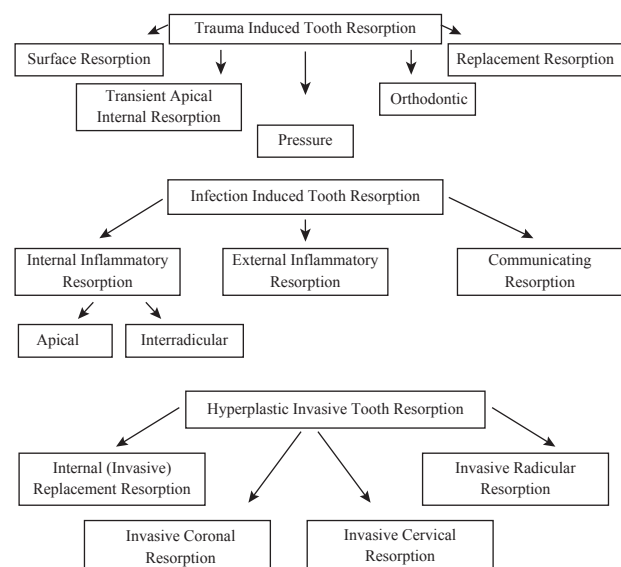


Fig. (1). Lindskog Classification of Root Resorption.

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ETIOLOGY

Trauma, chronic or prolonged inflammation of the pulp, cracked tooth, orthodontic treatment, tooth transplantation procedures such as pulpotomy, extreme heat caused by cutting of dentin, and systemic viral infection herpes zoster and Genetic factors [5-8].

PATHOPHYSIOLOGY

Continuous chronic inflammatory process usually results in the internal root resorption. Internal resorption progress is dependent on the necrotic pulp completely or partially coronal and the presence of pulp vital tissue below/at the resorption area, due to this there is continuous entry of bacteria and its toxins in the canal [9]. Inflammatory process and intensity of stimulus determine the progression, necrotic tissue and viable blood supply acts as a stimulus for the origin and formation of the clastic cells [10]. Hyperaemia in pulp, causes increase oxygen tension and low pH which attracts numerous macrophages, thus leading to the onset of resorption. Metaplasia of the connective tissue occurs to form granulation tissue. As a protective mechanism, the entire pulp undergoes necrosis in order to limit the resorptive process [11]. Nevertheless the presence of a collateral blood supply aid in maintaining the resorptive process. Chronic irreversible pulpitis, prolonged inflammation or partial necrosis of the pulp will result in internal resorption of replacement type in the root canal [12]. The reactive lesion produced by low grade chronic infection brings metaplastic tissue deposition which resembles bone or cementum [13]. Progressive internal resorption a case examined by wedenberg and zetterqvist perceived that periodontal connective tissue replaced the normal pulp tissue and was associated with osteogenic potential. Moreover, it was appeared to interlace between apposition of mineralized tissue and resorption, and the intensity of stimulus determines the extent of the resorption [14].

CLINICAL CHARACTERISTICS

Approximately 2% of cases shows clinical signs. Internal Resorption is asymptomatic [15]. It is observed more generally in males than females [16]. Internal resorption by inflammatory process is 0.01%–1% prevalent as suggested by haapasalo [17]. No morphological or clinical difference in primary and permanent teeth resorption was reported by wedenberg and zetterqvist, however the rate of resorption is more rapid in primary teeth. Internal resorption is discovered by pinkspot/mark on the crown or on routine radiographs found either on apical or mid of the root. In an actively progressing lesion, symptoms of typical of pulpitis may be observed because of partially vital pulp [17]. Complete perforation of the crown may be presented by pain and the ingrowth of granulation tissue resulting in the pink tooth specifically when the resorption in the crown has extended to the cervical area [17,18]. The location of the spot gives the origin inflam-

matory internal resorption a color change spot except in multi-rooted teeth is typically seen in the middle of tooth., although it is located either mesially, centrally, or distally in cervical resorption [17]. Extensive unrestorable tissue loss occur in progressive resorption; due to perforation of the root and external communication can develop between a root canal and the periodontal ligament [18].

RADIOLOGICAL FEATURES

The diagnosis is based on radiographs. It is detected in the radiograph after resorption of the pulpal dentin wall. In early stage the resorption terminates and cannot be detected clinically and radiographically when the infection spreads rapidly and result in necrosis of entire pulp [17]. The inflammatory internal resorption given by Gartner *et al.* as a well defined clear symmetrical radiolucency which balloons out of the pulp chamber or root canal [19]. Facial/lingual/palatal resorptive defects, are mostly missed during examination and becomes a major challenge in diagnosis. Such defects can be identified by Tuned aperture computed tomography (TACT) and newer radiographic techniques [20].

HISTOPATHOLOGY

Lesion consist mainly of granulation tissue. Inflammation is seen in the connective tissue of the pulp, infiltrated by neutrophils, lymphocytes, plasma cells and macrophages. Numerous odontoclasts with neutrophils and macrophages which are attached to the mineralized dentin surface and resorptive bays are seen. Bacteria are found in the dentinal tubules or in the coronal necrotic zone of root canal or in dentinal tubules which is communicating with the necrotic part and the granulation tissue which is undergoing progressive resorption. Calcifications, osteoid or cementum in the pulp is reported by Allen and Gutmann [21].

DIFFERENTIAL DIAGNOSIS AND DIAGNOSIS OF INTERNAL RESORPTION

For the diagnosis of internal resorption we should look for Etiology trauma history, pulpotomy or crown preparation procedure and positive pulp sensitivity test should be ruled out for its diagnosis [22]. Sensitivity Testing. As active resorbing cells are present in the apical part of the canal and the coronal part of the pulp is necrotic a negative response is obtained [22]. Pink Spot. Pink spot should be ruled out in cervical resorption/ subepithelial external inflammatory root resorption before internal resorption diagnosis [22]. Radiology. By different radiographic techniques internal and external resorption can be distinguished, the radiolucency moves with the canal in the internal resorption when the radiographs are taken at different angles, while in external resorption the lesion, radiolucency “moves” outside of the canal [23].

TREATMENT AND MANAGEMENT

Progressive internal Resorption occurs if the treatment is delayed [24]. However, it can be arrested. The size or extend of lesion determines the prognosis [24]. Pulpectomy is required to apprehend the resorption process when internal resorption is detected clinically [23]. A conservative access opening along with disinfectant like sodium hypochlorite and ultrasonics to facilitate the penetration of the irrigating solution [24]. Inhibitors of inflammation is calcium hydroxide, mineral trioxide aggregate should be used [23]. Interappointment dressing of calcium hydroxide should be given in order to control bleeding and to necrotize the pulp [23]. Flowable root canal filling materials such as thermoplasticized gutta percha should be used so that the filling material fills the resorptive defects [24].

When resorption develops an external communication, the tooth in most cases cannot be retained. Complex surgical procedures to gain access for repair should be considered [25]. Several materials according to culbreath such as guttapercha, amalgam alloy and zinc oxide eugenol, can be used for the internal resorption [26]. Endodontic treatment in closed apices should be attempted within 7–10 days of the injury, cannot be revascularized, before the necrosed pulp becomes infected [25]. In resorbing defects such as perforations, root canal filling material such as mineral trioxide aggregate can be used [27-30]. Mineral trioxide aggregate allowed bone healing and deposition of the cementum over the repair [30-34]. Furcal perforations repair is also been reported [35-39]. Use of composite materials in coronal third of root canal should be considered to strengthen and make tooth resistant to fracture [40].

DISCUSSION

The early diagnosis and treatment stops the process of internal resorption [2]. Clinically and radiographic control should be followed for the success or failure of the treatment, we believe that our treatment is successful if the resorption is not progressing [23]. The prognosis of resorption treatment depends basically on the size of the lesion and its extent [25]. Tooth fracture occurs in large lesions. Hence, it is crucial to initiate root canal treatment as soon as possible in order to stop the restorative process and to prevent further cervical crown fracture or root fracture [10].

CONCLUSION

Process of the internal resorption is idiopathic a rare insidious [1]. Diagnosis of the internal resorption can be done only with advance radiographic techniques such as periapical radiographs of high quality and CT scans [4]. Tooth loss can be prevented only by proper diagnosis and treatment. The outcome of the 6 ISRN Dentistry treatments is good and

depends upon the amount of remaining dentin wall thickness [22]. There should be proper differentiation between resorption of various types for the appropriate management of internal resorption [26]. Repair of the perforating internal resorption occurs with the modern treatment techniques like minimum access preparation, ultrasonic debridement of the canal with hypochloride and interappointment dressing of calcium and thermoplastic filling of the canal so that the material passively flows into the canal The prognosis of the internal resorption is good with newer cements like calcium silicate and MTA [35-40].

AUTHORS' CONTRIBUTION

All authors have contributed equally.

CONFLICT OF INTEREST

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