



## CASE REPORT

# The Orthodontic Treatment of a Patient with Idiopathic Root Resorption in Upper Incisors

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## ABSTRACT

The aim of this case report was to present the treatment of a 14-year-old patient with anterior crossbite with idiopathic root resorption. A 14-year-old female patient referred to our clinic because of the presence of crossbite on the maxillary central incisor. The smile esthetics were compromised because of the crossbite of the maxillary right central incisor. Intraorally, the patient had an Angle Class I molar relationship on the left side, and her lower right first molar was lost because of decay. Initial cephalometric analysis showed that the ANB angle was  $-1.3$ , and the upper and lower incisor angles were  $105.9$  and  $82.3$ , respectively. The arch length discrepancies in the upper and lower arches were  $-2.9$  mm and  $4$  mm, respectively. On radiographical examination, we noticed severe root resorptions. Hormonal tests (FT3, FT4, and TSH) were performed. The parents of the patient were informed about the root resorption. In the hematological and biochemical examinations, the patient did not show any problems. As a result of 8-month treatment, the chief complaint of crossbite was corrected in five months. The teeth were leveled and aligned. The final occlusion showed a Class I canine and molar relationship. Posttreatment radiographs showed that the pretreatment maxillary incisors' root resorption was at the same level. A satisfying occlusion and esthetic were achieved. Orthodontic treatment of the teeth with idiopathic root resorption can be achieved using proper mechanics and optimum force.

**Keywords:** Root resorption, orthodontic treatment, idiopathic

## INTRODUCTION

While external apical root resorption is usually caused by environmental factors such as idiopathic, genetic, and hormonal reasons, it may also be the result of orthodontic treatment<sup>1</sup>. The treatment for external apical root resorption (EARR) may vary according to the causes, although successful orthodontic treatments may restrict the outcomes that emerge as the unintended results of the orthodontic treatment. In particular, after Ottolengui's report in 1914, clinicians began to worry about such outcomes and started to take measures to reduce this problem<sup>2</sup>.

Orthodontic treatment-associated root resorption in patients who undergo excessive and long-term force results in an undesired direction of tooth movement and weak roots, which is particularly evident in the teeth with supporting tissues. The beginning and progression of EARR during orthodontic treatment are initiated by many factors. These factors can be biological, mechanical, or a combination of both<sup>3</sup>.

Root resorption is a multifactorial process that results in tooth structure loss. In accordance with the cases they studied with unidentifiable etiological factors, Belanger and Coke first defined the term "root resorption," while "idiopathic resorption" was first reported by Mueller and Rony in 1930<sup>4,5</sup>.

External resorption initially affects the external and lateral surfaces of a tooth or of multiple teeth. This trauma may be the result of periapical inflammation, tumors or cysts, increased mechanical and occlusal forces, radiation therapy, osteosclerosis, impacted teeth, reimplantation, or idiopathic resorption. In addition, ex-



Figure 1. Pretreatment intraoral radiographs



Figure 2. Pretreatment facial and intraoral photograph



Figure 3. Maxillary lingual retainer

ternal root resorption may follow endocrine disorders, Paget's disease, hypophosphatemia, hyperparathyroidism<sup>4</sup>, hypocalcemia, and intravenous narcotic drug intake<sup>6</sup>.

A 14-year-old girl was admitted to our clinic for orthodontic treatment, upon which we initiated a diagnosis-targeted examination. The examination showed largely resorbed areas in



Figure 4. Posttreatment facial and intraoral photographs



Figure 5. Posttreatment panoramic radiograph

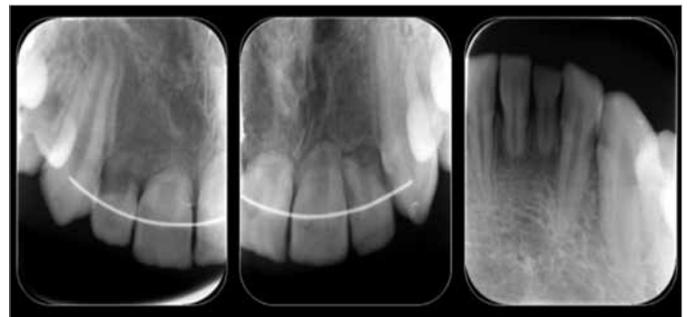


Figure 6. Posttreatment intraoral radiograph

the roots of the maxillary central and lateral teeth and shortened roots. With a straight look in the front teeth, the patient did not have any signs of temporomandibular joint dysfunction. The patient did not have any specific complaints about her teeth, and the resorption was incidentally noticed during the routine intraoral radiographical examination (Figure 1).

Panoramic radiography showed apical root resorption seriously affecting the entire roots of the maxillary incisors. The periodontal examination did not reveal any signs of alveolar bone loss or periradicular periodontitis. We observed normal tissue structure in the hematological and biochemical examinations; the EARR diagnosis was radiographically achieved.

The intraoral view showed a Class I molar relationship on the left and Class II canine relationship on both sides. The oral hygiene was excellent, and the periodontium was in good condition. The maxillary and mandibular teeth at the front contained crowding of 2.9 mm in the upper incisors. In addition, we observed that the dental midline coincided with the facial midline (Figure 2).

Cephalometric analysis reported that the patient had a Class III skeletal relationship, the maxillary right lateral tooth was inclined toward the labial, and the central tooth had a palatal inclination. The 1st mandibular right molar was taken out because of decay, and the bottom right permanent central incisor was congenitally missing. The primary problem seemed to be the incisal trauma on the right maxillary incisor due to the anterior crossbite.

We aimed to (1) fix the crossbite and open up some space for the upper right central incisor without increasing the resorption and (2) to eliminate the crowding issue to help the patient have properly functioning teeth and to provide an esthetic smile.

Throughout the orthodontic treatment, we first applied an essix plate to the lower jaw to remove the incisal contact in the front. The acrylic components we added to the plaque helped us to raise the occlusion and remove the contact with the front middle incisors. We applied brackets and arch wires to the upper jaw and started the orthodontic treatment. We explained to the patient that she should use the essix plaque 24 hours a day during the treatment process.

The active orthodontic treatment was completed within 8 months, at the end of which the crossbite and rotation issues were resolved. We started the active treatment by using 0.012-inch round NiTi wires, and continued the treatment with 0.016 and 0.018-inch NiTi wires, respectively, until the crossbite and rotation problems were eliminated. We used the maxillary lingual retainer as the retention device (Figure 3). Because the teeth did not have enough tooth root support, we did not plan gingivoplasty.

Since there were no problems in terms of the esthetic look and functionality, we did not apply fixed orthodontic treatment to the lower jaw to keep the treatment process shorter.

At the end of the active orthodontic treatment, we achieved a good dentition while also obtaining an optimal overjet and overbite relation (Figure 4).

The panoramic and intraoral radiographs showed that the resorption of the root did not increase (Figure 5, 6).

In terms of oral functions, the tissue functions were found to be normal. The patient was satisfied with the look of her teeth at the end of the therapy.

## DISCUSSION

EARR can emerge before or after orthodontic treatment<sup>3</sup>. EARR before treatment can be caused by genetic, hormonal, idiopathic, or anterior cross or lateral cross non-occlusion related reasons<sup>1</sup>. Similarly, in our study, the cause of EARR was possibly due to a long-existing anterior crossbite that had led to approximately 80% resorption in the upper incisor roots (Figure 1). Orthodontists are cautious about starting treatment for teeth with EARR since it is usually considered to be risky. In the literature, we did not come across any study related to treatment of a patient with EARR observed prior to the treatment. In general, studies have focused on the orthodontic treatment of EARR emerging after treatment. We were also reluctant to initiate the treatment due to the extreme resorption in the roots of the upper incisors. However, the patient told us that she was not happy with her teeth in terms of esthetics and functionality and insisted on undergoing the treatment. We informed the patient about the possible risks (that she may lose her teeth, etc.) and started the treatment after getting her and her parents' consent. As a result, we did not observe any of the undesired complications.

The studies in the literature relate to the emergence of root resorption during active orthodontic treatments and report that the resorption increases throughout the therapy. At the end of the treatment, such treatment-related resorption is reported to increase or, sometimes, decrease during the retention phase. In our study, the resorption did not increase either during the orthodontic treatment or in the retention phase (8 months) (X-ray). In this respect, we can conclude that the tissue turns to its normal physiological state once the factor causing EARR has been eliminated. Therefore, it can be stated that optimum forces do not actually damage teeth with EARR.

EARR that emerges before or after orthodontic treatment is an important phenomenon for orthodontists. Sharing similar case reports of patients with EARR before or after the treatment on a scientific platform will undoubtedly encourage orthodontists and patients into undergoing such kind of treatment.

## CONCLUSION

It was observed that EARR existing prior to orthodontic treatment did not increase during or after the treatment or in the retention period.

The orthodontic treatment of teeth with idiopathic root resorption prior to the treatment may be conducted using appropriate mechanical methods and optimum strength.

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