CASE REPORT

Radix Paramolaris an Endodontic Challenge: A Case Report

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Abstract

Awareness of anatomy of root canal and its associated variations is important to ensure successful endodontic treatment. Mandibular first molar generally demonstrates presence of one mesial and distal root with three canals. But in some cases, they depict anatomic variation in terms of number of roots wherein an additional root might be present either buccally [radix paramolaris (RP)] or lingually [radix entomolaris (RE)]. Appropriate diagnosis of such atypical anatomic variation is key to success for root canal therapy. This case report describes endodontic management of a mandibular first molar with radix, variation was identified through clinical examination along with the aid of multiangled radiographs, and was confirmed with the help of a cone-beam computed tomography (CBCT) imaging.

Keywords: Anatomical variations, Disinfection, Endodontics, Mandibular first molars, Radix distolabialis, Radix paramolaris, Tooth root.

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Introduction

The primary objective of endodontic treatment is thorough cleaning and shaping, followed by three-dimensional obturation of all root canals with a fluid-tight or bacteria impervious seal. Missed canals, incomplete instrumentation, inadequate obturation, and remnants of necrotic pulp tissue are the main reasons associated with failure of endodontic treatment. Root canals are often left untreated because of operator's lack of ability to identify them. Therefore, for a successful endodontic treatment it is imperative for an endodontist to be aware of internal anatomy of root canals and its potential variations.[1,2]

Mandibular first molar generally has two distinct roots, one mesial and other distal. However, anatomic variations associated with mandibular first molars have been described in literature.[3] One such variation is presence of supernumerary root which was first reported by Carabelli. This supernumerary root if located distolingually is called RE and if located mesiobuccally it is known as RP.[4]

Mandibular first molars are the first permanent teeth to erupt in our oral cavity and are considered as key to occlusion and physiologic function of chewing. They are considered to be the most frequently exposed teeth requiring endodontic treatment.[5] Therefore, it is essential for a clinician to be familiar with potential variations exhibited by these teeth to overall increase the success rate of root canal therapy.

Morphology of RP

The RP is located mesiobuccally or distobuccally. The dimensions of RP may vary from short conical extension to a mature root which can be separate or fuse. An increased number of cusps is not necessarily related to an increased number of roots; however, an additional root is always associated with an increased number of cusps, and with an increased number of root canals.[6]

Carlsen and Alexanderson describe two different types of RP.

Type A—refers to an RP in which the cervical part is located on the mesial root complex.

Type B—refers to an RP in which the cervical part is located centrally, between the mesial and distal root complexes.[6]

Etiology

The formation of radix molar is generally related to racial, genetic, and external factors during odontogenesis. Meanwhile, gender is not expected to have an important role in the formation of the radix roots.[7] The exact etiology behind the formation of radix root in a mandibular molar is still unclear. In dysmorphic, supernumerary roots, its formation could be related to external factors during odontogenesis, or to penetrance of an atavistic gene or polygenetic system (atavism is the reappearance of a trait after several generations of absence). In eumorphic roots, racial genetic factors influence the more profound expression of a particular gene that results in the more pronounced phenotypic manifestation please refer Table 1 for survey on molars.[1]

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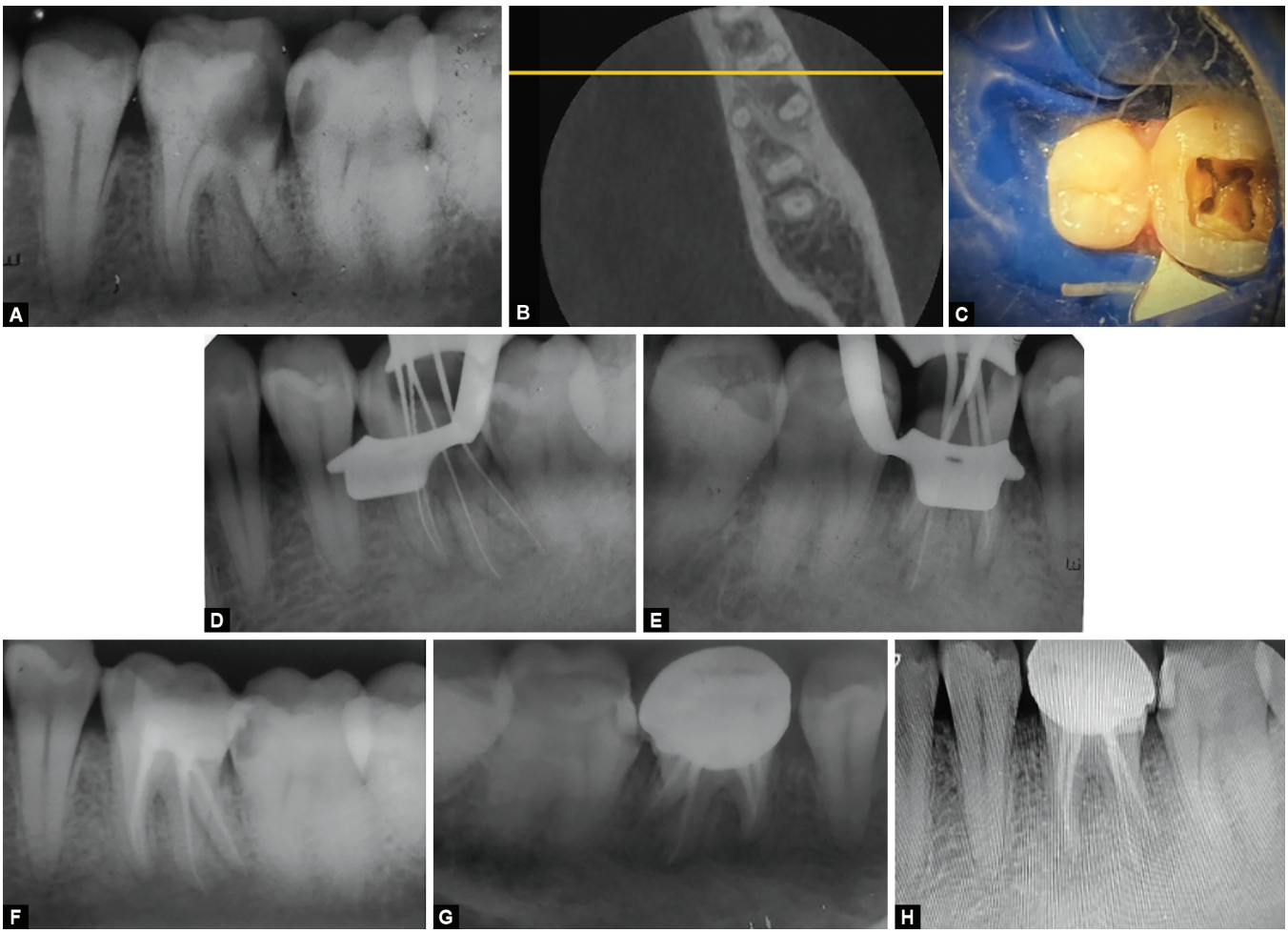
Case Description

A 28-year-old male patient reported to Department of Conservative Dentistry and Endodontics with chief complaint of pain in lower left back tooth region (36). He gave a history of intermittent pain for the past 1 month, which increased in intensity for 5–6 days. On clinical examination, the left mandibular first molar was carious with pulpal involvement and tender on percussion. Tooth vitality (thermal and electric pulp testing) elicited a negative response. The diagnostic radiograph revealed widening of the periodontal ligament space with an additional root between the mesial and distal roots. Two radiographs with different horizontal angulations confirmed presence of additional root distobuccal to the mesial root. Medical history was noncontributory (Fig. 1A). A diagnosis of a nonvital right mandibular first molar with apical periodontitis was made and endodontic treatment was planned after taking informed consent from patient.



Figs 1A to H: (A) Diagnostic X-ray irt 36; (B) Axial view of CBCT showing extra root; (C) Access opening; (D) Working length X-ray; (E) Master cone X-ray; (F) Obturation X-ray; (G) PFM crown cementation; (H) 6-month follow-up X-ray

In order to ascertain the presence of additional root, CBCT scan of mandible was done. Computed tomography revealed the presence of the additional distobuccal root (RP) (Fig. 1B).

The tooth was anesthetized and isolated under rubber dam. Access cavity with straight-line access was prepared using an endo access bur no. 2 (Dentsply Maillefer, Switzerland). Upon close inspection, a dark line was observed between the distal canal orifice and the distobuccal corner of the pulp chamber floor. A second distal canal orifice was detected when overlying dentin was removed and the opening was confirmed as a buccal canal orifice (RP) (Fig. 1C).

Working length was determined with 10K file (Dentsply Maillefer, Switzerland) using Root ZX II Apex locator followed by radiographic confirmation (Fig. 1D). Cleaning and shaping were performed by 25–4% with Hyflex CM rotary files (Coltene/Whaledent, Mumbai, India) using 15% ethylenediaminetetraacetic acid (EDTA) (Glyde, Dentsply Maillefer, Ballaigues, Switzerland) in crown-down technique. Irrigation was performed in between each instrument by 2.5% sodium hypochlorite (Medilise Chemicals, Kannur, India) and copious saline followed by final rinse with chlorhexidine (Dentachlor 2% Ammdent, Mohali, India) and were dried using sterilized paper points (Dentsply Maillefer, Ballaigues, Switzerland). Master cone fit was checked (Fig. 1E) and root canals were obturated with respective gutta-percha (Coltene/Whaledent, Mumbai, India) along with AH Plus resin-based root canal sealer (Dentsply Maillefer, Ballaigues, Switzerland). Composite (Filtek Z350 XT, 3M ESPE, Germany) was used as post root canal filling material so as to ensure coronal seal (Fig. 1F). Prosthetic rehabilitation done with porcelain fused to metal (PFM) crown and a 6-month follow-up reveal healthy periradicular tissues (Figs 1G and H).

Discussion

Prevalence of supernumerary root in mandibular first molars—[8] a survey of available studies.

Table 1: Prevalence of three rooted mandibular first molars— survey of available studies

Population	*Author (year)*	*Prevalence*	*Evaluation method*
Caucasians	Skidmore and Bjomdahl (1971)	2.2	*In vitro*
Germany	Schafer (2009)	0.7	*In vivo* (periapical radiographs)
United Kingdom	Taylor (1899)	3.4	*In vitro*
	Martin (2016)	2.2 (RE)	*In vivo* (CBCT)
Eskimo (Mongoloid Keewitan)	Curzon and Curzon (1971)	27	*In vitro*
Mongoloids			
Korea	Song (2009)	33.1	*In vivo* (periapical radiographs)
Asian			
Chinese	Tratman (1938)	5.8	*In vitro*
	Yew and Chan (1993)	21.5	*In vivo* (periapical radiographs)
	Zhang (2011)	29 (RE)	*In vivo* (CBCT)
	Xin Qioa (2020)	25 (RE)	*In vivo* (CBCT)
Burmese	Gulabivala (2001)	10.1 (RE)	*In vitro*
Japanese	Tratman (1938)	1.2	*In vitro*
India	Garg (2010)	4.55	*In vivo* (periapical radiographs)
South India	Saurabh (2011)	13.3	*In vivo* (periapical radiographs)
North India (Haryana)	Gupta (2017)	13.00 (RE)	*In vivo* (periapical radiographs and CBCT)
Taiwanese	Tu (2007)	21.09 (RE)	*In vivo* (periapical radiographs)
Iran	Maryam (2017)	1.2 (RP) 0.8 (type A) 0.4 (type B)	*In vitro*
	Rahimi (2017)	3 (RE)	*In vivo* (CBCT)
Saudi Arabia	Abdullah (2019)	3.05	*In vivo* (CBCT)
	Hassan (2020)	4.3 (RE) 0.3 (RP)	*In vivo* (CBCT)
African	Younes (1997)	0.7 (RE)	*In vitro*
Eurasian	Tratman (1938)	4.2	*In vitro*

The prevalence of these three-rooted mandibular first molars appears to be less than 3% in African populations, less than 5% in Eurasian and Asian populations, and is reported to be higher than 5% (even up to 40%) in Mongolian traits.[6] Bolk first reported the occurrence of RP. Radix paramolaris is very rare and occurs less frequently than RE. Visser reported the prevalence of RP to be 0% for mandibular first molars, 0.5% for second molars, and 2% for third molars.[9,10]

Conclusion

Aberrant root canal morphologies of mandibular first molars in terms of number of roots and missed canals contribute to an increased failure rate of endodontic treatment. This case report highlights that though RP is a less frequent finding among Indians, its presence should not be ignored. Knowledge of their occurrence and ability to locate the same area is of paramount importance for a clinician.

References

1. Calberson FL, De Moor RJ, Deroose CA. The radix entomolaris and paramolaris: clinical approach in endodontics. J Endod 2007;33(1): 58–63. DOI: 10.1016/j.joen.2006.05.007
2. Riyahi AM, Alssum K, Hadadi H, et al. Prevalence of three-rooted mandibular permanent first and second molars in the Saudi population. Saudi Dent J 2019;31(4):492–495. DOI: 10.1016/j.sdentj.2019.04.010
3. Cohen S, Hargreaves KM. Pathways of the Pulp. 10th ed. St. Louis, MO: Elsevier Mosby; 2010.
4. Carabelli G. Systematisches Handbuch der Zahnheilkunde. 2nd ed. Vienna: Braumuller und Seidel; 1844. p. 114.
5. Qiao X, Zhu H, Yan Y, et al. Prevalence of middle mesial canal and radix entomolaris of mandibular first permanent molars in a western Chinese population: an in vivo cone-beam computed tomographic study. BMC Oral Health 2020;20(1):224. DOI: 10.1186/s12903-020-01218-z
6. Carlsen O, Alexandersen V. Radix paramolaris in permanent mandibular molars: identification and morphology. Scand J Dent Res 1991;99(3):189–195. DOI: 10.1111/j.1600-0722.1991.tb01884.x
7. De Moor RJ, Deroose CA, Calberson FL. The radix entomolaris in mandibular first molars: an endodontic challenge. Int Endod J 2004;37(11):789–799. DOI: 10.1111/j.1365-2591.2004.00870.x
8. Al-Alawi H, Al-Nazhan S, Al-Maflehi N, et al. The prevalence of radix molaris in the mandibular first molars of a Saudi subpopulation based on cone-beam computed tomography. Restor Dent Endod 2019;45(1):e1. DOI: 10.5395/rde.2020.45.e1
9. Bolk L. Welcher Gebibreihe gehören die Molaren an? Z Morphol Anthropol 1915;17(7):83–116.
10. Visser JB. Beitrag zur Kenntnis der menschlichen Zahnwurzelformen. Hilversum: Rotting; 1948. p. 49–72.