Review Article

INTERNAL RESORPTION: A REVIEW ARTICLE

ABSTRACT:

Tooth Resorption is classified majorly into internal and external resorption as given by Andreason Internal resorption is known to be caused due to trauma to the tooth physically or thermally (excessive heat produced during access cavity preparation). The lesion puts the dentist in a predicament for treatment of the lesion, as most often it is discovered accidentally hence decreasing the prognosis as it is found at a later stage. Since the lesion usually affects the esthetically important region it places the dentist in quandary on what to do. Various factors affecting the pathophysiology of the lesion are the inflammatory process, stimulation of clastic cells. The etiology for the lesion is trauma in the majority of the cases but may also be caused because of excessive heat production during cavity preparation and in untreated carious lesions. Clinically it appears to be typically asymptomatic although when it is actively progressing the lesion shows symptoms of pulpitis as it mainly occurs due to chronic inflammation of the pulp. Histopathologically the lesion shows the connective tissue o the pulp which is inflamed and infiltrated by neutrophils, lymphocytes, plasma cells, and macrophages. The granulation tissue dominates the lesion. Radiographically the lesion occurs as oval to round radiolucency in the crown whose margins are precise, smooth with deformation of the initial outline of the root canal. The treatment performed is root canal treatment, as terminating the progressing resorptive process is the goal, and by doing so, further damage to the tooth can be prevented. Internal resorption will result in loss of tooth unless it is treated.

KEYWORDS: internal resorption, pink tooth, inflammatory resorption, tooth resorption, external resorption.

INTRODUCTION:

The term *internal resorption* is defined as a process that results in the loss of cementum and dentin or bone. Once the loss of dentin has occurred, the internal resorption area appears to be a *pink spot* due to an increased number of blood vessels in the area. There are two ways in which this lesion

manifests which can be identified in the histopathology of the lesions. One type is destructive where there is the destruction of mineralized tissues of the tooth and the other is reparative in which the lesion is substituted by cementum and dentin-like tissue in the adjoining area of the resorption. The pink tooth is produced by granulation tissue ingrowth when the resorption process reaches the cervical portion of the crown. This lesion is usually clinically asymptomatic, with maxillary incisors being the most affected teeth in the jaw. [(1)] When diagnosing internal resorption, it is obligatory to use a radiograph. Consequently, the radiograph reveals oval radiolucency with smooth and precise margins with distortion of the original root canal outline. [(2)] The oval radiolucency in the pulp space indicates enlargement of the pulpal space. The lesion can also be detected using clinical examination based on changes in the tooth's color, conventional radiography, and cone-beam computed tomography, light microscopy, and electron microscopy. **[(3)]** The treatment of choice is root canal treatment, as terminating the progressing resorptive process is the goal, and by doing so, further damage to the tooth can be prevented [(4).] The treatment also helps remove the granulation tissue and necrotic pulp. The tooth affected with internal resorption has a weaker tooth structure (due to loss of hard tissues dentin, cementum). Hence, care must be taken to keep the shaping of the root canal as conservatively as possible during the treatment. As there is an increased number of blood vessels in the area, the bleeding might affect visibility during the procedure. Internal resorption will result in loss of tooth unless it is treated.

Tooth Resorption is classified majorly into internal and external resorption as given by *Andreason* (MODIFIED):

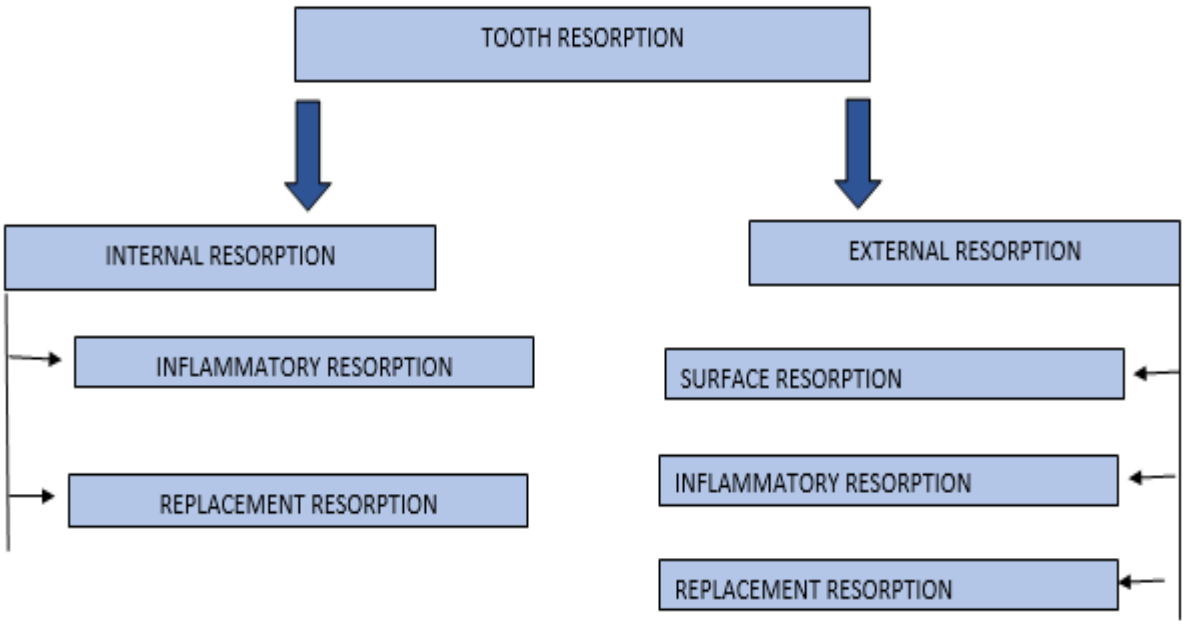

Fig 1. Andreasen classification of tooth resorption; GS Heithersay Australian Dental Journal Supplement 2007;52

ETIOLOGY

Internal resorption is initiated due to trauma to the tooth physically or thermally (excessive heat produced during access cavity preparation). In most cases, it was also observed that untreated carious lesions might also result in internal resorption of the tooth due to chronic inflammation of the pulp.

PATHOPHYSIOLOGY

The viable blood supply present in the pulp and the necrotic debris provides stimulus, which then stimulates the formation of clastic cells. Various factors are affecting this, such as the inflammatory process and the intensity of the stimulus. [11]. The onset of resorption is caused by hyperemia in the pulp and low ph, leading to the accumulation of numerous macrophages. Caries, when extended deep, it causes damage to the predentin leading to its loss, odontoblastic degeneration leading to inflammation and necrosis of pulp which then leads to activation of odontoblasts, consequently causing internal resorption, which is then replaced by granulation tissue. Granulation tissue is formed when the connective tissue undergoes metaplasia after resorptive activity (5). The entire pulp tissue undergoes necrosis due to continuously progressing infection, limiting the process of resorption, thereby preventing its progression. (17) the ongoing process of resorption can be maintained by collateral blood supply present at the site of resorption emerging from the periodontal ligament via the accessory canals. The lesion typically spreads symmetrically and radially into the surrounding dentin. It has been found that its development can only be initiated if the vital pulpal tissue is substituted by a connective tissue analogous to the periodontium. This process of dissolution of tooth structure involves two mechanisms, the stimulating factor and the factor that provides a nidus for the process to continue. When the surface of the root is separated from the blast cell layer that protects it which may have occurred due to trauma, it provides a trigger that promotes the resorptive process. The infection is present in the canal along with the continuously acting mechanical forces on the tooth. The tooth with apical periodontitis which may be produced following the death of pulpal tissue may develop apical root resorption.

Deep carious lesion

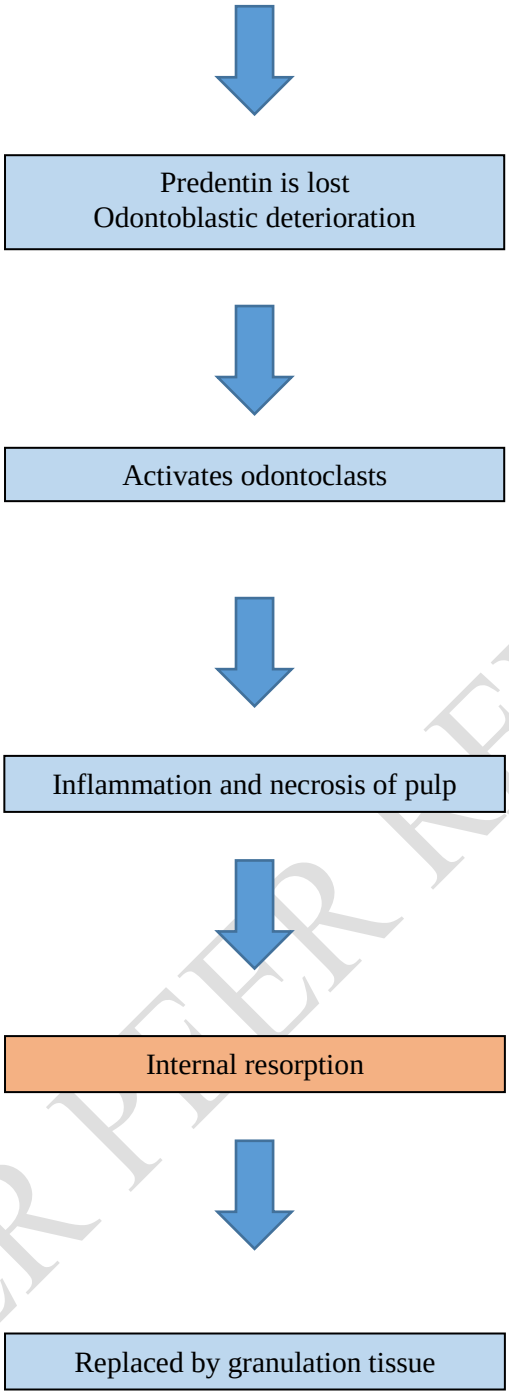

fig: 2. pathogenesis of internal resorption.

CLINICAL FEATURES:

Tooth affected with Internal resorption appears reddish/pinkish due to the presence of granulation tissue which then changes to dark grey/grey once the pulp becomes necrotic. When the lesion is actively progressing, it shows symptoms of pulpitis as it mainly occurs due to chronic inflammation of the pulp. Since the pulp is vital initially, the vitality test gives a positive result till the pulp becomes necrotic and perforation of the canal has taken place. After the pulp becomes necrotic, it will result in apical periodontitis, which develops into periodontal abscess and formation of the

sinus tract due to progressing inflammatory process. Extensive, irreversible tissue loss occurs due to root perforation, and an external connection between a root canal and the surrounding tissue might develop.

HISTOPATHOLOGY:

The connective tissue in the pulp is inflamed and is infiltrated by neutrophils, lymphocytes, plasma cells, and macrophages. These macrophages and odontoclasts are connected to the mineralized dentinal surface and resorptive bays. The granulation tissue dominates the lesion. Under microscopy, bacteria are found in abundance in the dentinal tubules and coronal gangrenous zone of the root canal, which communicates with the necrotic and granulation tissue experiencing resorption. There are two ways in which this lesion manifests which can be identified in the histopathology of the lesions. One type is destructive where there is the destruction of mineralized tissues of the tooth and the other is reparative in which the lesion is substituted by cementum and dentin-like tissue in the adjoining area of the resorption.

RADIOGRAPHIC FEATURES:

Radiographically the lesion occurs as oval to round radiolucency in the crown whose margins are precise, smooth with deformation of the initial outline of the root canal. The lesion goes undetected in cases where it rapidly spreads in the root canal, causing the death of the pulp and thereby terminating the resorptive process. The lesion starts in different ways in single-rooted and multirooted teeth. In single-rooted teeth, it originates symmetrically from the coronal pulp. In contrast, in the multirooted teeth, it originates from one part of the pulp and then extends to the adjacent dentin. [(12)] Internal resorption is differentiated from external resorption in a way where if the lesion (radiolucency) shifts towards the canal after taking intraoral periapical radiograph from two separate angles, it is internal resorption and if not, then otherwise.

DIAGNOSIS

The diagnosis should be made after correlating the discoveries in clinical investigation and on intraoral radiographs. The lesion must be thoroughly examined to check if it is perforating or nonperforating type of lesion. The lesion takes place in both the dentition and appears to be clinically, etiologically (trauma, untreated carious lesion), and morphologically similar in both apart from the rate at which the lesion progressed, resorption is found to be quicker in milk teeth than permanent dentition. Bacteria were found in abundance in teeth in which the lesion was progressing

quite rapidly. the cells causing resorption in the tooth and other parts of the body show similarity in a way that they show the robust activity of an enzyme termed tartrate-resistant phosphatase. The changes in vascularity of pulp can be effectively detected by MRI.

TREATMENT:

Three treatment modalities are possible for this lesion. Until the lesion is symptomatic, no treatment may be done. If and when the lesion becomes symptomatic eventful extraction can be performed. The tooth can also be immediately extracted if the prognosis after restoration is low. Several criteria must be considered during the decision-making process, which includes: The patient's age, medical history, the position of the teeth, clinical crown form, occlusion, the place where the resorption takes place, the presence or absence of root perforations, as well as the extent to which they are present, the remaining root hard tissue's resistance or weakness, the ability to perform a restorative procedure on the tooth in question based on the data gathered during the clinical exam CBCT. There are a few things to think about like In the absence of therapeutic abstinence, monitoring symptoms of an infectious disease plays an important role. There are three possibilities for orthograde root canal therapy depending on whether perforation is present or not. If the lesion is non-perforated to the radicular wall, the root canal may be filled with gutta-percha. If the lesion appears to be of mixed type, the root canals can still be filled with gutta-percha or mineral trioxide aggregate or MTA. [(11)] The perforated area is then filled with bioactive material like MTA or Biodentine in lesions with short root length. [(7)] However, the cleaning and shaping of the root canal are challenging due to complex irregularities present in the root canal system. The long-term success of the endodontic treatment depends on the presence of bacteria and organic debris after endodontic treatment [(8).] Calcium hydroxide causes necrosis of the remaining pulp and also aids in controlling excessive bleeding. In addition to this, it also makes the necrotic pulp more soluble to sodium hypochlorite [(9).] Calcium hydroxide can be used as a sealant in the canals for 1-2 weeks in cases where perforation has not taken place, after which at the next appointment, the removal of residual tissue can be done using irrigation and instrumentation. Calcium-silicate-based materials can also be used to seal the resorptive cavity with perforating defects as it forms a barrier between the obturating material and the resorptive cavity. Calcium hydroxide as an intracanal medicament is also done. This will assist dissolve any leftover granulation tissue before completing interadicular treatment, which will be followed by gutta-percha canal obturation. Recently there are new advances taking place in the field of regenerative endodontics which can also be used alternatively to treat a perforated type of lesions. To ensure that the root canal is effectively cleaned and debrided, curettage is done after resection of the root end and it is done up to the area till where the perforation has extended. In cases where the lesion may be perforating from the apical to lingual side, the expansion of the access opening on the lingual side is not always accepted however if

required it can be done. Since the process of dissolution of the mineralized tooth structure makes the tooth weaker in terms of strength a post and core restoration long with composite may be used to regain the strength of the tooth so that it resists fracturing or chipping under occlusal forces.

CONCLUSION

Internal resorption is a rare insidious and usually asymptomatic condition. It shows more affliction towards females and maxillary incisors as they are easily more prone to trauma. The diagnosis of the lesion can be done visually by the color change seen in the tooth crown. Radiographically the lesion can appear as oval to round radiolucency, Internal resorption is differentiated from external resorption in a way where if the lesion (radiolucency) shifts towards the canal after taking intraoral periapical radiograph from two separate angles, it is internal resorption and if not, then otherwise. For the management of internal resorption, root canal treatment still stands to be the therapy of choice as it eradicates the necrotic pulp and necrotic tissue and hence terminating the resorptive activity. The onset of resorption is caused by hyperemia in the pulp and low ph, leading to the accumulation of numerous macrophages. The liveliness of the periodontal membrane is an essential factor for the development of the lesion, it has been noted that the good vitality of the periodontal ligament(pdl) will lead to a lesser extent of resorption as compared to the teeth with poor vitality of (pdl). When a tooth gets traumatized and advances to avulsion of the tooth if during reimplantation of the tooth there is damage to pdl it will lead to a massive inflammatory response which will further increase the chances of resorption. The tooth with apical periodontitis which may be produced following the death of pulpal tissue may develop apical root resorption.

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