

## CASE REPORT

# Idiopathic Generalized Root Agenesis

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## ABSTRACT

The shape and size of tooth roots are genetically predetermined. Clinical defects in root formation can manifest in the form of shortened roots, caused reported either by root agenesis or root resorption. The present case report is of a 17-year-old patient who reported with fully erupted permanent dentition, with roots only half of the normal length as seen in orthopantomograph. In the absence of any other significant finding, it is speculated that the arrested root development was most likely due to a genetic predisposition. Adequate and accurate records are critical from medical and legal point of view in the treatment of patients with potential problems in root agenesis.

**Keywords:** Arrested root development, Root agenesis, Root formation.

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## INTRODUCTION

The shape and size of tooth roots are genetically predetermined. Developmentally, once the crown of a tooth is formed, root genesis starts, and the tooth erupts along a path toward the oral cavity.<sup>1,2</sup> There have been reports of defects in root formation, frequently presence of roots that are shorter than normal.<sup>3,4</sup> Whenever a clinician comes across a radiograph depicting shortened roots, the etiology is related to one of the following condition being (i) failure of complete root formation, (ii) resorption of roots that have already been formed, and (iii) part of a syndromes.

In this report, we describe a patient in whom aberrant root development of all permanent teeth was observed.

The history, clinical and radiographic records revealed a unique case study.

## CASE REPORT

A 17-year-old male patient reported to the Oral Health Sciences Center, Postgraduate Institute of Medical Education and Research in March 2010 with the chief complaint of mobility in upper and lower teeth. His medical history did not reveal any significant finding. Clinically, he showed a complete set of permanent dentition with the exception of missing 12 (Figs 1 and 2). The family history did not reveal any positive finding related to his present condition. His periodontal condition was poor with the presence of generalized supragingival and subgingival



Fig. 1: Maxillary arch (occlusal view)



Fig. 2: Mandibular arch (occlusal view)

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**Fig. 3:** Panoramic radiograph of 17-year-old male patient showing generalized root agenesis

calculus deposits, for which a thorough prophylaxis was done. Although the panoramic radiograph was consistent with the dental age of 17 years, the most striking feature was the absence of complete root formation on almost all the permanent teeth along with missing 12. There was no bone loss associated with the shortened roots (Fig. 3).

## DISCUSSION

Shortened root formation in this patient offers a classical example of the unpredictability of aberrant root formation. Root genesis, cementogenesis, and tooth eruption are interrelated processes. Prefunctional development of the roots of permanent teeth is a protracted phenomenon in humans that continues for 5 to 7 years prior to the emergence of the tooth into the oral cavity.<sup>5</sup> No defects in crown formation or pulpal obliteration or internal resorption in the affected teeth could be seen in this case, thus ruling out the most common cause of generalized aberrant root formation, i.e., dentin dysplasia type I.<sup>6</sup> Shortened roots can be the result of resorption due to orthodontic treatment, in this case no such history was found. Another possible risk factor could be a damage to the dental follicles due to trauma. The patient revealed a history of trauma, almost 10 years ago, which, however, appeared to be insignificant and noncontributory. Some of the other factors that contribute to arrested root development include chemotherapy,<sup>7</sup> radiation therapy, and local factors, e.g., infection and illnesses like idiopathic hypothyroidism;<sup>8</sup> which were all ruled out by the past medical and dental history. In this case, the periodontal infection was mild and present only for the last 5 to 6 months. The generalized affliction of the entire permanent dentition points towards a systemic cause rather than local. The possible causes of growth arrest of the teeth

in this patient, therefore, could be idiopathic, infection, trauma, or genetically predetermined

Tooth eruption is more likely to be affected when the dental follicle is damaged or traumatized, whereas in our patient, eruption had progressed normally. Interestingly, the fact that the teeth were fully erupted in the arches and in full occlusal plane in spite of the absence of fully formed roots supports the prevailing thinking that the supraosseous phase of tooth eruption does not depend on proper root formation at the apical end reviewed by Wise and King.<sup>1</sup>

A major genetic impact on root formation has been established in the literature and further confirmed in a study on monozygotic twins.<sup>9</sup>

In case, it is suspected that the patient had a genetic disposition to aberrant development of the teeth that, when combined with a heightened sensitivity to environmental insults (e.g., trauma in adjacent areas), tipped the balance towards root agenesis. Proper, adequate, and accurate records are critical from medical and legal point of view in the management of patients within root agenesis.

## CONCLUSION

A rare case of generalized radicular agenesis of the permanent dentition has been presented. The case stands as evidence that root formation is not a prerequisite to tooth eruption. We speculate that the arrested root development was due most likely to a genetic disposition.

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