CASE REPORT

Endodontic Management of Radix Entomolaris: A Report of Two Cases

Reshma Rajasekhar[1], Varsha Maria Sebastian[2], Emil S Mani[3]

Abstract

Root canal anatomy is complicated and interpretation of the variations from the norm is crucial for an optimum treatment outcome. Radix entomolaris (RE) is a common variation recorded in the mandibular molars. It is characterized by a supernumerary root located distolingually. Proper diagnosis is critical for identifying this supernumerary root and preventing misdiagnosis, which could potentially give rise to an unfavorable outcome. The objective of this article is to describe the successful management of two cases presenting with RE.

Keywords: Mandibular molar, Radix entomolaris, Root canal preparation.

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Introduction

Successful endodontic treatment outcome requires thorough chemomechanical preparation of the root canal system. Failure to identify root canals and their variations could lead to the persistence of infection giving rise to poor outcomes. Therefore, an in-depth understanding of the anatomy of root canals and their possible variations is mandatory to reduce possible errors and achieve treatment success.

Mandibular molars usually present with two roots having two mesial and one or two distal canals.[1] One of the major variations in mandibular molars is the occurrence of third root present lingually or buccally. Carabelli in 1844 was the first to report the presence of an extra third root located distolingually and termed it as "radix entomolaris" (RE).[2] This additional distolingual root was termed as RE by Bolk.[3] Sometimes, an additional third root may be discovered on the mesiobuccal side and is termed as "radix paramolaris" (RP).[4] Occurrence of RP is rare compared to RE.[5] RE is reported on mandibular first, second, and the third molar, with the least frequent occurrence on mandibular second molar.[6,7]

Radix entomolaris is mostly shorter and curved compared to mesial and distal roots and can appear separately or fused with the remaining root which could add to increased difficulty in diagnosis and treatment.[8]

In 1990, Carlsen and Alexandersen divided RE into four categories based on the position of its cervical part into four types such as A, B, C, and AC. Types A and B refer to cervical parts located distally with two normal distal roots and one normal distal root respectively. Type C refers to the cervical part located mesially, while type AC refers to the cervical part located between mesial and distal root.

De Moor et al. in 2004 divided RE according to the curvature of the root/root canal:[9]

- Type 1: the presence of a straight single root/root canal.
- Type 2: the presence of a curved coronal third that appears straighter in the middle as well as in the apical third.
- Type 3: curvature in the coronal third with curve oriented buccally beginning in the middle or apical third.

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Song et al. in 2010 classified two additional variations of RE:[10]

- Small type: length of RE rootless than half the length of the distobuccal root.
- Conical type: length of RE rootless than small type with no root canal within the root.

The prevalence of RE has both genetic as well as ethnic predilection. RE root is present in <5% population of Eurasian, Indians, White Caucasians, and Africans. It is present with a prevalence of 5–30% in races such as Native Americans, Eskimos, and Chinese.[11–14] Despite the reported variations in prevalence of RE, its diagnosis and treatment are important for a successful treatment. This article presents case series on the diagnosis and management of RE present in mandibular molars.

Case Descriptions

Case 1

A 39-year-old female patient was referred to our outpatient department for endodontic management of the lower first molar (#46). The patient had a history of intermittent pain 5 months back and aggravated on cold and hot stimuli. On clinical examination, there was a fixed partial denture in relation to #46 and #45. The patient had no tenderness to palpation and vertical percussion. On radiographic examination, diffuse radiolucency in relation to distal root was seen (Fig. 1A). Based on findings, a diagnosis of asymptomatic apical periodontitis was formulated.

The fixed partial denture was removed in relation to #46 and #45. Local anesthesia was administered using 2% lignocaine in 1:1,00,000 epinephrine. Endo access bur no. 2 (Dentsply, Maillefer) was used for access cavity preparation and the distal canal orifice was located which was slightly off-center buccally. On modifying the access cavity by using Endo-Z bur (Dentsply, Maillefer), a second distal, mesiobuccal, and mesiolingual orifice was located. #10 k-file (Dentsply, Maillefer) was used for initial canal negotiation and apex locator (J Morita Root ZX Mini, Tokyo, Japan) as well as periapical radiographs were used for working length assessment (Fig. 1B). Cleaning and shaping procedures were done till Protaper Gold till F2 (Dentsply, Maillefer) and irrigation using 3% sodium hypochlorite (Parcan, Septodont, India) followed by 17% ethylenediaminetetraacetic acid (EDTA). Intracanal medication with calcium hydroxide (Metapex, Metabiomed) was placed into the canals with lentulospiral followed by temporary restoration with Cavit (3M ESPE, Germany).

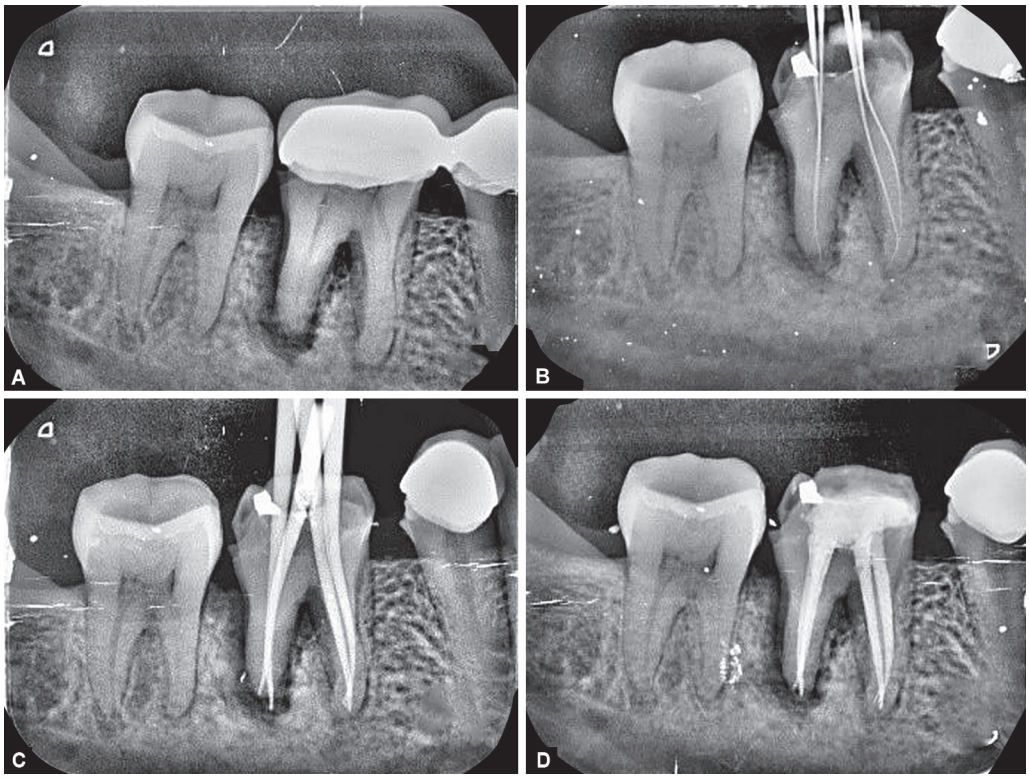
The patient was recalled after 2 weeks and was asymptomatic. The calcium hydroxide medication within the canals was removed using #30 H-file and irrigation with 3% sodium hypochlorite. Final irrigation was done using 2% chlorhexidine (Asep-RC, Anabond, India) and after drying the canals with paper points, master cones were selected (Fig. 1C) followed by obturation using AH-Plus sealer (Dentsply, Maillefer) and gutta-percha. The access cavity was sealed using composite restoration (Fig. 1D).

Case 2

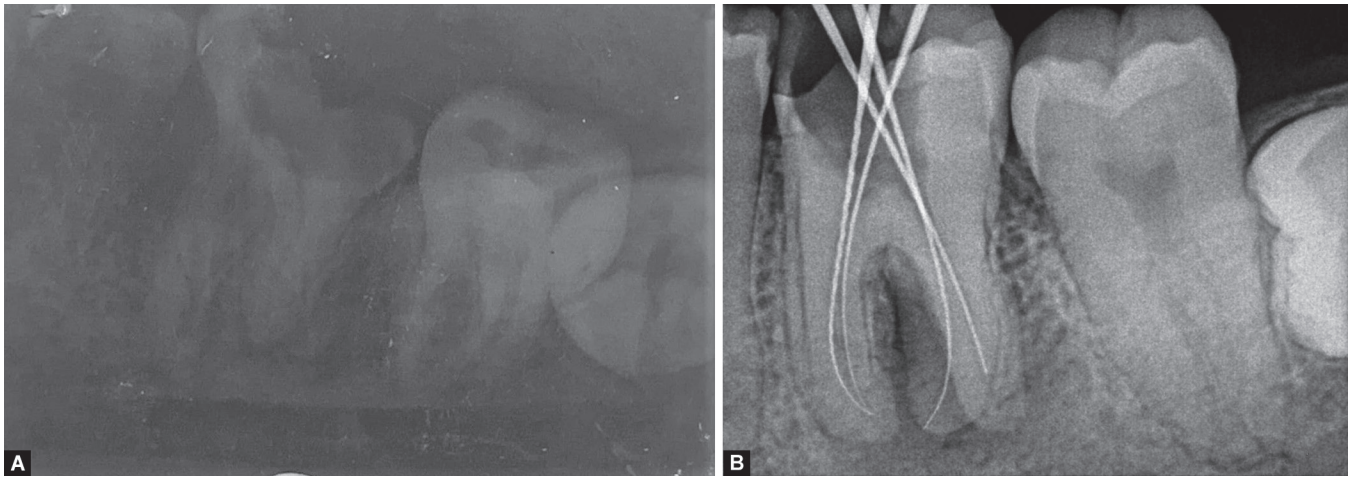
A 29-year-old male patient was referred to the outpatient department with a prime complaint of pain in relation to the lower left first molar (#36). The patient had a history of pain in chewing and intermittent pain for the last 1 week. On examination, deep caries was present occlusally on #36, tenderness on palpation, and vertical percussion were present. Electric pulp testing showed delayed reading and thermal test showed no response. Radiographic examination indicated periapical radiolucency in relation to distal root and a second distal root was seen (Fig. 2A). A diagnosis of symptomatic apical periodontitis was formulated and endodontic treatment was initiated.

Local anesthesia was administered using 2% lignocaine with 1:1,00,000 epinephrine. Endo access bur no. 2 (Dentsply, Maillefer) was used for access cavity preparation. Both mesial and distal canal orifices were identified initially. On modifying the access cavity, using Endo-Z bur (Dentsply, Maillefer) second distal canal was located lingual to the first distal canal. Canal negotiation was done using #10 k-file (Dentsply, Maillefer) and working length assessment was done with the help of apex locator (J Morita Root ZX Mini, Tokyo, Japan) and periapical radiographs (Fig. 2B). Cleaning and shaping procedures were done using Hyflex CM (Coltene Whaledent, USA) till 25/0.04 for mesial and distal canals with irrigation using 3% sodium hypochlorite (Parcan, Septodont, India) and 17% EDTA in between. Intracanal medication using calcium hydroxide (Metapex, Metabiomed) was placed into the canals followed by temporary restoration with Cavit (3M ESPE, Germany).

The patient was recalled 1 week later and was asymptomatic. Under rubber dam isolation, calcium hydroxide removal was done by irrigation with 3% sodium hypochlorite and H-file #30. Final irrigation was done using 2% chlorhexidine (Asep-RC, Anabond, India). After drying the canal spaces using paper points, master cones were selected followed by obturation with gutta-percha and Sealapex sealer (Kerr, Romula, Michigan, USA) (Fig. 3). Post endodontic restoration was done with composite resin restoration.



Figs 1A to D: (A) Preoperative; (B) Working length; (C) Master cone selection; (D) Obturation



Figs 2A and B: (A) Preoperative; (B) Master cone selection

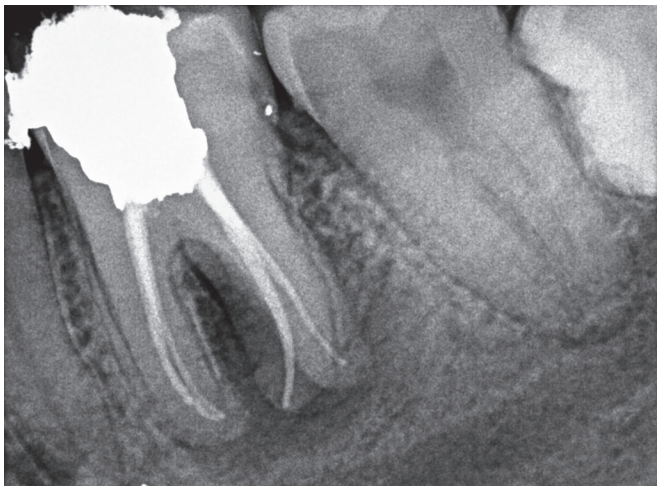


Fig. 3: Obturation

Discussion

Identification of variations in root canal morphology plays an important role in successful endodontic treatment. Possible variations in root canal morphology need to be understood properly in order to prevent treatment failures. RE is a major variation identified in the mandibular first molar. Without proper care taken during diagnosis, visual examination, and treatment, chances of missing this variation are high. Therefore, RE can be identified by a combination of clinical, radiographic, and other imaging modalities especially cone-beam computed tomography as well as by using different endodontic accessories.

On clinical examination, factors, such as the presence of an extra cusp, prominent distolingual lobe, bulbous crown, cervical convexity, complex external contour of the furcation hints at the possible presence of RE. Radiographically, the presence of a double periodontal ligament image or an obscure view of the distal root/root canal also provides clue to the presence of RE. For this, a thorough radiographic examination is required. Routine straight radiographs cause overlapping of distal roots making the identification of entomolaris root difficult.[4] Therefore, a preoperative radiograph taken using the tube shift technique (25–30°) assists the clinician in finding the supernumerary root and also helps in knowing whether it is located buccally or lingually.[15] It has been established that the accuracy of diagnosing mandibular molars with three roots is nearly 90%, even by using panoramic radiographs.[16]

During the treatment procedures, the use of adjunctive aids, such as dental loupes, dental operating microscope, and intraoral cameras are useful in canal orifice identification. Methods, such as inspecting the dentinal map, identification of canal bleeding points, using instruments, such as DG-16, pathfinder, ultrasonic tips, and micro-opener, staining with 1% methylene blue in the pulp chamber floor, champagne bubble test helps in identifying the missed canal.[4,15]

The RE orifice is located more disto/mesiolingually from the main canal in the distal root. Tu et al. estimated the distance between distolingual canal orifice with distobuccal, mesiobuccal, and mesiolingual canal orifices as 2.7, 4.4, and 3.5 mm, respectively.[6] Duman et al. assessed the distance between distolingual canal and mesiobuccal, distobuccal and mesiolingual canal orifices to be 4.30 ± 0.75, 1.63 ± 0.66, and 2.60 ± 0.68 mm, respectively.[17]

During access cavity preparation the outline has to be modified accordingly based on the RE orifice identification from triangular to more rectangular/trapezoidal form in order to obtain straight-line access for instrumentation and obturation.

Entomolaris root is characterized by moderate to sharp curvature especially in buccolingual direction which causes technical difficulties during cleaning and shaping and has higher chances for instrument separation, furcal or strip perforation, vertical root fracture, canal straightening, ledge formation, loss of working length, root canal transportation.[15] Therefore, during endodontic procedure special care should be taken during orifice enlargement and cleaning and shaping. Use of 10 k-file or smaller files should be preferred during initial canal negotiation and flexible nickel-titanium rotary instruments with less taper must be used during chemomechanical preparation to prevent procedural errors.

Conclusion

Thorough knowledge regarding the internal anatomy of the root canal system and its most common variations could assist clinicians in preventing misdiagnosis and ensure a successful treatment outcome. Radix entomolaris is characterized by a

supernumerary distolingual root which usually appears short and has distinct curvature in most cases. Therefore, iatrogenic errors like misdiagnosis of this variation, technical difficulties during cleaning and shaping, such as ledge formation, perforation, instrument separation are high. Hence, meticulous care should be taken from diagnosis till the completion of the treatment procedure.

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