Case Report

Bilateral external root resorption of maxillary anterior teeth associated with history of meningitis: A case report

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ABSTRACT

Osteoclastic activity affects the cementum and dentin layer in multiple pathways leading to external root resorption. During permanent tooth eruption, deciduous teeth undergo root resorption, which is categorized under the physiologic process. On the contrary, permanent teeth are unlikely to undergo such structure loss unless they are stimulated by specific etiologies. This report described a 22-year-old female suffering from mobile upper left lateral incisor for 2 years. Her medical history showed no systemic disease. Many radiological examinations have been done such as periapical radiographs for anterior teeth as well as a panoramic radiography, in addition to cone beam computed tomography. All radiographs showed bilateral external root resorption in upper lateral incisors with a symmetrical pattern, associated with the history of viral meningitis that affected the patient during childhood as a result of the relation between the affected teeth and the neural innervation.

Key words: Maxillary anterior teeth, Meningitis, Root resorption

The predisposing factors that induce root resorption are trauma and inflammatory conditions such as pulpitis, tooth bleaching, and excessive pressure applied to the roots during orthodontic treatment [1]. The etiology of root resorption comes through two phases: Injury and stimulation, without the stimulation of osteoclastic activity, the resorptive cell will cease spontaneously [2]. The immunohistological examination shows that the nerve (neuroectoderm) layer is located closest to the root surface, then dense fiber (ectomesenchyme) layer, while the epithelium of Malassez (ectoderm) forms the farthest layer from the root. All these tissue layers comprise the peri-root sheet layer. The necessity of the peri-root sheet is to attach the tooth to the periosteum and protect the root from resorption during the eruption [3]. Changes in the ectodermal layer may cause ectodermal dysplasia and tuberous sclerosis. The mesodermal changes may cause osteogenesis imperfect, while changes in the neuroectodermal layer may be the result of viral diseases [4].

The following presented case spot the light on bilateral external root resorption of the upper lateral incisors in relation to the history of viral meningitis during childhood. To the best of our knowledge, this is the first presentation of bilateral involvement with a symmetrical pattern regarding the external root resorption of upper lateral incisors.

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CASE REPORT

A 22-year-old female complained of mobility and pain in tooth 22. The tooth mobility had been noticed by the patient within the last 2 years. Medical history taken from the patient revealed no systemic disease except the patient was hospitalized when she was 8–9 years old due to meningitis.

The patient was in good general condition with normal vitals (pulse of 70 bpm and 80/110 mmHg blood pressure). Intraoral clinical examination showed Class I skeletal occlusion, and Grade II mobility of tooth 22, though the gingiva was pink, and firm, with no bleeding on probing, and no calculus. The teeth were affected by simple carious spots and simple external discoloration due to drinks or foods. The patient had good oral hygiene (Fig. 1). While tooth 12 showed Class I mobility which she was unaware of. The clinical examination shows no periodontal disease.

Recent laboratory tests of erythrocyte sedimentation rate and complete blood count showed normal values. Radiographic examination using periapical radiographs was taken for all upper anterior teeth. They showed severe external root resorption for tooth 22 (Fig. 2c), while tooth 12 showed less extent root resorption (Fig. 2a). The periapical radiographs for 11, and 21 (Fig. 2b) revealed a short root-to-crown ratio. A further supplementary panoramic radiograph orthopantomogram (OPG) (Fig. 3) showed

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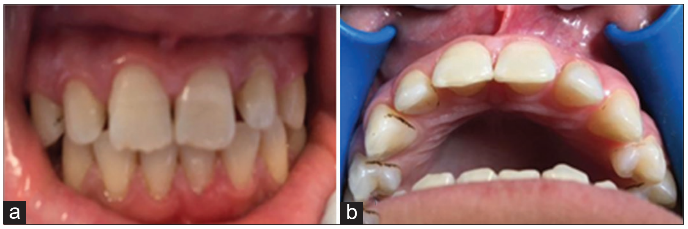

Figure 1: (a and b) Intraoral examination shows normal and healthy gingiva and periodontal conditions

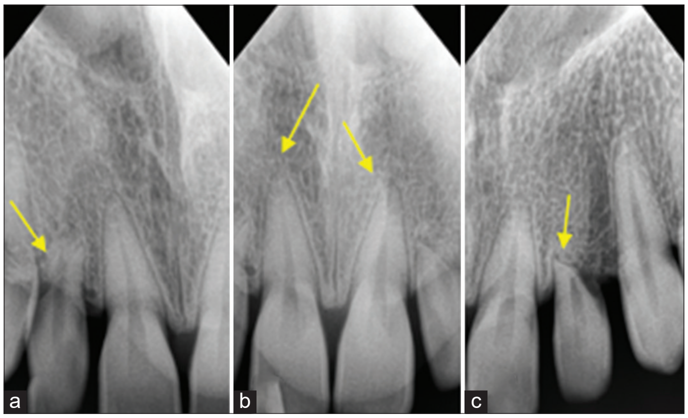

Figure 2: Periapical radiographs show severe external root resorption of tooth 12 (a). Short root to crown ratio of teeth 11 and 21 (b). More severe root resorption in tooth 22 (c). The bone and lamina dura follow the resorbing roots (a and c).

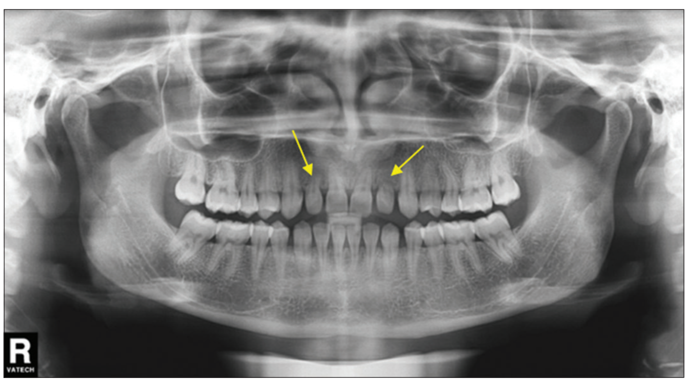

Figure 3: Orthopantomogram revealed that the external root resorption affects the upper incisor area

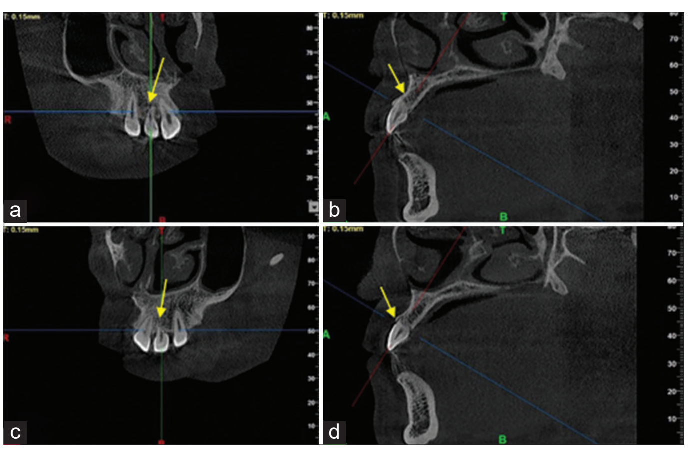

Figure 4: Cone beam computed tomography sections for upper anterior region. (a and b) coronal and sagittal sections of tooth 12, respectively. (c and d) coronal and sagittal sections of tooth 22, respectively

external root resorption of teeth 22, 12, and short-rooted upper central incisors. In addition; OPG shows no periodontal disease in the upper and lower arches. The patient's dental history excluded any previous trauma or orthodontic treatment. As periapical and panoramic radiographs did not display the cause of external root resorption further detailed data needs to be formed, the patient was asked for cone beam computed tomography (CBCT) to exclude any pathology such as cyst and tumor. The coronal and sagittal views of CBCT for tooth 12 revealed an uneven resorption process and the lamina dura surrounding the remaining root (Fig. 4a and b). While tooth 22 shows a similar resorption pattern of tooth 12 but to a greater extent (Fig. 4c and d).

The patient was referred for the extraction of teeth 12 and 22 and the insertion of implants for both teeth.

The follow-up of the patient was done in two phases only, the first was when she brought her laboratory results and the second was when she brought the CBCT within a period of 1 month. No difference was found in terms of clinical signs for the laterals. The patient did not respond to the recommended follow-up or treatment plan, as she refused tooth extraction. This is common in developing countries, for patients to go to other dental centers to receive the treatment they want. We were unable to reach the patient despite continuing contact with her.

DISCUSSION

External root resorption with unknown etiology was described in the past as idiopathic resorption. When there is abnormal tooth/teeth development the three peri-root tissue layers should be evaluated to exclude the idiopathic resorptions [5]. The researchers found that some of the idiopathic resorption cases were due to viral attack (such as herpes zoster, and meningitis) that affects the brunch of the trigeminal nerve. In these cases, the resorption occurred in limited fields interpreted by the innervation of various branches of the peripheral nerves [6,7].

The embryonic development of the peripheral nervous system in the jaws revealed that the individual tooth groups (incisors, canine/premolars, and molars groups) are innervated separately from trigeminal ganglia. In both maxilla and mandible, there are three bilateral neuro-osteological developmental fields; an incisor field with its own innervation, a canine and premolar field with its individual innervation, and a molar field with a separate innervation [8]. The developmental field is a region that includes structures that react to the same innervations [5].

The innervation is essential from the developing dental follicle where the nerve growth factor receptor is so close to the developing tooth buds [9]. There is a close correlation between tooth development and nerve development, as well as, tooth development and surrounding bone tissue development. From a neuro-osteological point of view, the teeth that exist adjacent to the nerve stems are the first ones to be formed [8]. While the teeth farthest from the main nerve stem are those most often affected by agenesis [10]. From this point of view, it seems that any disruption of innervation through a virus attack can stimulate an inflammatory reaction in the periodontal layer, where the innervation plays an important role at the time hard-dental tissue is formed [9]. In the present study, it is remarkable that variant external root resorption affects central and lateral incisors on both sides where these teeth are the ones innervated last. This condition may be caused by the destruction of the peripheral nerves to the incisor regions following a virus attack of meningitis in childhood. The clearly visible radiolucent line surrounding the central and lateral incisors' roots in radiographic images indicates a healthy-wise periodontal condition.

The current case report is noteworthy due to the rarity of bilateral external root resorption as a result of a virus attack of meningitis in childhood. As far as we know, this is the first case that has been reported in the dental literature, making it an important contribution in the diagnosis. This report spots the diagnostic challenges of idiopathic external root resorption which offers a valuable vision for clinicians faced with similar cases, especially at a young age. In addition, it may serve as a base for more extensive studies to put diagnostic and preventive strategies for this rare case.

CONCLUSION

The peripheral neural innervation played a significant role in idiopathic root resorption and has been demonstrated in several cases. Viral meningitis has strengthened its evidence over cases of idiopathic root resorption. Moreover, the affected lateral incisors have more resorption than centrals which implies that an individual branching of the last tooth is more involved than the first in the regional branch.

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