

# Primary Mandibular First Molar with Single Root and Single Canal: A Case Report of a Rare Morphology

Zahra Bahrololoomi<sup>1</sup>, Roya Ghafourifard<sup>2</sup>✉, Ali Asghar Soleimani<sup>2</sup>

<sup>1</sup>Associate Professor, Department of Pediatric Dental School, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

<sup>2</sup>Assistant Professor, Department of Pediatric Dental School, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

## Abstract

Single rooted primary mandibular first molar is a rare developmental anomaly. Literatures reveal that failure of invagination of Hertwig's epithelial root sheath leads to this unusual root form. Thorough knowledge of root canal morphology and anatomical variations of primary teeth can help a pediatric dentist in successful root canal treatment. Hereby, we describe two cases of primary mandibular first molars with an unusual morphology as a single root called pyramidal molar.

**Key Words:** Molar; Dentition, Primary; Tooth Root

✉ Corresponding author:

R. Ghafourifard, Department of Pediatric Dental School, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

royaghafourifard@yahoo.com

Received: 2 January 2014

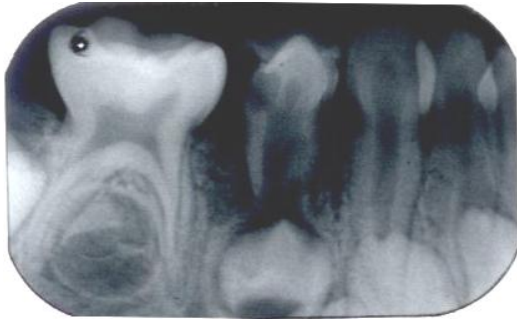
Accepted: 7 April 2014

*Journal of Dentistry, Tehran University of Medical Sciences, Tehran, Iran (2014; Vol. 11, No. 3)*

## INTRODUCTION

The dental pulp consists of connective tissue with an ectomesenchymal origin surrounded by bilayered mineralized tissues including the enamel, dentin and/or cementum. The basal layer of the epithelial dental organ constitutes inner and outer enamel epithelium that form Hertwig's epithelial root sheath (HERS). Root growth depends on a continuous elongation of HERS. Furthermore, the size, shape and number of radicular pulps are determined by HERS [1, 2]. It has been demonstrated that failure of invagination of Hertwig's epithelial root sheath leads to root dysmorphology [2, 3]. Pulp involvement of primary molars as a result of dental caries and trauma necessitates treatment to maintain the integrity of arch length and harmonized development of the underlying permanent teeth [4, 5].

In the cases of nonvital or irreversibly inflamed primary teeth, pulpectomy should be considered as an alternative to extraction [4, 6]. When evidence of accessible root canal and normal supporting bone is present, pulpectomy is indicated in the primary teeth [5, 7]. Anatomic variation in root canal configuration especially in multirouted teeth such as primary molars makes the diagnosis and successful root canal therapy challenging [8]. Thus, good insight to root canal morphology and its anatomical variations is necessary for dentists to achieve a successful treatment. Limited researches have surveyed the anatomy of primary root canal and their findings are inconsistent [6]. Bagherian and colleagues have found that all deciduous mandibular first molars in a sample of Iranian population had two roots and two to four canals [5].



**Fig 1.** Preoperative periapical radiograph showing primary mandibular right first molar with a single root



**Fig 2.** Follow up radiograph showing primary mandibular right first molar with a single root after six months

These findings are in agreement with those of Gupta et al. [7] and Hibbard et al. [9] Several researchers have reported variations in the number of roots in primary molars (Table 1) [2, 3].

In routine practice, root canal configuration can be evaluated by means of periapical radiographs, although these radiographs are subjected to inherent limitations that compromise their reliability [10, 11].

Multiple radiographs with different horizontal angulations can be used to assess the unusual morphology of root canals. Recently, computed tomography (CT) has been used to evaluate the three-dimensional anatomy of the teeth and root canal morphology [10, 11].

In this paper we report two extremely rare cases of single-root and single-canal primary first molars.

## CASE REPORT

**Case 1:** A 6-year-old boy was referred to the department of pediatric dentistry, Dental University of Yazd, Iran, complaining of pain in the lower right region. Clinical examination revealed disto-occlusal caries of the primary mandibular right first molar. The tooth was not tender on percussion. Widening of the periodontal ligament and periapical radiolucency in the primary mandibular right first molar as well as the unusual anatomy of the deciduous mandibular right first molar as a single root and single canal were evident in preoperative periapical radiographs (Figure 1). Diagnosis of dens in dent or deep taurodontism was made for the primary mandibular right first molar and pulp therapy (complete pulpectomy) was planned, and access opening was done under rubber dam isolation.

**Table 1.** Case Reports of Unusual Canal Morphology in Primary Molar

Unusual root morphology	No. of case	Authors
Single rooted primary molars	2	Ackerman et al. (1973), Jeevanandan et al. (2012)
Single rooted primary & Permanent molars	3	Gideon et al. (1991), Anne Marie. H. Ngyen et al. (1996)
Three rooted primary mandibular molar	8	Micheal et al. (1997), Mayholl et al. (1981), Curzon et al. (1972), Tartman et al. (1938), Badger GR (1982), Falk et al. (1983), George ACS et al. (1992)



**Fig 3.** Preoperative periapical radiograph showing the right deciduous mandibular first molar with a single root



**Fig 4.** Periapical radiograph showing primary mandibular left first molar with deep taurodontism

On clinical examination, only one solitary wide orifice was found in the center of the pulpal floor. After determination of the working length (11 mm), cleaning and shaping were performed. Normal saline solution was used for irrigation between hand instrumentations. The root canal was dried with sterile paper points and filled with zinc oxide-eugenol paste (Kemdent, Purton, Swindon, and Wiltshire, UK) with a plugger. Reinforced zinc oxide-eugenol paste (Zonalin, Kemdent, Purton, Swindon, Wiltshire, UK) was placed on the pulp chamber floor in 2-mm thickness and after an approximately 2-minute interval that was necessary for the setting of ZOE, the tooth was temporarily filled with amalgam (Lojic plus, SDI, Bayswater, Australia). Six months after pulpectomy, a periapical radiograph was taken that showed healing of the periapical region with no evidence of failure (Figure 2). Becoming assured of the treatment success, the parents were asked to come back for placement of definitive restoration (stainless steel crown), but unfortunately they did not turn up.

**Case 2:** A 6-year-old girl presented to us with toothache in the lower right region coincident with or immediately after a meal.

On intraoral examination, dental caries of the primary mandibular right first and second molars and primary mandibular left first and second molars were noted.

The preoperative periapical radiographs showed caries involving the pulp in the primary mandibular right and left first molars. Another interesting finding was presence of a single root with one broad canal in the primary mandibular right first molar (Figure 3), while the primary mandibular left first molar showed taurodontism (Figure 4).

Pulp therapy and stainless steel crowns were planned for the primary mandibular right and left first molars and the primary mandibular right second molar. Furthermore, extraction of the primary mandibular left second molar was done and space maintainer was included in the treatment plan.

Formocresol pulpotomy and SCC (3M/ESPE, Unitek, St Paul, USA) were performed for the primary right first molar, but the patient did not come back for treatment of the primary mandibular right second molar until she came back for dental abscess and facial swelling. Oral amoxicillin was prescribed before definitive treatment could be accomplished. On the next appointment, the periapical radiograph showed extensive periapical radiolucency associated with primary mandibular right second molar extending to the crypt of the underlying permanent mandibular right second premolar (Figure 5), so it was extracted.

## DISCUSSION

One of the most important goals in pediatric dentistry is to preserve the primary teeth until



**Fig 5.** Periapical radiograph showing pulpotomy of primary mandibular right first molar with a single root and extensive periapical radiolucency regarding primary mandibular right second molar

eruption of their succedaneous teeth in attempt to prevent primary tooth loss sequels such as disturbance in mastication, speech, esthetics and correct tooth spacing [5, 6].

After Ackerman et al. and Gideon et al. described the first cases of single rooted primary molars in children, only one study reported this rare phenomenon [2]. Bagherian et al. stated that all deciduous mandibular first molars in a sample of Iranian population had two roots and two to four canals. They also observed the presence of a single broad buccolingual canal in each root of the mandibular primary molars, especially in the distal root [5]. However, they did not find any single rooted primary mandibular first molar. Regarding the study conducted by Barker et al., single and wide root canals of deciduous mandibular first molars were usually broad [12], but continuous deposition of secondary dentin led to complete or partially separated canals with horizontal anastomosis [7, 12].

Although extra canals are seen commonly, the clinician should be conscious about a possibility of fused or fewer canals. Single rooted molar is one of the morphological dental anomalies attributed to fusion of the root or deep taurodontism [3].

Taurodontism is a rare dental anomaly of multi-rooted teeth, characterized by a vertically elongated pulp chamber and apical displacement of the pulp floor [13-15].

It may occur unilaterally or bilaterally and is most frequently seen in the permanent dentition [3, 16].

This deformity can appear as an isolated trait or it may be concomitant to other odontogenic anomalies such as oligodontia, [3] hypodontia, [17] microdontia, dens invaginatus, idiopathic generalized short root [13] and pyramidal molar [3,13,16,18]. Taurodontism is hereditary in nature with various modes of expression; [3,14,16] Taurodont, pyramidal and fused roots may be variations of a single heritable trait. The prevalence of taurodontism and pyramidal molars has been reported to be 48.6% in the Senegalese population, while isolated taurodontism and isolated pyramidal molar were found in 91.6 % and 8.6 % of the cases, respectively [18].

A number of terms have been used to describe single rooted molars such as conical, fused, and pyramidal [2, 3].

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, [2] which is inherited as an autosomal dominant trait [2, 3].

In these two cases, we initially doubted deep taurodontism or dens in dent, but further clinical inspection of the pulpal floor revealed a single root tooth with a solitary enlarged canal, which is so-called pyramidal root.

The parents were unaware of any other dental anomalies in their family.

Kumar and colleagues have demonstrated a case of single-rooted primary and permanent molars associated with non-syndromic oligodontia in an 11-year-old boy [3]; however, in the reported cases such an association was not observed. Although three dimensional imaging such as computed tomography (CT) and spiral (SCT) or helical CT can be used for accurate evaluation of root canal morphology, [10, 11] using additional radiographs with different horizontal angulation (20 degrees mesial and distal angulation) is preferred in young children [19].

The most important aspect of this rare dental anomaly is difficulty in performing endodontics procedure.

Excessive hemorrhage during access opening and pulp amputation may be mistaken for perforation; therefore, the possibility of this anatomic variant in the primary mandibular first molar should be always kept in mind to select the best material and technique during root canal treatment.

Due to its sedative effect and years of clinical success, zinc oxide-eugenol remains the material of choice for obturating the root canal following pulpectomies in the primary dentition [20]. Although the root canal was filled with ZOE as a conventional obturating material in case 1, it has been said that it may produce a bulk that may need longer time to be resorbed and the potential of interferences with normal exfoliation of the tooth exist [14,15].

## REFERENCES

- 1- Sarkar S, Rao AP. Number of root canals, their shape, configuration, accessory root canal in radicular pulp morphology. A preliminary study. *J Indian Soc Pedod Prev Dent.* 2002 Sep;20(3):93-7.
- 2- Jeevanandan G, Subramanian E, Muthu MS. Single-rooted primary first molars. *Indian J Dent Res [serial online]* 2012 [cited 2012 Sep 17];23(1):104-6.
- 3- Kumar MG Manoj, Sankar AJ Sai, Srikanth RK. Pyramidal molar roots in primary and permanent dentition along with non syndromic oligodontia in a 11 year old boy. *Annals Essences Dent* 2010; 2(2):36-9.
- 4- Aminabadi NA, Farahani RM, Gajan EB. Study of root canal accessibility in human primary molars. *J Oral Sci.* 2008 Mar;50(1):69-74.
- 5- Bagherian A, Kalhori KA, Sadeghi M, Mirhosseini F, Parisay I. An in vitro study of root and canal morphology of human deciduous molars in an Iranian population. *J Oral Sci.* 2010 Sep;52(3):397-403.
- 6- Mesbahi M, Talei Z, Mollaverdi F, Kadkhodazadeh M. Comparison of root canal system configuration in primary teeth. *Res J Biol Sci.* 2010;5(7):488-91.
- 7- Gupta D, Grewal N. Root canal configuration of deciduous mandibular first molars – an in vitro study. *J Indian Soc Pedod Prev Dent.* 2005 Sep;23(3):134-7.
- 8- Malagnino V, Gallotini L, Passariello P. Some unusual clinical cases on root canal anatomy of permanent maxillary molars. *J Endod.* 1997 Feb;23(2):127-8.
- 9- Hibbard ED, Ireland RL. Morphology of the root canals of the primary molar teeth. *J Dent Child.* 1957; 24:250-7.
- 10- Shigli A, Agrawal A. Permanent maxillary first molar with single root and single canal : A case report of a rare morphology . *J Indian Soc Pedod Prev Dent.* 2010 Apr-Jun;28(2):121-5.
- 11- Gopikrishna V, Bhargavi N, Kandaswamy D. Endodontic management of a maxillary first molar with a single root and a single canal diagnosed with the aid of spiral CT: a case report. *J Endod.* 2006 Jul;32(7):687-91.
- 12- Barker BC, Parsons KC, Williams GL, Mills PR. Anatomy of the root canals. IV deciduous teeth. *Aust Dent J.* 1975 Apr;20(2):101-6.
- 13- Nagaveni NB. An unusual occurrence of multiple dental anomalies in a single nonsyndromic patient: a case report. *Case Rep Dent.* 2012:1-4.
- 14- Bhat SS, Sargod S, Mohammed SV. Taurodontism in deciduous molars-a case report. *J Indian Soc Pedod Prev Dent.* 2004 Oct-Dec;22(4):193-6.
- 15- Tyagi P, Gupta S. Bilateral taurodontism in deciduous molars: a case report. *People's J Sci Res.* 2010;3(2):21-3.
- 16- Burklein S, Breuer D, Schafer E. Prevalence of taurodont and pyramidal molars in a German population. *J Endod.* 2011 Feb;32(7):158-62.
- 17- Kan WY, Seow WK, Holcombe T. Taurodontism in children with hypodontia and su-

pernumerary teeth: a case control study. *Pediatr Dent*. 2010 Mar-Apr;32(2):134-40.

18- Sarr M, Toure B, Kane AW, Fall F, Wone MM. Taurodontism and the pyramidal tooth at the level of the molar. Prevalence in the Senegalese population 15 to 19 years of age. *Odontostomatol Trop*. 2000 Mar;23(89):31-4.

19- De Moor RJ. C-shaped root canal configura-

tion in maxillary first molars. *Int Endod J*. 2002 Feb;35(2):200-8.

20- Donly KJ, Segura A. Dental material. In: Pinkham JR, Casamassimo PS, Field HW, Mc Tighe DJ, Nowak AJ. *Pediatric dentistry infancy through adolescence*. 4<sup>th</sup> ed. St Louis: Mosby Co; 2005. p. 327.