

## RADIX ENTOMOLARIS: AN ENDODONTIC CHALLENGE - CASE REPORTS

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### ABSTRACT

Permanent mandibular first molars usually have 2 roots placed mesially and distally and 3 root canals. However, Radix Entomolaris (RE), an anatomical variant of permanent mandibular first molar, is characterized by the presence of additional or extra distolingual root. Clinicians should be aware of this unusual root morphology in mandibular first molars for the successful outcome of root canal treatment. This report discusses endodontic treatment of three rooted mandibular molars with Radix Entomolaris.

**KEYWORDS:** Anatomic variation; Radix entomolaris; Distolingual root

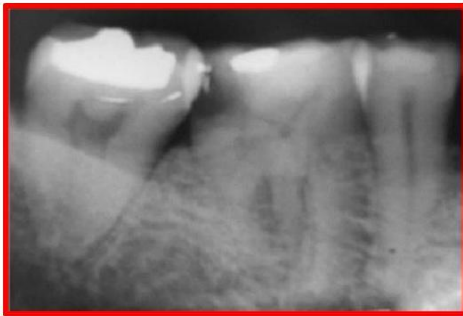
### INTRODUCTION

A thorough understanding of root canal anatomy and morphology is required for achieving high level of success in endodontic treatment. Incomplete instrumentation and cleaning of the root canal space and faulty obturation are the main reasons for failure of endodontic treatment. Root canals are often left untreated because the operator fails to recognize their presence, especially in teeth exhibiting anatomic irregularities or accessory or aberrant root canals.<sup>[1]</sup> The majority of mandibular first molars are two rooted with one mesial and one distal root with two mesial and one distal canal. The major variant in this tooth type is the presence of an additional third root; a supernumerary root is found lingually referred as distolingual root, Radix entomolaris (RE), first described by Carabelli,<sup>[2]</sup> is an anatomical variant found in the permanent mandibular first molar. Radix entomolaris (RE) refers to mandibular molars having an additional root located lingually. Endodontic literatures on RE in permanent

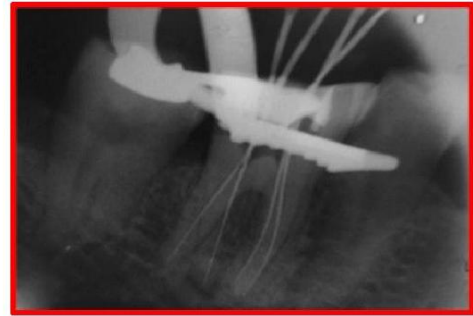
mandibular first molars reveals its incidence ranging from 0%-43.7%, with highest prevalence among the Mongolian and Eskimo traits.<sup>[3]</sup> Based on different methods of investigation, the prevalence of RE is also found to be high among Taiwanese (Chinese) population and found to be ranging from 21.1% to 33.33%, with a bilateral incidence ranging from 53.65% to 68.57% in them.<sup>[2]</sup> Because of its high frequency in these populations, the RE is considered to be a normal morphological variant. In spite of high prevalence of RE in certain races, its incidence among the Indian population is found to be very low and only 0.2%.<sup>[3]</sup> An awareness and understanding of this unusual root and its root canal morphology, locating the canal orifice, chemo mechanical cleaning and shaping of the root canals before a dense root canal filling with a hermetic seal can contribute to the successful outcome of root canal treatment. This case report is about the detection and management of radix entomolaris (RE) in a mandibular first molar during its root canal treatment.

### CASE REPORT 1

A 38 year old male patient was referred to Department of Conservative dentistry & Endodontics, DAPMR Dental College Bangalore, with throbbing pain in his mandibular left first molar for the past four days. On clinical examination of the patient his mandibular left first molar had a deep carious lesion. Tooth was severely tender on percussion. Intra Oral Periapical (IOPA) Radiograph of tooth 19 showed a broad coronal radiolucent area involving the pulp. Radiograph also revealed the presence of an extra distal root with accompanying apical radiolucency. From patient history and clinical examination a diagnosis of acute apical periodontitis was established. Buccal object rule (SLOB technique) confirmed the additional root



**Fig. 1:** Pre-operative diagnostic radiograph showing additional distolingual root



**Fig. 2:** Working length determination radiograph



**Fig. 3:** Periapical radiograph after obturation



**Fig. 4:** Radiograph taken without mesial angulation showing only two roots w.r.t 46



**Fig. 5:** Two separate distal roots can be distinguished when a radiograph is exposed 30° from mesial angulation



**Fig. 6:** Periapical radiograph after obturation

as distolingual root [RADIX ENTOMOLARIS] (Fig. 1). After local anesthesia and rubber dam isolation, the tooth was accessed. Four distinct canal orifices were located and negotiated using k-flex file ISO 15 (Dentsply Maillefer). The working length was determined by periapical radiograph (Fig. 2) and later confirmed by apex locator (Dentaport ZX, J Morita). After debriding pulp tissues, Calcium hydroxide powder (DPI, India) mixed with saline was placed with an absorbent point and closed dressing was placed and patient was recalled after 5 days. At the second appointment the coronal access was defined with Gates Glidden burs (Dentsply, Maillefer) and canals were shaped with Protaper

Nickel Titanium rotary instruments (Dentsply, Maillefer) under copious irrigation with 2.5% sodium hypochlorite and lubrication with RC-Prep. The canals were enlarged by crown down preparation using F2 protaper rotary instrument to the working length. Calcium hydroxide powder mixed with saline was placed with an absorbent point after cleaning and shaping, and the access cavity was sealed with a temporary coronal sealing material. At the third appointment after 5 days, the patient was completely asymptomatic and canals were dry. The root canal system was obturated with 6% Gutta percha and lateral condensation with accessory points and Grossman's sealer (Zical).

Post-operative radiographs were taken from varying angulations (Fig. 3). Patient was recalled after a week for check up, she was completely asymptomatic and then she was given an appointment for permanent restoration.

### CASE REPORT 2

A 28 year old male patient reported to the Department of Conservative Dentistry & Endodontics, with a complaint of pain in the right lower back tooth region. He gave a history of intermittent pain for the past two weeks, which had increased in intensity since two days. On examination, tooth number 30 displayed a restoration which was tender on percussion. Second molar had deep carious lesion with tender on percussion. IOPA Radiograph revealed deep restoration approximating the pulp space and slight widening of the periodontal ligament space around the apical area of the distal root. Close inspection of the radiograph revealed a faint outline of an additional root overlapping the mesial and distal roots (Fig. 4). This led to the suspicion of additional or extra root entity. A diagnosis of apical periodontitis was made and endodontic treatment was planned for both 46, and 47. The tooth was anesthetized. The pulp chamber was opened. When the floor of the pulp chamber was reached, three canals orifices were initially identified. On further exploration, a second distal and more lingually located canal was found. The radiograph taken with a mesial angulation to verify the working length confirmed the presence of extra distolingual root (Fig. 5). All the canals of 46 were cleaned and shaped using rotary Nickel-Titanium Protaper files (Dentsply Maillefer, Switzerland) in a crown down manner and irrigated using 2.5 sodium hypochlorite and lubrication with EDTA (RC - Prep). Calcium hydroxide (DPI India) was used as an intracanal medicament and closed dressing was placed with Zinc Oxide Eugenol Cement. One Week later, when the tooth was asymptomatic, the obturation was carried out by selecting Protaper gutta-percha (Dentsply Maillefer, Brazil) master cones, Grossman sealer and lateral compaction method (Fig. 6). Following the obturation, the access opening was filled with Zinc oxide eugenol cement (DPI, India) and patient was scheduled for follow-up visits.

### DISCUSSION

Anatomic variations of permanent mandibular molars are documented in the literature. The RE is located distolingually, with its coronal third completely or partially fixed to the distal root. Etiology is still unclear, In dysmorphic, supernumerary roots its formation could be related to external factors during odontogenesis or penetrance of an atavistic gene or polygenetic system where as in eumorphic roots, racial genetic factors influence the more profound expression of a particular gene that results in the more pronounced phenotypic manifestation.<sup>[4]</sup> An RE can be found on the first second and third mandibular molars, occurring least frequently in second molar. Some studies report a bilateral occurrence of the RE from 50-67%.<sup>[5-10]</sup> Calberson *et al.* described 4 types of RE,<sup>[7]</sup> and De Moor *et al.* classified REs evaluated from extracted teeth into types I–III.<sup>[5]</sup>

- *Type A & B:* Distally located cervical part of the RE with two normal and one normal distal root components respectively
- *Type C:* Mesially located cervical part
- *Type AC:* Central location between the distal and mesial root components.

In apical two third of RE a moderate to severe mesially or distally oriented inclination can be present. Based on the curvature of the separate RE variants in buccolingual orientation De Moor *et al.* (Ribeiro & Consolaro) classified:

- *Type I:* refers to a straight root/root canal
- *Type II:* refers to an initially curved entrance which continues as a straight root/root canal
- *Type III:* refers to an initial curve in the coronal third of root canal and a second curve beginning in the middle and continuing to the apical third.

The presence of an RE has clinical implication in endodontic treatment. An accurate diagnosis of these can avoid complications or a 'missed canal' during root canal treatment. Because the (separate) RE is mostly situated in the same buccolingual plane at the distobuccal root, a superimposition of both roots can appear on the preoperative radiograph and resulting in an inaccurate diagnosis. A thorough inspection of the preoperative radiograph and interpretation of particular marks or characteristics such as an unclear view or outline of the distal root contour

or the root canal can indicate the presence of 'hidden' RE. To reveal the RE, a second radiograph should be taken from a more mesial or distal angle (30°). Clinically, with a good knowledge of law of symmetry and law of orifices, various methods like, visualizing the dentinal map and canal bleeding points, using DG-16 explorer, micro-opener, toughing of the grooves with ultrasonic tips, staining the chamber floor with 1% methylene blue dye, champagne bubble test, magnetic resonance microscopy and micro computed tomography will be useful to locate the canals.<sup>[4]</sup> Further, good illumination and the use of accessories like magnifying loupes, microscopes etc are also valuable in locating and managing RE.

### CONCLUSION

Clinicians should be aware of these unusual root morphological variation of the RE in terms of root inclination and root canal curvature demand careful, adapted diagnostic and clinical approach to avoid or overcome procedural errors during endodontic therapy. The initial diagnosis of a RE before RCT is important to facilitate the endodontic procedure and to avoid 'missed canals'. Preoperative periapical radiographs exposed to two different horizontal angles and clinical diagnosis are required to identify these additional roots.

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**Source of Support: Nil**  
**Conflict of Interest: Nil**