

# Single-rooted Pyramidal Molars: A Rare Case Report

Kavitha Ramar, V. P. Hariharavel, Mukund R. Nair

Department of Pedodontics and Preventive Dentistry, SRM Kattankulathur Dental College and Hospital, Chennai, Tamil Nadu, India

## Abstract

Anatomical variations of the first primary molars are very rare. Anatomic variation in root canal configuration, especially in multi-rooted teeth such as primary molars, makes the diagnosis and successful root canal therapy challenging. Thorough knowledge of root canal morphology and anatomical variations of primary teeth can help a pediatric dentist in successful root canal treatment. These deviations are also one of the major causes for endodontic treatment failure owing to inadequate cleaning, shaping, and sealing of root canal system. In addition, periodontally, fused roots are more prone to tooth destruction. The main purpose of the article is to present a very rare case of primary first molars with an unusual morphology as a single root called pyramidal molar. Various etiological factors are discussed briefly, and emphasis is placed on endodontic and periodontal aspects of these root canal aberrations.

**Key words:** Single root primary molar, pyramidal molars, root morphology

## INTRODUCTION

Anatomic variation in root canal configuration, especially in multi-rooted teeth such as primary molars, makes the diagnosis and successful root canal therapy challenging. Multi-rooted molars show the presence of single root due to fusion or deep taurodontism. These roots were termed “pyramidal,” “cuneiform,” “tubular,” “cylindrical,” “prismatic,” and “conical.”<sup>[1]</sup> Taurodont, pyramidal, and fused roots may be variations of a single heritable trait, with the single pyramid-shaped root the most severe expression of this trait. Only four cases of single-rooted primary molars have been reported so far in literature, and they are unilateral or bilateral.<sup>[2]</sup>

Tooth development is a complex process which is well coordinate and achieved through a series of reciprocal interactions between the dental epithelium and ectomesenchyme. After root dentin formation, Hertwig’s epithelial root sheath (HERS) becomes perforated, and the newly formed root dentin comes in contact with dental follicle cells. Root growth, size, shape, and a number of radicular pulps depend on the continuous elongation of and determined by HERS. The failure of invagination of HERS leads to root dysmorphology.

In this paper, we report one extremely rare case of single root and single canal of all the four primary first molars which is first of its kind to be reported in the literature.

## CASE REPORT

A 7-year-old girl was referred to the Department of Pediatric Dentistry, SRM Kattankulathur Dental College and Hospital, Chennai, India. She presented with a chief complaint of decayed tooth in her right lower back tooth region for past 1 week. History revealed that she had previous episodes of dull aching pain which was intermittent in nature and had subsided on taking medicines. With a similar history of pain for the past 1 week, clinical examination revealed dental caries with tenderness on percussion of a mandibular right primary first molar. She was advised intraoral periapical X-ray which revealed periapical radiolucency with single-rooted and single canal in 84 [Figure 1]. Diagnosed as dental caries with chronic pulpitis in 84, it was planned for pulpectomy followed by stainless steel crown and it was explained to the parents of the child. After obtaining verbal consent, access opening was done under local anesthesia by isolating the teeth 84, and it was found to have a single root canal. After determination of the working length (11 mm), cleaning and shaping were performed. Normal saline solution and 2.5% sodium hypochlorite were

**Address for correspondence:** Dr. Kavitha Ramar,  
Department of Pedodontics and Preventive Dentistry, SRM Kattankulathur  
Dental College and Hospital, Chennai,  
Tamil Nadu, India.  
E-Mail: [kavidr@gmail.com](mailto:kavidr@gmail.com)

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alternatively used for irrigation. The root canal was dried with sterile paper points and filled with Metapex<sup>®</sup> paste from the preformed syringe. Reinforced zinc oxide-eugenol (ZOE) paste was placed on the pulp chamber floor in 2 mm thickness, and after an approximately 2 min interval that was necessary for the setting of ZOE, the tooth was temporarily filled with glass ionomer cement (GIC). Following tooth preparation, stainless steel crown was cemented using GIC Type II on 84. Since it was a single rooted in 84, we suspected the same in other primary first molars, and hence we advised for orthopantomogram X-ray (OPG). OPG revealed single root and single canal in all four primary first molars [Figure 2]. Since morphologically the pulp chambers of first primary molars have their pulp horns close to the superficial enamel, to prevent caries, fissure sealants were applied on the occlusal surface of 54, 64, and 74.

## DISCUSSION

Literature reveals that this is the first time; all four primary first molars with a single root and single root canal have been reported. Investigators suggested that single pyramidal-shaped root in molars were inherited as an autosomal dominant condition.<sup>[2]</sup> The term fused roots have been used for confluent roots with separated pulp canals, but the pyramidal-shaped root refers to teeth with single and wide root canals, which is inherited as an autosomal dominant trait. Here, we first doubted it to be a case of taurodontism, but further clinical inspection of the pulp floor revealed a single root tooth with a single but enlarged canal, and hence diagnosed as so-called pyramidal root. Regarding the study conducted by Barker *et al.*, single and wide root canals of primary mandibular first molars were usually broad, but continuous deposition of secondary dentin led to complete or partially separated canals with horizontal anastomosis.<sup>[3]</sup>

Although extra canals are seen commonly, the clinician should be conscious about a possibility of fused or fewer canals. When all four single-rooted primary first molars were affected, a genetic cause was suspected and ruled out. In this case report, the child had no siblings, and her mother was unaware of any other family members with dental anomalies. Since no lineage

was obtained, it was not possible to relate the occurrence of these dental findings on the basis of genetic transmission. Literature claims a handful of genes could be responsible for root aberrations. *Msx-1* and *Pax-9* genes are responsible for selective tooth agenesis.<sup>[4]</sup> Loss of the *Nfic* gene may decrease the proliferation of cervical loop and ectomesenchymal cells through an increase in p21 expression and decrease in *FGF10* expression in ectomesenchymal cells and may contribute in part to short root formation.<sup>[5]</sup>

*Bmp2* promotes the differentiation of immortalized dental follicle cells toward an osteoblast/cementoblast phenotype and affects root formation. It affects vascular system formation in the dental pulp and in the periodontium in the absence of its precursors.

*FGF8* induces expression of barx homebox 1 genes (*Barx1*), distal less homebox 1 (*Dlx1*), distal less homebox 2 (*Dlx2*), lim homebox 6 (*Lhx6*), and lim homebox 7 (*Lhx7*) genes, which affect molar morphogenesis.<sup>[6]</sup>

Meng has classified root aberrations, and fused roots are classified as Type V in permanent teeth. Fused roots present unfavorable crown-to-root ratio, short root length, and a taper-shaped root may offer less resistance to heavy occlusal loads and/or torque forces and may accelerate periodontal tissue destruction and may be responsible for the progression of aggressive periodontitis. In addition, occlusal interferences and oral hygiene play a major role in aggravating tissue destruction.<sup>[7]</sup>

## CONCLUSION

Knowledge of root and root canal morphology is important from an endodontic point of view for it helps to avoid overzealous removal of tooth tissue during access preparation and exploration of root canal orifices. In addition, we need to concentrate on the periodontal and oral hygiene status of these teeth on regular intervals as they are prone for accelerated periodontal destruction. Since the prevalence is very less in these types of cases, long-term studies should be done.

Clinical significance:

1. Endodontic access preparation and exploration of root canal orifices

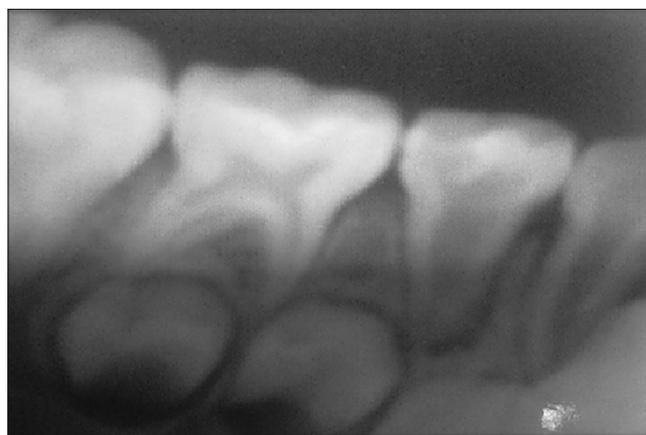


Figure 1: Intra oral periapical radiograph of 84.

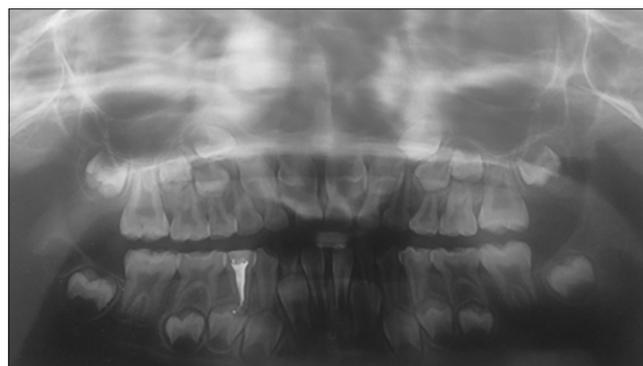


Figure 2: Orthopantomogram.

2. Single-rooted molars are more prone for periodontal destruction
3. First case of all four first primary molars to have single roots.

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### Conflicts of interest

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