

Radix Entomolaris – A Case Report

**Dr Chanchal Goinka, MDS¹, Dr B. Devi Priya, MDS², Dr. Bala Raju Korrai, MDS³,
Dr Aruna Kumari, MDS⁴, Dr VB Srinidhi, MDS⁵, Dr Hare Krishna Saladi⁶**

¹Senior Lecturer, Department of Conservative Dentistry & Endodontics, St Joseph Dental College, Eluru, Andhra Pradesh, 534003

²Senior Lecturer, Department of Conservative Dentistry & Endodontics, St Joseph Dental College, Eluru, Andhra Pradesh, 534003

³Senior lecturer, Department of Conservative Dentistry & Endodontics, Neerukonda Institute of Dental Sciences, Sangivalasa, Visakhapatnam, Andhra Pradesh

⁴Assistant Professor, Department of Pedodontics, Mallareddy College of Women, Hyderabad, Andhra Pradesh

⁵Reader, Department of Conservative Dentistry & Endodontics, St Joseph Dental College, Eluru, Andhra Pradesh 534003

⁶PG Student, Department of Conservative Dentistry & Endodontics, St Joseph Dental College, Eluru, Andhra Pradesh 534003

Abstract: During Root canal treatment if the dentist fails to identify any root canal, it leads to endodontic failure, particularly in teeth with anatomical variation in the form of extra roots or canals. Permanent mandibular first molars usually have 2 roots which are mesial & distal. The mesial root usually has 2 root canals & distal root have 1 root canal. However, radix entomolaris (RE), an anatomical variant of permanent mandibular first molar, is characterized by the presence of additional or extradistolingual root. The prevalence of radix entomolaris in permanent mandibular first molars differs significantly with race but found to be very low among the Indian population. This case report is about the radiographic identification and endodontic management of radix entomolaris in a mandibular right first molar.

Keywords: Radix entomolaris, Distolingual root, Anatomic variation, Permanent three-rooted mandibular first molars

1. Introduction

Variations from the normal are very usual with the root canal system. A thorough knowledge and an understanding of the potential for variations are required to achieve success in endodontics. The main reasons for failure of endodontic treatment are incomplete instrumentation and cleaning of the root canal space and faulty obturation. In teeth exhibiting anatomic irregularities or accessory or aberrant root canals, the operator fails to recognize their presence which lead to endodontic failure^{1,2}

Anatomical variations are very common for mandibular permanent molars. Permanent mandibular first molars usually have 2 roots which are mesial & distal. The mesial root usually has 2 root canals & distal root have 1 root canal, but variations in the number of roots and in canal morphology are not uncommon. Presence of third root is a major variant of permanent first molar^{2,3}. One such variant is presence of additional third root (i.e. the supernumerary root or extra distal root), which is typically distributed lingually. This extra distolingual root is generally smaller than the distobuccal root and is usually curved. This was first described by Carabelli as Radix entomolaris (RE). RE has not been reported for the mandibular second molar, but it is found (rarely) in the mandibular third molar^{2,3}.

As reported by Tu et al the prevalence of RE in permanent mandibular first molars differs significantly with race. 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. But gender did not show a significant relationship with this variant prevalence. The

incidence of permanent mandibular first molars ranges from 0%- 43.7%, with highest prevalence among the Mongolian and Eskimo traits.^{3,4,5}

However the incidence of RE among the Indian population is found to be very low and only 0.2%³. This case report is about the detection and management of radix entomolaris (RE) in a mandibular first molar during its root canal treatment

2. Case report

A 24-year-old male patient reported with pain in right mandibular first molar i.e. 46, since 10 days. On taking history the pain aggravated on taking cold and hot food items and upon mastication. His medical history was non-contributory. On clinical examination, 46 revealed deep distoocclusal carious lesion and was tender to occlusal percussion. Electric pulp test reveals no response. Thermal test was negative. Periodontal examination was found to be within normal limits. Intraoral periapical radiographic examination revealed deep distal caries involving the pulp space and slight widening of the periodontal ligament space around the apical area of the mesial root. Apart from this, close inspection of the radiograph also revealed the presence of an additional periodontal ligament space crossing over the distal root leading to an impression of double periodontal ligament space on the distal aspect. This led to the suspicion of additional or extra root entity (Fig 1).

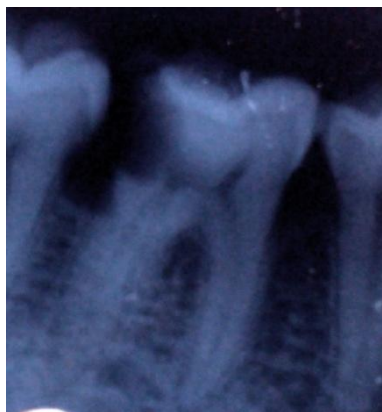


Figure 1: Preoperative radiograph of 46 depicting the additional PDL space crossing over the distal root and possibility of RE.

Based on the clinical and radiographic examination, a diagnosis of symptomatic irreversible pulpitis with acute apical periodontitis in 46 was made and the patient was suggested to undergo root canal treatment. Under local anesthesia Caries was excavated and the distal missing wall was built with Type 9 Glass Ionomer cement (GC corporation Tokyo, Japan). Root canal treatment in 46 was initiated under rubber Dam. Upon careful exploration of the pulp chamber floor, four canal orifices (2 mesial & 2 distal) were detected, confirming the presence of additional distal canal (Fig 2). The pulpal tissue remnants were extirpated from the canals using Kfile no.10 & no.15 (Dentsply Maillefer, Switzerland). Coronal flaring was accomplished with Gates Gliddendrills (Dentsply Maillefer, Switzerland). Working length was determined using an apex locator (Root ZX, Morita, Tokyo, Japan). The radiograph taken with a mesial angulation to verify the working length confirmed the presence of extra distolingual root (Fig 3).



Figure 2: Four canal orifices (2 mesial & 2 distal)



Figure 3: Working length radiograph of 46 revealing the existence of RE.

All the canals were cleaned and shaped using rotary Nickel-Titanium Hero Shaper files (Micro Mega, France) in a crown down manner and irrigated using 3% sodium hypochlorite and 2% chlorhexidine solutions. Calcium hydroxide (Prime Dent, India) was used as an intracanal medicament and access opening was sealed with Zinc oxide-eugenol cement (DPI, India). Two weeks later, when the tooth was asymptomatic, the obturation was carried out by selecting matched gutta-percha (Dentsply Maillefer, Brazil) master cones (Fig 4,5), AH Plus sealer (Dentsply De Trey, Konstanz, Germany) and lateral compaction method. Following the obturation, the access opening was filled with Zinc oxide eugenol cement (DPI, India) and patient was scheduled for follow-up visits (Fig 6).



Figure 4: Master cone radiograph of 46

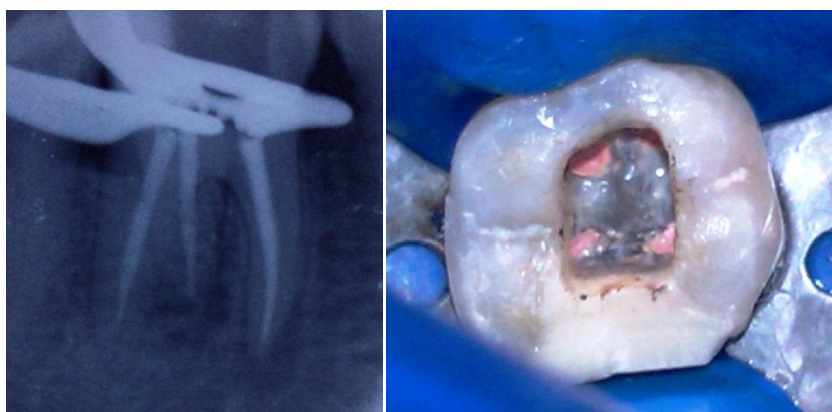


Figure 5: Radiograph showing obturation of 46, Clinical pic showing Obturation



Figure 6: Post obturation radiograph of 46 showing the outline of RE.

3. Discussion

As in this case the Radix entomolaris (RE), was detected in the preoperative radiograph itself, by the presence of an additional distolingual root. This signifies the importance of preoperative radiograph in the endodontic treatment^{2,6}. The 3-rooted mandibular first molar reported here had 1 mesial root with 2 canals and 2 distal roots with one canal each which is the same as that of the other 3-rooted mandibular first molars described previously. Studies focusing on canal morphology in mandibular first molar have assessed that the presence of 2 roots (1 mesial & 1 distal) with 3 canals (2 in mesial root and 1 in distal root) is the most common finding. Nevertheless, the presence of 2 roots (1 mesial & 1 distal) with 4 canals (2 in mesial root and 2 in distal root) is also relatively frequent, particularly with both the distal canals terminating in a single foramen. However, RE characterized by the presence of 2 distal roots, the second one being the extra distolingual root, is not very common as a morphologic variant^{1,2,3}.

In this patient, the additional fourth canal orifice led into the extra distolingual root which displayed Vertucci type I canal configuration. This is in accordance to the general finding related to the canal configuration in RE². Calbertson et al described 4 types of RE, and De Moortel et al classified REs evaluated from extracted teeth into types I–III. RE or extra distolingual root of permanent mandibular first molars is curved buccolingually and typically smaller than the distobuccal root which could be confirmed in this patient during working length determination^{3,5,7,8}.

It has been reported that RCT in mandibular first molars have a significantly lower success rate than the other teeth. Persistent infection caused by a missing canal and failure to remove all microorganisms and pulp remnants in the root canal system are some of the reasons for non-healed root canal treatment. Therefore, a better awareness of root canal anatomy is essential for improving the healing rate of root canal treatment of mandibular first molars⁶.

Intra-oral periapical radiographs may serve as an important aid in identifying RE. Apart from the awareness about the possible existence and the racial prevalence of RE, thorough inspection of pretreatment radiographs, especially those

taken from different angles aids in detection of RE. It is suggested that the radiographs were successful in over 90% of the cases while identifying additional roots⁹. Radiographic features like double periodontal ligament images or unclear view of distal root/canal indicate the possibility of RE⁶. In the present case, all the radiographs taken during the root canal procedure were clearly suggestive of RE and prevented the need for further investigations like cone-beam computed tomography and 3-dimensional reconstruction which are useful to study the morphology of RE in a noninvasive manner³. Clinically, the possibilities of detecting and managing RE can be enhanced by obtaining straight line access and modifying typical triangular shape of access preparation to a trapezoidal form. The values based on the mean inter-orifice distance between extra distolingual canal and remaining canals, as found in a study by Tu et al, may also serve as a useful guideline to locate and treat RE^{3,10}. Further, good illumination and the use of accessories like magnifying loupes, microscopes etc are also valuable in locating and managing RE¹¹.

4. Conclusion

Radix entomolaris (RE) in mandibular first molar is not a frequent finding in the Indian population. However, dental clinician should be aware of the occurrence of RE as an anatomical variant. The detection of RE and its thorough cleaning, shaping and obturation would contribute significantly towards the success of primary endodontic treatment. Further, mandibular first molars have lower success rate following root canal treatment due to factors like missed canal etc, and awareness about RE helps in the diagnosis and to better the overall prognosis for endodontic retreatment. For the above reasons, molars also have high rate of extraction and early identification of extra distolingual root will minimize complications related to exodontia like root breakage. This case report also highlights the role of radiographs alone in the early identification and endodontic management of RE.

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