External cervical resorption case report and a brief review of literature

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Abstract

External cervical resorption (ECR) is the loss of dental hard tissue as a result of odontoclastic action; it usually begins on the cervical region of the root surface of the teeth. The etiology, predisposing factors, diagnosis, and management of ECR have been reviewed here. Effective management and appropriate treatment can only be carried out if the true nature and exact location of the ECR lesion are known. This paper reports on the management of a case of external cervical root resorption (ECRR), which involved root canal treatment and removal of the resorbing area of the affected tooth as well as filling the resorbed area with mineral trioxide aggregate (MTA) and resin-modified glass ionomer filling material (RMGIC). The defect was filled with bone graft material and guided tissue regeneration (GTR) membrane. This case highlights the importance of using MTA and successful management of cervical resorption with a stable uneventful clinical recovery.

Key words: External cervical resorption, mineral trioxide aggregate, resin-modified glass ionomer cement

INTRODUCTION

Root resorption is the loss of hard dental tissue (i.e., cementum and dentin) as a result of odontoclastic action.[1] Physiological root resorption associated with primary teeth is desirable because it results in exfoliation of the teeth, thereby allowing eruption of the permanent successors. However, root resorption of permanent dentition is usually unfavorable because it might result in irreversible damage and/or eventual tooth loss. Root resorption might be classified by its location in relation to the root surface, i.e., internal or external resorption. External root resorption (ERR) can be further classified into surface resorption, external inflammatory resorption, external replacement resorption, external cervical resorption (ECR), and transient apical breakdown. One of the least understood types of external resorption is ECR. This form of external resorption has been described at length by Heithersay,[2-5] who preferred the term "invasive cervical resorption," which describes its invasive and aggressive nature. Other terms used to describe ECR include odontoclastoma,[6] peripheral cervical resorption,[7] extracanal invasive resorption,[8] supraosseous extracanal invasive resorption,[9] peripheral inflammatory root resorption,[10] and subepithelial ERR.[11] In this article, it will be described as ECR, as it reflects its starting point on the tooth. ECR usually occurs immediately below the epithelial attachment of the tooth at the cervical region.[12] ECR defects can be difficult to diagnose and manage. This article reviews the etiology, diagnosis, and management of ECR in a patent.

External inflammatory root resorption (EIRR) is the most common type of ERR. It commonly presents as a bowl-shaped resorptive defect that penetrates into dentine. It can be subcategorized into those parts of the tooth where it can occur. Cervical root resorption makes up about 4% of all ERR cases.[13]

Common etiological factors of cervical root resorption have been listed as follows:

- Physical - Tooth trauma, surgical procedures, orthodontic movement, periodontal root planning, and bruxism
- Chemical - Agents used within root canal system, e.g., internal bleaching with external heat and high concentrations of hydrogen peroxide (30-38%). Cementoenamel disjunction, where there is a fault at the junction of the enamel and dentine, has been recognized as a risk factor. It is a histological variation[14] that can occur in up to 10% of teeth. Physical or chemical injury can lead to damage to bone, cementum, and dentine. This can produce chemical changes within the affected tissues and may result in the formation of multinucleated giant cells, commonly referred to as "clasts." These cells are responsible for continuing

hard tissue resorptive processes. They are joined by cells such as macrophages and monocytes in the resorptive activities. Collectively, these cells orchestrate a complex interplay of molecular biological events, involving cytokines, enzymes, and hormones that influence the progression of resorption.[15] Cervical root resorption often begins at the cervical aspect of the tooth and progresses inwards. As it approaches the pulp, it usually spares it by leaving a thin layer of predentine and instead progresses circumpulpally, so that extensive dentinal destruction can occur without pulpal involvement. Sometimes, however, resorption can progress rapidly and, if it does, the root canal will often be penetrated.

Identifying EIRR

Clinical and radiographical

Differentiation between root caries and cervical root resorption is sometimes difficult, but it is crucial in trying to plan the correct treatment. Root caries is usually identified clinically as a soft lesion of dentine associated with gingival recession. It often presents radiographically as an ill-defined, radiolucent patch or saucer-like lesion. In contrast, cervical root resorption is often first discovered radiographically as an incidental finding. It can be identified radiographically as a single radiolucent patch in the cervical region, and it is often located in the supra alveolar portion of the tooth. It usually does not involve the subcrestal part of the root,[16] and its defining feature is a sharp edge at the cavity border. On clinical examination, cervical root resorption is usually covered by soft tissue, and, when explored with a probe, it produces a hard sensation accompanied by a sharp scraping sound. In advanced cases involving the crown of the tooth, a pink coronal discoloration may be seen. This appearance is created by the translucent appearance of granulation tissue which, when it penetrates under the enamel, produces a deep-red color.

Histological evaluation

EIRR usually presents as a bowl-shaped resorption area penetrating into the cementum and dentine with inflammation of adjacent periodontal tissue. The presence of infected or necrotic pulp in the root canal is noted in cases where the resorption had penetrated the pulp. In the periodontium, granulomatous tissue is usually present with lymphocytes, plasma cells, and polymorphonuclear leukocytes. The adjacent resorbing surface of the root exhibits many Howship's lacunae, which occasionally contain osteoclasts.

Aetiology and presentation

The condition of multiple idiopathic cervical root resorption (MICRR) was first reported by Mueller and Rony in 1930. Since then, numerous other cases have been documented where none of the common initiating factors appear to have been involved and where more than one tooth has been affected. Those authors presenting their reported cases of MICRR have suggested other possible causative or predisposing factors, as follows:

- Segmental orthognathic surgery[17]
- Transplanted maxillary canines
- Secondary alveolar bone grafting in unilateral complete cleft of the lip and palate patients[18]
- Guided-tissue regeneration[19]
- Tetracycline conditioning.[20]

Liang *et al.,*[21] concluded in their review on MICRR that, although younger females were most frequently involved, no single common cause was conclusively identified. The etiology still remains unknown and no prediction of speed or pattern of progression could be made in the condition. It therefore appears that MICRR can occur spontaneously in the absence of any local or systemic factors.

Mineral trioxide aggregate

MTA is a bioactive material that was developed in the early 1990s, originally as a retrograde filling material, and first appeared in the dental scientific literature in 1993. The ability of MTA to induce reparative dentinogenesis or dentin bridge formation has been consistently demonstrated in animal studies in which direct pulp capping or pulpotomy was performed in mechanically exposed pulps.[22] These studies have also shown that MTA causes limited pulp tissue necrosis shortly after its application. Thus, MTA seems less causative as compared with calcium hydroxide, which is known to cause the formation of a necrotic layer along the material–pulp interface.[23-25] Compared with calcium hydroxide, MTA induces reparative dentin formation at a greater rate and a superior structural integrity.[26,27] MTA capping was carried out in mechanically pulp-exposed healthy human teeth, showing that MTA provides higher frequencies of dentin bridge formation, a better quality (thickness, completeness, and/or integrity) dentin bridge, and milder pulp inflammation as compared with calcium hydroxide-based materials.[28-29]

Resin modified glass ionomer cement

The resin-modified glass ionomer materials are hybrid materials of traditional glass ionomer cement with a small addition of light-curing resin, and hence exhibit properties intermediate to the two, with some characteristics superior to conventional glass ionomer materials. Generally, they have the advantages of both such as adhesion to tooth structure, esthetics, fluoride release, and rapid hardening by visible light.

Figure 1: Resorption site mesial to 21

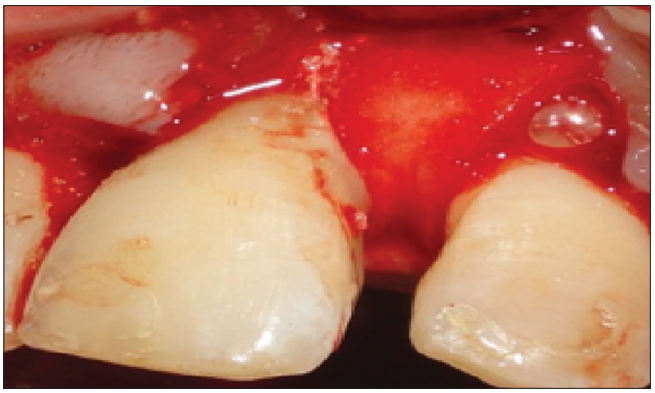

Figure 2: Guided tissue membrane placed mesial to 21

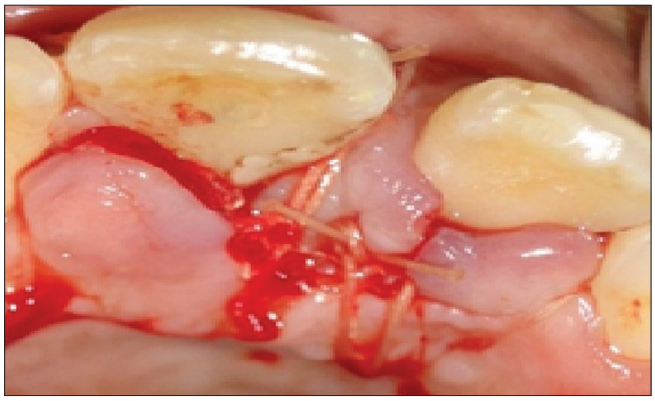

Figure 3: Resorbable suture given palatal view

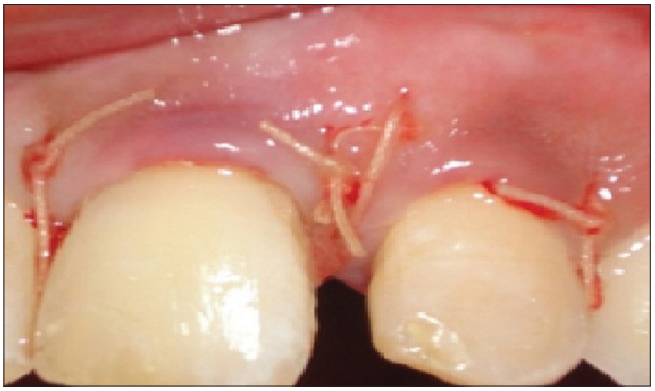

Figure 4: Resorbable suture given buccal view

Figure 5: RMGIC placed coronally to the resorption site distal to 21

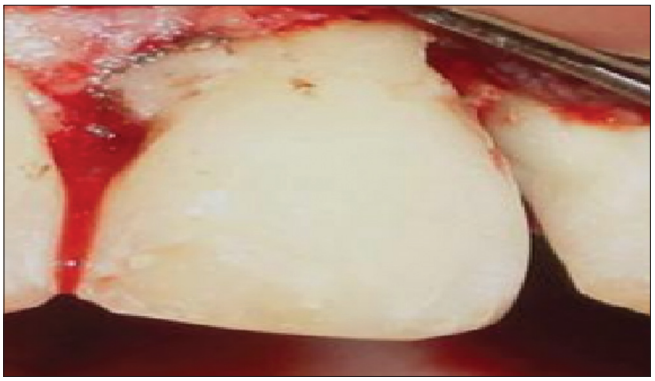

Figure 6: RMGIC placed on the resorption site mesial to 21

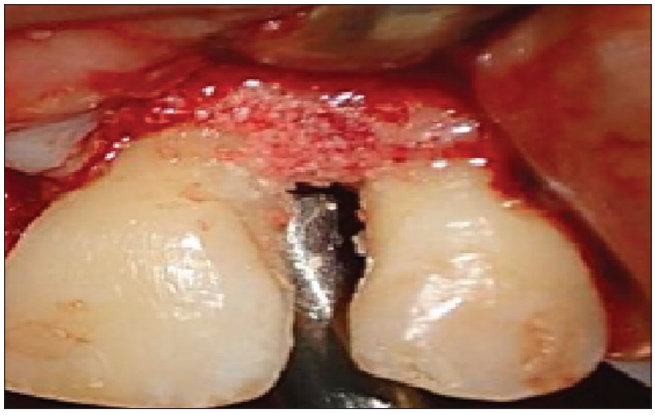

Figure 7: Osseo graft placed mesial to 21

Figure 8: MTA placed apically to the resorption site distal to 21

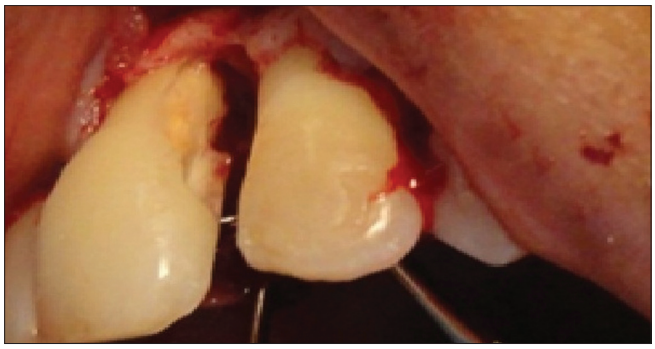

Figure 9: Resorption site distal to 21

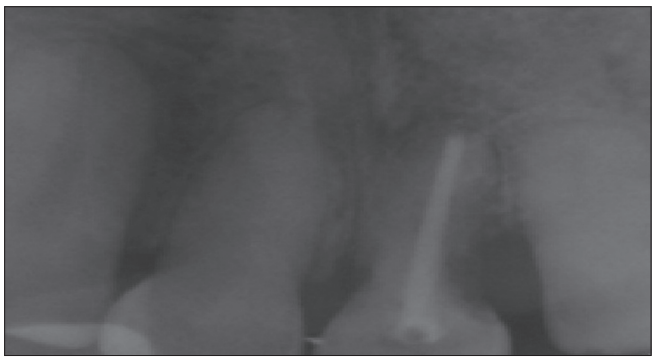

Figure 10: IOPA showing cervical resorption in mesial and distal to 21

Figure 11: Sulcular incision placed

CASE REPORT

A 23-year-old female patient reported to the Department of Periodontics in Thai Moogambigai Dental College with the chief complaint of pain in the left upper-front teeth region for the past 2 months, seeking treatment. On clinical examination, the tooth was found to be non-vital, and grade 1 mobility was observed. Temporary splinting was done from 13 to 23 to stabilize the tooth. Patient was then referred to conservative department to check the non-vitality and further management in relation to 21. The tooth was found to be non-vital and root canal treatment was performed. The patient was then referred back to Department of Periodontics for management of periodontal pocket of 10 mm in relation to distal aspect of 21. Radiographic examination revealed vertical bone loss and external tooth resorption on the distal aspect of 21 [Figures 9 and 10].

On subsequent appointment, scaling and root planning was done, and patient was reviewed after 2 weeks. On reviewing the patient, the pocket still persisted in distal aspect of 21 region. Therefore, flap surgery was planned and local anesthesia (2% lignocaine 1:80,000 adrenaline) was given. Sulcular incision was given and the flap was raised [Figure 11]. On raising the flap, there was resorption in the mesisl and distal aspect of 21 [Figures 1 and 9] and combined two-walled defect in the coronal aspect and three-walled defect in the apical region. The defect was then debrided, resorption was filled with MTA [Figure 8], and covered with resin-modified glass ionomer filling material (RMGIC) [Figures 5 and 6] in a sandwich technique [Figures 2 and 7]. Osseograft and healiguide membrane was placed in the defect and sutured with 5-0 vicryl resorbable suture material [Figures 3 and 4]. The patient was reviewed 6 months later when the upper left central incisor was found to be asymptomatic, and radiographs showed no further signs of resorption on the tooth.

CONCLUSION

Cervical root resorption can begin and progress asymptomatically without the presence of any of the known etiological factors. When multiple teeth are affected, resorption does not necessarily occur simultaneously or at the same rate. Separate lesions can begin long periods of time apart and in different quadrants. When resorption begins, it can proceed to destroy dentine rapidly. As the ability to maintain these teeth depends to a large extent on the amount of hard tooth tissue that is lost, early diagnosis is vital. However, due to the variable speed of progression, the management of these cases is difficult when trying to save any affected teeth. The most effective therapy usually involves the exposure of the resorption lacunae, followed by the removal of granulation tissue. Endodontic therapy should be carried out when pulpal involvement is evident. It is important to note that due to the progression of cervical root resorption, it can be technically very difficult, if not impossible, to spare the pulp when restoring these defects as only a very thin layer of predentine is left intact around the root canal, and due to the blood from the resorptive process this is often difficult to identify. Successful management of these patients should involve long-term monitoring of preexisting and restored lesions as well as attempting early diagnosis of new lesions through regular clinical and radiographic assessments.

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How to cite this article: Ahmed N, Mony GB, Parthasarthy H. External cervical resorption case report and a brief review of literature. J Nat Sc Biol Med 2014;5:210-4.

Source of Support: Nil. **Conflict of Interest:** None declared.

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Website: www.jnsbm.org

DOI: 10.4103/0976-9668.127336