

Full Title: Replacement Resorption –Proxy of Root By Bone A Case Report

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Abstract

Resorption can be defined as a physiological or pathological process. It presents with complexity of diagnosis due to various etiological factors and clinical presentation. The two major factors contributing to the resorptive process are traumatic injuries and pulpal inflammation. Resorption may either be of internal or external variety. Osteoclasts adhering to the mineralized surface cause release of hydrogen ions and proteolytic enzymes creating an environment which is acidic and localized. This leads to the dissolution of mineralized tissue. Replacement resorption is one of the hidden complications which may occur as a result of trauma to the tooth or due to luxation or avulsion. It eventually results in loss of the tooth. This article presents a case of replacement resorption, a rare complication which can occur even if the tooth is properly treated after dental trauma.

Introduction

Resorption is defined as a condition associated with either a physiologic or pathologic process. that results in loss of substance from a tissue such as dentin, cementum or alveolar bone.

Classification of Resorption [1]

- Internal resorption
 - Inflammatory
 - Root canal Replacement
- External resorption
 - Surface
 - Inflammatory root
 - Replacement
 - ankylosis

External resorption begins in the periodontium and the resorptive process initially begins in the external surfaces of the tooth. Internal resorption initiates within the pulpal space affecting the internal dentin surface. The causes of root resorption are trauma, pulp necrosis, periodontal treatment, orthodontic treatment ,tooth whitening agents. Other causes may include systemic disturbances such as viruses, scleroderma and hormone dysregulation. Incidence levels from 0-40% were recorded when radiographically diagnosed .The table below indicates the incidence levels of resorption:

Incidence Level of Resorption Cause

6.9% Tooth Bleaching

17.24% Luxation/Avulsion injury

5-90% Orthodontic tooth movement

Histologically there is a high level of evidence of resorption, as it is a normal physiologic process in permanent teeth. The pathogenesis of resorption is considered to be inflammatory in nature. [2] It involves RANK (receptor activator of nuclear factor kappa B) ligand (RANKL) and osteoprotegerin (OPG); additionally, Substance P, NKA, NPY, VIP, and CGRP may contribute to the resorptive process due to their vasoactive, chemotactic, and cellular effects. The main pathophysiological features of resorption are osteoclast formation, recruitment and stimulation. When clastic cells adhere to the mineralized surface, hydrogen ions and proteolytic enzymes are released. This produces a localized, acidic microenvironment which causes the mineralized tissue to dissolve. Our case focuses on internal replacement resorption.

Case Presentation

A healthy 14 year old male patient reported to the Department of Oral and Maxillofacial Surgery at SRMC&RI, Chennai. His chief complaint was the unesthetic appearance of his upper front tooth region (fig 1). The patient revealed that he had a history of trauma 1 year ago due to a cricket bat injury for which he underwent a root canal treatment one week after the injury. Intraoral examination revealed an Ellis Class III fracture of 21 with infra occlusion. On percussion of the tooth, a metallic sound was evident. Radiographic analysis revealed a radiopaque filling material suggestive of an endodontically treated teeth with the resorption lacunae being filled with bone (fig.2). In addition, the periodontal ligament space was missing suggestive of replacement resorption. Based on the radiographic and intraoral

findings extraction of 21 was advised due to poor endodontic prognosis. The extraction of 21 was performed under local anesthesia, atraumatically and hemostasis was achieved. The patient was asked to report back after one week to evaluate healing. The extracted tooth was further sent for histopathological analysis to confirm the diagnosis (fig 3). Based on the histopathological report, the decalcified section showed dentin with areas of resorption. When correlated with the clinical findings, this was confirmed to be a case of internal replacement resorption.

Discussion

Resorption is a physiological or a pathological process which leads to loss of dentin, cementum or bone. Resorption is caused due to mechanical or chemical injury to protective tissue. Resorption is a two-stage process. First, there is degradation of the inorganic mineral structure; subsequently the organic matrix disintegrates. Resorption can either be external or internal. On the basis of location, resorption can be apical, lateral or cervical.

[3], External resorption originates in the periodontium, with initial effects on the external tooth surfaces. Sub-categories of external resorption are surface cervical resorption with or without a vital pulp (invasive cervical root resorption) and external apical root resorption.

[4], Internal resorption does not affect the surface but may be either an inflammatory or a replacement process. Its origin is inside the pulp space and it causes a dentin to be lost, as well as causing the potential invasion of cementum. Internal resorption may be further classified as inflammatory or replacement. [5] Internal inflammatory resorption can be perforating or non perforating root resorption. Internal inflammatory resorption exhibits progressive loss of dentin, whereas root canal replacement resorption involves subsequent deposition of hard tissue that resembles bone or cementum but not dentin. Incidence of replacement resorption is more common in

young children .The progress of the condition differs in children and adults., In the former, there is a rapid loss of ankylosed tooth [6] ,typically within 1-5 years . In the latter, the condition progresses more slowly. Joseph Fox in 1806 likened tooth resorptive lesions to a “tumor in bone”. Internal resorption is caused due to two major factors: trauma and pulpal inflammation/infection. In the clinical context, internal root resorption is usually diagnosed following routine radiographs. Although it may occur in all areas of the root canal, it is more commonly affects the cervical region. The key way to differentiate internal and external resorption is by examination of the pulp chamber’s outline. Where the outline is within the lesion itself, internal resorption is the probable diagnosis . If there is a radiolucent halo within which the outline can be identified, the more likely cause is external resorption.

[7],Internal root resorption (IRR) pathology sees formerly unaffected pulp tissue, then transform into granulomatous tissues. This results in giant cells which resorb dentin, leading to the subsequent resorption of the dentinal walls. This process starts from the centre and spreads outwards to the periphery. Internal resorption is sub-classified in two categories:[8], internal root canal inflammatory resorption and internal root canal replacement resorption.

1. Inflammatory resorption originates in the intraradicular dentin. It can be identified by the fact that examination of the resorptive sites will not reveal any adjunctive deposition of hard tissues . Instead, routine radiography will reveal granulation tissue (which will be seen as a radio clear zone) in the areas of resorption centred on the root canal.

2. Replacement resorption is a condition in which the resorptive activity affects the dentin next to the root canal. Bone-like tissue will be deposited in some areas of the defect, which result in the pulp space becoming irregularly

enlarged. This may obliterate the pulp chamber region, whether in whole or in part.

Internal resorption can be treated successfully provided there is early detection. If diagnosed before it becomes extensive with perforation, endodontic management may result in the retention of the tooth. If the lesion advances and the replacement resorption cannot be arrested or repaired then the definitive treatment would be extraction of tooth followed by prosthetic replacement.

Conclusion

Timely diagnosis of internal replacement resorption is of the utmost importance in the management of functional and esthetic defects following trauma. Prompt diagnosis in turn depends upon adequate clinical knowledge, including awareness of the means by which IRR may be identified from routine radiography. Early intervention not only makes a better physiological outcome more likely but may also significantly reduce psychological trauma to the patient. For example, carrying out root canal treatment as soon as possible after trauma prevents the possibility of tooth resorption.

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Figure 3:



Legends Figure

Figure 1:



Figure 2:

