CLINICIAN’S CORNER

Short-root anomaly in an orthodontic patient

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Short-root anomaly is a rare condition, but it can be a problem for orthodontists and their patients. Our aim in this article was to report the treatment of an orthodontic patient with short-root anomaly, highlighting the diagnostic aspects involved and the strategy used. (Am J Orthod Dentofacial Orthop 2010;138:346-8)

Short-root anomaly (SRA) is a rare condition, with a prevalence estimated at 1.3%. It is more common in female patients and principally affects the premolars and the maxillary incisors, the apexes of which are rounded rather than the usual pointed shape.1,2 The condition has a genetic background and is related to other dental anomalies, such as agenesis, invaginated teeth, conoid teeth, supernumerary teeth, microdontia, taurodontia, pulp calculus, and type I dentin dysplasia.3-6 Moreover, it can be related to syndromes, such as Down7 and Stevens-Johnson.8 SRA has also been associated with exogenous factors, including radiation of the head and neck or chemotherapy in children with malignant tumors during dental development.9

Short dental roots, resulting in unfavorable root-crown ratios, can affect the prognosis of teeth and complicate the treatment plan in orthodontics and prosthodontics when considering aspects such as anchoring and the capacity of teeth to bear mastication forces.10 Specifically in orthodontic patients, this problem takes on an even more critical dimension, because of the tendency in patients with short roots toward root resorption during orthodontic treatment.11,12 Moreover, anomalies such as agenesis, ectopic teeth, and taurodontism are risk factors for periapical resorption.13,14

Although SRA is a potential problem in the clinical practice of orthodontists, no studies were found that directly address this subject. Thus, our aim in this study was to present the treatment of an orthodontic patient with SRA, highlighting the diagnostic aspects involved and the strategy used.

CASE REPORT

A girl, aged 10 years 7 months, sought orthodontic care, accompanied by her parents. Their objective was to continue the treatment that had been started 6 months earlier by another orthodontist. The girl had an orthodontic appliance in her maxillary arch from second premolar to second premolar (Fig 1). She had a mesofacial growth pattern, a convex facial profile, and a Class II dental and skeletal malocclusion. The radiographs showed SRA in the maxillary and mandibular central incisors and first premolars (Fig 2). The mandibular central incisors were affected to the greatest degree. There were no reports of disease or systemic abnormalities.

The new treatment plan involved removal of the fixed appliance and placement of a functional orthopedic appliance aimed at mandibular advancement (Fig 3). Headgear was also prescribed to limit the anterior movement of the maxilla. After 8 months of functional orthopedic appliance treatment, the patient exhibited significant mobility in the mandibular central incisors. The decision was then made to place a fixed lingual retainer, with a 0.025-mm braided fiber, on the mandibular incisors and canines (Fig 4). After 19 months of retention, there was stability of the sagittal correction and satisfactory intercuspation (Fig 5).

DISCUSSION

There are 2 main reasons for short dental roots: disturbance during dental development and resorption of originally well-developed roots. Clinical orthodontists should be careful not to diagnose SRA as root resorption. Because of the genetic background, the diagnosis of SRA is established when members of the family also have short roots and the possibility of systemic disease has been discarded.15 Root resorption is most often
considered a collateral effect of orthodontic treatment. In the case presented here, although the patient was already in orthodontic treatment and the root shortening affected both maxillary and mandibular teeth, this could not be attributed to the forces of the appliance, since it was attached only to the maxillary teeth. Furthermore, the diagnosis of SRA was confirmed by a similar situation observed in the patient’s sister, although to a lesser degree.

No reports were found in the literature regarding orthodontic treatment in patients with SRA. However, using the finite element method, Oyama et al\textsuperscript{16} demonstrated that, in model short root, significant stress was concentrated at the middle of the root, enough for the development of root resorption. Thus, orthodontic forces should be applied with considerable caution and preferentially avoided in patients with this anomaly. Fortunately, in our patient, the severity of the malocclusion did not require complex mechanics or considerable

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**Fig 1.** Intraoral photographs of a patient seeking to continue treatment started 6 months earlier with a different provider.

**Fig 2.** Radiographs showed the SRA of the central incisors and first premolars.

**Fig 3.** Fixed appliances and a functional orthopedic appliance were placed.

**Fig 4.** Eight months later, the mandibular central incisors showed significant mobility, so a fixed lingual retainer was placed.
force. Moreover, she was in phase 2 (acceleration) of vertebral maturation and, therefore, before the pubertal growth spurt. These characteristics allowed a treatment plan that preferentially addressed orthopedic aspects (activator and headgear) that did not involve force directly on the affected teeth. Once mobility was found in the mandibular incisors, we decided to apply a splint to stabilize them to prevent movement and an overload of forces as much as possible. A possible explanation for the mobility observed in these teeth was the effect of the projection of the incisors from the mandibular advancement appliance.

CONCLUSIONS

The definition of short roots has been most often used subjectively. However, orthodontists and dental professionals should be careful to make a correct diagnosis and an individualized treatment plan for this abnormality, because these determinations could mean the difference between success and failure of the strategy.

REFERENCES