



Endodontic management of Radix entomolaris: Two case reports

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ABSTRACT

A major anatomical variant of the two-rooted mandibular first molars is a tooth with an additional root located lingually or buccally. Presence of an extra lingual root distally in mandibular molars is called Radix entomolaris (RE). Preliminary diagnosis and understanding of this unusual root and its canal morphology can contribute to the successful outcome of root canal treatment. This case report discusses the endodontic treatment of two mandibular first molars with radix entomolaris (RE).

Keywords: Distolingual root, radix entomolaris, mandibular first molar, anatomical variations.

I. INTRODUCTION

The main objective of root canal treatment is the prevention or healing of endodontic pathology by thorough mechanical and chemical cleaning and shaping of root canals before obturation. As stated by Barrett, "of all the phases of anatomic study in the human system, one of the most complex is that of pulp cavity morphology" (1). An awareness of the presence of unusual root canal morphology and possible variations can thus contribute to the successful outcome of root canal treatment. Mandibular first molars mostly are two rooted with two mesial and one distal canal, a second distal canal may also be present. Investigators have reported variations not only in the number of canals but in the number of roots also (2). An additional root located in the distolingual position often referred to as radix entomolaris (RE) was first mentioned in literature by Carabelli (3), whereas an additional root in the mesiobuccal side is termed as radix paramolaris (RP) (4). Literature suggests the presence of RE can be found in European populations mainly on first and less frequently on the second and third mandibular molar. The prevalence of RE in mandibular first molars in Indian population is reported to be less than 5% (5).

This article highlights the cases on clinical approach for identification, detection and endodontic management of two RE.

CASE REPORT 1

A 24 year old male patient reported to the Department of Conservative Dentistry and Endodontics, Government Dental College, Thiruvananthapuram with a chief complaint of pain in relation to left lower back tooth for past 2 weeks. He had intermittent throbbing pain which disturbed his sleep. The patient's medical and allergic history was non-contributory. Clinical examination revealed that tooth 36 had deep caries which was tender on percussion. The periodontal status was within normal limits. The tooth gave negative response to cold test and electric pulp test. Radiographic examination revealed radiolucency involving dentin extending to pulp with periodontal ligament widening and showed an unusual anatomy of additional distolingual root (Fig 1a,b). A diagnosis of symptomatic apical periodontitis was made and root canal treatment was advised.

Local anesthesia (2% lidocaine hydrochloride with 1:80,000 epinephrine) (Lignospan Special, Septodont, Raigad, India) was administered, and a dental dam was placed. All procedures were performed under $\times 3.2$ magnification loupe (Admetec, Israel). Access opening was done using endo access bur #1 and endo- z tapered safe end bur. After refining the access cavity, 4 canal orifices were detected: mesiobuccal (MB), mesiolingual (ML), distobuccal (DB) and distolingual (DL) using an endodontic explorer (DG-16 Endodontic Explorer, Ash Instruments, Dentsply, Gloucester, United Kingdom) (Fig 1c). The root canals were explored with a K-file ISO 8 followed by 10 and 15. #15 size K-files (Mani, Tochigi, Japan) were used to determine working length using electronic apex locator (Root ZX Mini, J Morita, Kyoto, Japan) which was then confirmed using radiographs (Fig 1d).

Biomechanical preparation of all canals were completed using rotary nickel-titanium files (Neoendo and Orikam Healthcare India Private Limited) till 25/04 under abundant irrigation with 5.25% sodium hypochlorite and normal saline. The mesial canals were confluent; mesiolingual canal was first prepared followed by mesiobuccal canal.



At the second visit, Irrigant activation of the canals were done using PATS vario (Pro Agitator Tip System). Master cone radiograph was taken (Fig 1e), and obturation was done using gutta-percha cones and AH Plus sealer (Dentsply, York, PA,

USA) (Fig 1f). Finally, the chamber was sealed with resin modified glass ionomer and post endodontic restoration was done using composite resin (Palfique LX5, Tokuyama dental).



Fig 1a

Fig 1b



Fig 1c

Fig 1d



Fig 1e

Fig 1f

CASE REPORT 2

A 41 year old female patient reported to the Department of Conservative dentistry and Endodontics, Government dental college, Thiruvananthapuram with a chief complaint of pain

in lower right back tooth. Her medical history was non-contributory. Clinically, temporary filling was seen in tooth 46 and was tender on percussion. Cold test and electric pulp testing gave an exaggerated response and the pain persisted after removal of



stimulus. Periodontal status was within normal limits. Radiographic examination of the tooth showed coronal radiopacity indicating the temporary restoration up to the pulp space with periapical radiolucency in relation to #46. Angulated radiographs showed an unusual anatomy of additional distolingual root (Fig 2a,b). A diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis was made and root canal treatment was advised.

Local anesthesia (2% lidocaine hydrochloride with 1:80,000 epinephrine) (Lignospan Special, Septodont, Raigad, India) was administered, and a dental dam was placed. All procedures were performed under $\times 3.2$ magnification loupe (Admetec, Israel). Temporary restoration was then removed and access opening was done using endo access bur #1 and endo-z tapered safe end bur. After refining the access cavity, 4 canal orifices were located: mesiobuccal (MB), mesiolingual (ML), distobuccal (DB) and distolingual (DL) using an endodontic explorer (DG-16 Endodontic Explorer, Ash Instruments, Dentsply, Gloucester, United Kingdom). The root

canals were explored with a K-file ISO 8 followed by 10 and 15. #15 size K-files (Mani, Tochigi, Japan) were used to determine working length using electronic apex locator (Root ZX Mini, J Morita, Kyoto, Japan) which was then confirmed using radiographs (Fig 2c).

All the canals were prepared upto 4% 25 with rotary nickel-titanium files (Neoendo and Orikam Healthcare India Private Limited) under copious irrigation with 5.25% sodium hypochlorite and normal saline. The mesial canals were confluent; mesiolingual canal was first prepared followed by mesiobuccal canal.

At the second visit, irrigant activation of the canals were done using PATS vario (Pro Agitator Tip System). Master cone radiograph was taken (Fig 2d), and obturation was done using gutta-percha cones and AH Plus sealer (Dentsply, York, PA, USA) using the lateral compaction technique. Finally, the chamber was sealed with resin modified glass ionomer and post endodontic restoration was done using composite resin (Palfique LX5, Tokuyama dental). (Fig 2e).

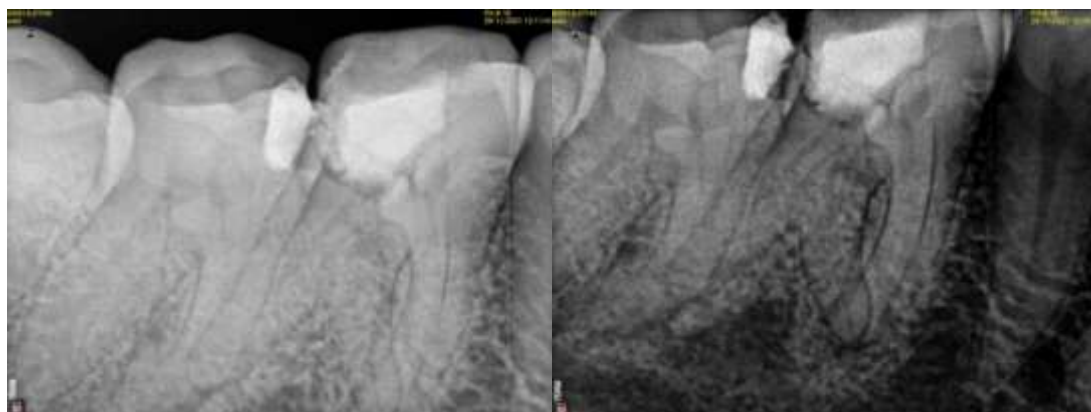


Fig 2a

Fig 2b



Fig 2c

Fig 2d

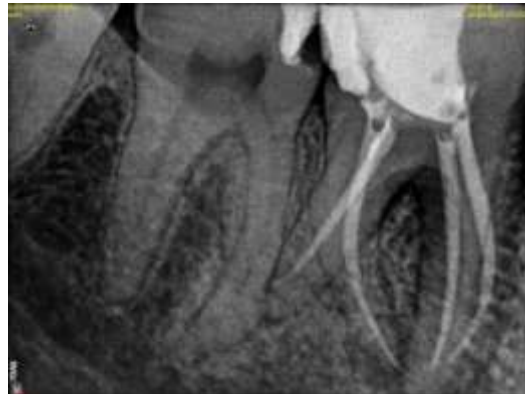


Fig 2e

II. DISCUSSION

The RE is considered to be a normal morphological variant rather than an abnormality in certain populations due to its high frequency (6). According to Calberson et al (7), the etiology behind the cause of RE is still not known but it could be related to external factors during odontogenesis or may be due to atavistic gene (8). RE is usually found distolingually with its coronal third completely or partially fixed to the distal root, located in the same plane and is overlapped by the distobuccal root in the buccolingual plane which gives superimposition of both the roots, thus tending to give inaccurate diagnosis. A thorough radiographic interpretation is necessary to identify the RE to rule out the outline of the distobuccal root (9). To reveal the RE, a second radiograph should be taken from a more mesial or distal angle (30°) (10). Morphologically, it usually appears smaller and more curved than the distobuccal or mesial root. This suggests that dentists must pay special attention when considering root canal treatment and/or extraction for a molar with RE.

Classification: Carlsen & Alexandersen (1990) classified radix entomolaris (RE) into four different types based on the location of its cervical part:

Type A: the RE is located lingually to the distal root complex which has two cone-shaped macrostructures.

Type B: the RE is located lingually to the distal root complex which has one cone-shaped macrostructure.

Type C: the RE is located lingually to the mesial root complex.

Type AC: the RE is located lingually between the mesial and distal root complexes (11).

De Moor et al. (2004) classified RE based on the curvature of the root or root canal: Type 1: A straight root or root canal Type 2: A curved coronal third which becomes straighter in the middle and

apical third Type 3: An initial curve in the coronal third with a second buccally oriented curve which begins in the middle or apical third (9).

Song et al. (2010) further added two more newly defined variants of RE: Small type: Length shorter than half of the length of the distobuccal root Conical type: Smaller than the small type and having no root canal within it (9).

Modification of conventional triangular access to rectangular or trapezoidal outline form assists in locating the orifice of RE. As RE exhibits greatest degrees of curvature among other roots of a mandibular molar, canal preflaring and creation of glide path with manual root canal exploration with small files is suggested to overcome procedural errors such as instrument fracture, ledging and transportation. (12)

III. CONCLUSION

Operator experience and meticulous knowledge about the anatomic variants of tooth plays a significant role in the location and negotiation of extra canals. Failure to identify and treat Radix entomolaris can significantly affect the outcome of endodontic treatment. Preoperative radiographs with proper angulation and their correct interpretation are important to prevent any lapse in the diagnosis of RE.

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