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Rootless Tooth Hanging with Gutta Percha Cone: Report of a Case with Replacement Root Resorption

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Case Report

History

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ABSTRACT

Resorption results in damage of tissues by either physiologic or pathologic process. External root resorption begins with the cementum, dentin or both and continues inwards approaching the pulp of the tooth. It may penetrate the pulp if not treated, leading to a connection between the pulp tissue and the bone. Replacement root resorption is type of resorption distinguished by loss of tooth substance along with periodontal ligament (PDL) and its replacement by bone tissues resulting in dental ankylosis. External replacement resorption is progressive in nature. Age has a strong impact on the rate of resorption, thus young individual experiences faster resorption. Clinical and radiographic features of mobile maxillary anterior tooth in an 18-years-old male have been described in the present report. Clinical examination revealed pinkish discoloration, mobility and intrusion with the maxillary left central incisor (#21) and Ellis class II fracture in the maxillary right central incisor (#11). Intra oral periapical radiograph revealed complete root resorption with 21 and radiopaque root canal restorative material in the alveolar region giving unique radiographic presentation of hanging crown with the support of gutta percha cone. Cone beam computed tomography after the tooth extraction reveled retained endodontic material in the alveolar bone. In cases of trauma to the tooth leading to avulsion and reimplantation of the tooth, dental practitioners should be aware of prognosis in terms of external replacement root resorption. The present article aims to report the unique presentation of external replacement resorption and highlight the importance of regular long term follow up.

Keywords : Root Resorption, Dental Trauma, Replacement Resorption

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Introduction

Resorption results in loss of tissue substance from physiological or pathological process. Loss of dentine, cementum occurs in tooth resorption. Replacement root resorption is type of resorption distinguished by loss of tooth substance along with periodontal ligament (PDL) and its replacement by bone tissues resulting in dental ankylosis. Osteoclastic activity results in resorption of the tooth and osteoblastic activity generates new bone.[1] Dental trauma causes irreparable injury to PDL. External replacement resorption generally occurs after an injury to the PDL and/or external root surface, leading to necrosis in the PDL cells and subsequent ankylosis. As the predominant healing response takes on an osseous nature, the tooth loses the protection provided by the PDL. This loss allows clastic cells from the nearby bone to initiate the resorption of cementum and dentin. Osteoblasts then generate bone in the resorption area. This progressive process ultimately results in the complete resorption of the root and the subsequent loss of the tooth.[2] Age has a strong influence on replacement resorption; rate of resorption is faster in younger patient. External root resorption is more prevalent among individuals aged 21 to 30 years, with a higher incidence in females compared to males.[3] In a study assessing the frequency of root resorption in cases of dental trauma involving supporting tissues, it was observed that 77.4% of the cases exhibited external inflammatory root resorption, while replacement resorption was uncommon, occurring in only 4.8% of the cases.[4] If ankylosis, occurs before the age of ten or before the individual's development peak, there is a significant probability of infraocclusion. However, in individuals aged above twenty, slower rate of resorption of root was reported. The associated tooth/teeth with no clinical symptoms, no movement, produces metallic sound in reaction to percussion.[5,6] Loss of lamina dura and PDL evident in the radiographs in case of ankylosis. Resorption with replacement is an irreversible process and presently no preventive methods are available.[7] The sole treatment is to avoid damage to the PDL following trauma.[8] Present case shows unique features of external replacement resorption with pinkish discoloration, mobility, complete loss of the root structure and crown hanging with restorative material 10 years after trauma to the tooth.

Case Report

A male of age 18 years presented with a mobile tooth in his maxillary anterior region for one month. Past history revealed avulsion of the same tooth secondary to trauma which was repositioned and root canal treated 10 years back. On intra-

oral examination, pinkish discoloration, mobility and intrusion was observed with maxillary left central incisor (#21). Ellis class II fracture was seen in the maxillary right central incisor (#11), as shown in Figure 1. The provisional diagnosis of internal resorption for #21 was made. Intra-oral periapical radiograph revealed complete root resorption with #21 and radiopaque root canal filling material in the alveolar region, depicting as rootless tooth hanging with gutta-percha cone (Figure 2). Fracture of enamel, dentine, and external root resorption were noticed with respect to #11. The clinical and radiographic features of #21 led to the final diagnosis of replacement root resorption. The patient was advised for extraction of #21 and prosthodontic rehabilitation. After the extraction patient was advised to undergo cone beam computed tomography (CBCT) imaging for further management. CBCT revealed buccally present endodontic restorative material in the alveolar bone with respect to 21 region and bone defect was observed with respect to 21 and 22 regions. Root resorption was also noticed with 11 and 22. The root resorption observed with tooth 11 resembled external apical inflammatory root resorption, while that with tooth 21 resembled external replacement resorption (Figure 3-5). Implant therapy was planned for the missing 21.

Figure 1: Clinical image showing pink tooth of mummery with respect to left maxillary central incisor.

Figure 2: Intra-oral periapical radiograph showing severe replacement resorption and complete loss of root structure and radiopaque restorative material suggestive of endodontic treatment with #21 and fracture of enamel and dentine along with external root resorption with #11 .

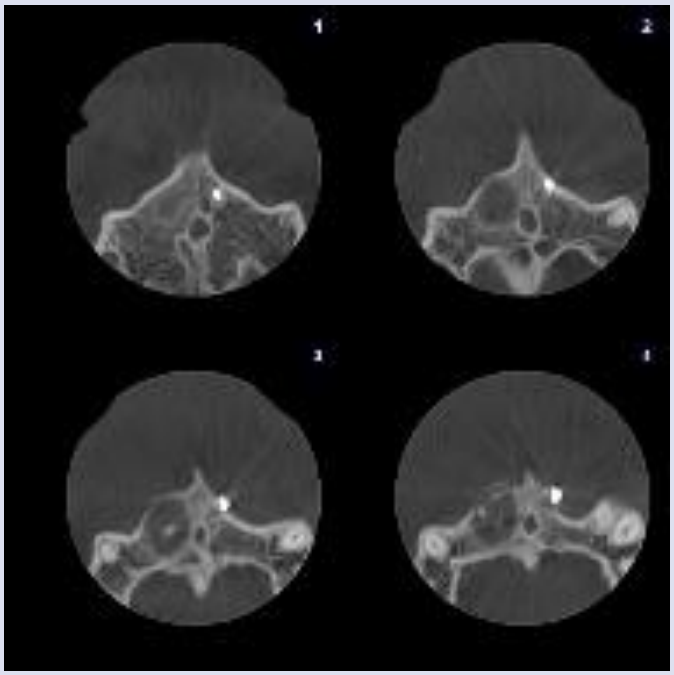

Figure 3: Cone beam computed tomography (CBCT) Axial sections showing the position of the residual endodontic material and the bone defect.

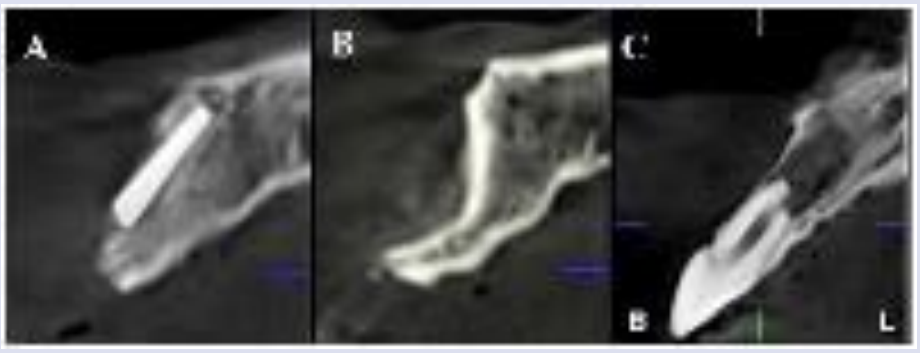

Figure 4: Cross sections in CBCT (A and B) showing buccally placed residual endodontic material with bony defect seen on the buccal aspect of 11 region. C) Root resorption resembling external apical inflammatory resorption seen in 11 with periapical pathology.

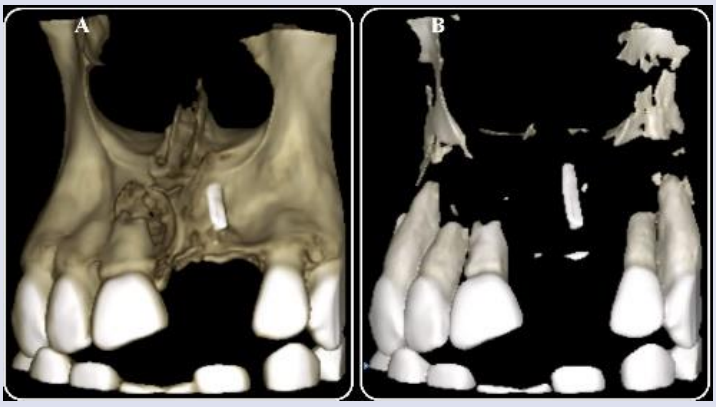

Figure 5: A) 3D reconstruction showing radiopaque material in the 21 region, B) Skimmed 3D reconstruction

Discussion

Resorption can lead to the depletion of surrounding bone, dentin, and/or cementum of the tooth. Root resorption can be classified into internal root resorption and external root resorption.[9,10]

Internal root resorption originates inside the root canal walls pulp or dentin. It extends outward towards the cementum and, in its final stage, may interact with the surrounding bone and PDL if left untreated. It can be further classified into resorption of surface, resorption of inflammatory origin and replacement resorption.

Whereas, external root resorption starts inside cementum, dentin or both If the cementum is not present at the site of initiation of resorption and moves inwardly towards the tooth pulp. It may reach pulp and cause interaction between the pulp and adjacent bone if untreated. It can be classified into surface resorption, inflammatory resorption, replacement resorption, invasive resorption, pressure resorption, orthodontic resorption, physiological resorption, idiopathic resorption.[2]

The present case report discusses external replacement root resorption, where cementum and dentin were resorbed and replaced by surrounding bone. PRICE 2020 Flow chart shows progress of present case (Figure 6). External replacement resorption is most commonly seen after trauma to the PDL and/or the outside root surface (cementum).[11-13] It occurs frequently with major luxation injuries such as avulsion and intrusion. Additionally, in the apical region, when the root rubs against the bony ledge created by the labial alveolar cortical plate fracturing, it may occur after lateral luxation. It may also occur on the palatal area on the root of coronal third, when the PDL and cementum are crushed due to bone contact with the alveolar socket wall. It is less likely to arise after extrusion because the root surface is less damaged. Nonetheless, because of the damage to the PDL, external replacement resorption remains a possibility.[9] Pathogenesis of external replacement resorption depicted in figure 7.[2]

External replacement resorption can be divided as (a) external transient replacement resorption and (b) external progressive replacement resorption. External transient replacement resorption occurs with minor damage to a limited portion of the root and PDL. At times, fibroblasts within the neighboring PDL contribute to the healing process of the PDL itself. In external progressive replacement resorption entire root will be resorbed followed by loss of tooth.[2]

On clinical examination, teeth exhibiting external replacement resorption will be less mobile, accompanied by a distinct percussive sound and sensation. The sound has been characterized as "high-pitched," "metallic," or "woody" by many authors, although it varies depending on the level of resorption. In most cases, the patient reports no symptoms and frequently has a history of a severe tooth damage or trauma. In more severe instances, the tooth may appear submerged, especially if the resorption started before puberty.[14,15]

On radiographic examination there will be regions where the outermost tooth material is resorbed and substituted by surrounding bone. Because certain areas may have faster resorption than others, the remaining root may have a very uneven appearance. In regions where resorption has taken place, The PDL space is expected to disappear, with the loss of the lamina dura.[16]

External transient replacement resorption doesn't need intervention, but the tooth must be checked on a regular basis before coming to a final diagnosis.[2]

The treatment of external progressive replacement resorption involves routinely taking periapical radiographs and clinical evaluation of the tooth to assess the resorption rate and the patient should be mentally prepared for tooth loss ultimately. Furthermore, due to cosmetic difficulties involved, the location should be taken into consideration and a future prosthetic tooth replacement, particularly if anterior tooth is involved. In our case, patient had to undergo extraction of remaining portion of the tooth which was discolored and mobile. Patients' age and dental growth stage should be considered, as the tooth undergoing resorption will not erupt in the future. This can negatively impact alveolar bone growth, leading to a bone defect that may be challenging to manage. In some cases, decoronation just beneath the crestal bone and "root burial" may be appropriate procedures to preserve bone in the area during tooth resorption and promote normal alveolar bone development.[15]

When possible, the ideal course of action is to prevent external replacement resorption; however, this is not always achievable since root and PDL damage usually develops before a patient who has had dental trauma visits a dental surgeon. Even if a dentist is consulted after an accident, like an avulsion, it can be too late for them to provide an advice on managing the tooth's first aid. One of the most crucial preventative strategies is to shorten the avulsed teeth's extra-oral time period. If the tooth cannot be transplanted, the use of an appropriate storage media should be encouraged, which will avoid the additional harm to PDL and root during the process of replantation or repositioning of the tooth, use of a splint (functional), preventing root canal treatment been done extra orally and delaying the use of $Ca(OH)_2$ which is a root canal medicament will be of great importance.[11,17] Primary drawback of the present study is reliance on the patient-provided information for evaluating the history of trauma, its type, and the treatment process.

Galley Proof

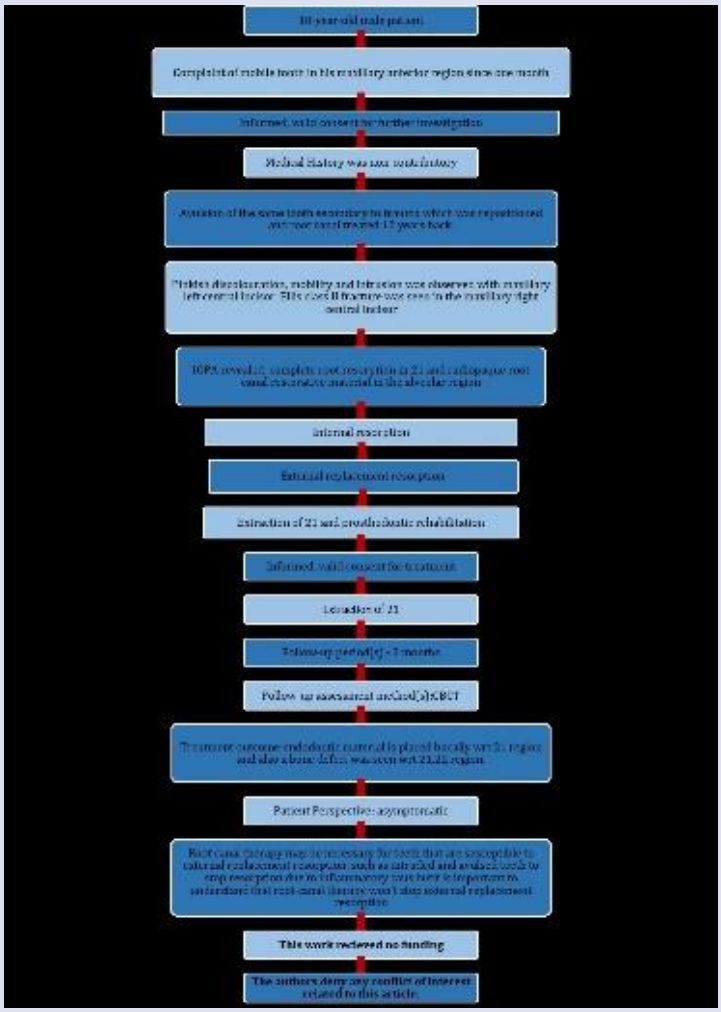

Figure 6: PRICE 2020 Flowchart.

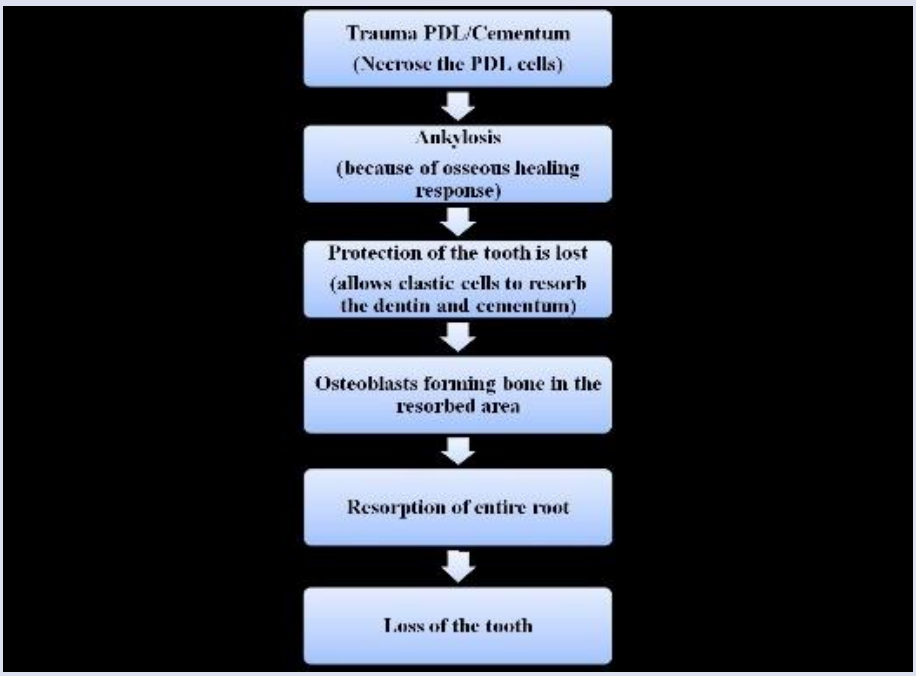

Figure 7: Mechanism of external replacement resorption .

Conclusions

In cases of trauma to the tooth leading to avulsion and reimplantation of the tooth, dental practitioners should be aware of prognosis in terms of external replacement root resorption. The present report highlights the unique presentation of external replacement resorption and emphasizes the importance of regular long term follow up.

Conflict of Interest

The authors declare that they have no conflict of interest in relation to this article

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Informed consent

Informed consent was taken from the patient to publish.

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