*https://doi.org/ 10.48047/AFJBS.6.5.2024. 9494-9504*

African Journal of Biological Sciences

# A case report on management of Radix distolingualis.

**Contributors' details:**

1. Ramu Shobhana, M.D.S, Senior Lecturer,
Department of Conservative Dentistry and Endodontics,
Sree Balaji Dental College & Hospital,
Bharath Institute of Higher Education & Research,
Pallikaranai, Chennai- 600100, Tamilnadu state, India.
2. Suresh Mitthra, M.D.S., Research Professor,
Department of Conservative Dentistry and Endodontics,
SRM Kattankulathur Dental College & Hospital,
SRM Institute of Science and Technology,
SRM Nagar, Potheri - 603203,Tamilnadu state, India.
3. Rajasekar Parthasarathy, M.D.S, Senior Lecturer,
Department of Conservative Dentistry and Endodontics,
Sree Balaji Dental College & Hospital,
Bharath Institute of Higher Education & Research,
Pallikaranai, Chennai- 600100, Tamilnadu state, India.
4. Savitha Lakshmi Raghavan, M.D.S., Senior Lecturer,
Department of Oral and Maxillofacial Surgery,
Sree Balaji Dental College & Hospital,
Bharath Institute of Higher Education & Research,
Pallikaranai, Chennai- 600100, Tamilnadu state, India.
5. Lakshmi Narayanan, B.D.S, Postgraduate student,
Department of Conservative Dentistry and Endodontics,
Sree Balaji Dental College & Hospital,
Bharath Institute of Higher Education & Research,
Pallikaranai, Chennai- 600100, Tamilnadu state, India.

**Corresponding author:** Ramu Shobhana, M.D.S, Senior Lecturer

**Corresponding address:**
Department of Conservative Dentistry and Endodontics,
Sree Balaji Dental College & Hospital,
Bharath Institute of Higher Education & Research,
Pallikaranai, Chennai- 600100, Tamilnadu state, India.

**Phone number:**8610017138

**Email address:** drshobhanaramuendo@gmail.com

Article History
Volume 6, Issue 5, 2024
Received: 15 May 2024
Accepted: 02 Jun 2024
doi: ***10.48047/AFJBS.6.5.2024. 9494-9504***

ABSTRACT

The number of canals, as well as the existence and form of roots, are most variable in mandibular first molars. Most first mandibular molars have a single mesial and distal root, but occasionally, a mandibular molar termed as a Radix entomolaris (RE) will show evidence of an additional lingual root located distally. To ensure successful treatment outcomes, it is essential to diagnose, identify and treat these variations with a comprehensive understanding of root and root canal architecture and configurations. This case report details the endodontic treatment of a mandibular first molar exhibiting RE.

Keywords:

Radix entomolaris, Mandibular molar, Distolingualis root, Anatomical variation, Endodontic treatment.

## INTRODUCTION

The main objective of endodontic treatment is to completely remove bacteria from the root canal system and ensure it remains free from future infections. This involves biomechanically cleaning the root canal anatomy and then sealing it hermetically with obturating material. To achieve successful endodontic treatment, clinicians must possess a comprehensive understanding of root canal anatomy and recognize potential anatomical complexities. These variations including additional canals, extra roots, fins, webs and isthmuses can present significant challenges during the procedure[1].

In nearly all cases of mandibular first molars, there is one mesial and one distal root, typically containing two mesial canals and one distal canal[2,3]. Three roots, one of which is located lingually, are a significant variation in the mandibular first molar. Carabelli initially identified this as radix entomolaris (RE)[4]. Although the exact

cause of this root formation is unknown, factors that are genetic or acquired, such as those connected to tooth development, may have an impact on it[4].

Radix entomolaris can be found in the mandibular first, second and third molars with the second molar being the least likely to exhibit this feature. It is rare in white Caucasian, African, Eurasian and Indian populations occurring in less than 5% of individuals. However, it is more common among Mongoloid, Eskimo and Native American populations, where its prevalence ranges from 5% to over 30% [5-7].

Radiographic techniques are frequently employed to offer an initial diagnostic for these alterations. Radiographic imaging from various angles can unveil the fundamental structure of a tooth, aiding in the detection of any anomalous anatomy, such as supernumerary canals or roots[8].

The existence of a second root can lead to various complications during endodontic therapy, including undetected canals, instrument breakage due to sharp curvatures, and irregular canal shaping and cleaning. Therefore, accurate clinical and radiographic diagnostic techniques, along with careful canal preparation are essential. The accompanying case studies outline the endodontic management of mandibular first molars featuring radix entomolaris, along with practical clinical recommendations for optimal treatment.

## CASE REPORT

### Case 1:

A 37-year-old female patient reported with a chief complaint of intense pain localized to her right mandibular molar region over the past four days. The pain was intermittent and intensified while eating cold food. Upon examination, the tooth revealed an occlusal amalgam restoration that was sensitive to pressure.

During the evaluation of a mandibular first molar on a diagnostic radiograph (Figure 1A), an additional root and a restoration proximal to the pulp were identified. The tooth exhibited symptomatic apical periodontitis upon diagnosis. Upon securing informed consent from the patient, the commencement of endodontic therapy was initiated.

After administering a local anaesthetic solution containing 2% lidocaine with 1:100,000 epinephrine, rubber dam isolation was promptly set up. The access cavity was meticulously prepared using a round, safe-ended tapered fissure bur, exposing two mesial canal orifices and a single distal orifice. The radix entomolaris opening was identified along the lingual aspect of the distal root canal orifice (Figure 1B). The working lengths were accurately determined electronically with apex locator, followed by radiographic verification of these measurements (Figure 1C). K-files were employed to establish glide paths for the rotary instruments within the root canals.

As part of the cleaning and shaping protocol, the root canals received thorough irrigation with a significant volume of 3% sodium hypochlorite solution (I-Dent, Rohini, Delhi, India). Subsequently, the canals were rinsed with 17% EDTA. All canals were enlarged using F2 ProTaper files (Maillefer, Dentsply), accompanied by saline irrigation. Following enlargement, gutta-percha master cones of appropriate sizes for each of the four canals were selected, inserted to the working length and confirmed radiographically (Figure 1D). After using paper points to dry the canals, the gutta-percha cone of choice was put inside the canal and sealed with AH Plus sealer (Dentsply De Trey, Germany). Obturation was followed by postobturation restoration. To determine the quality of the obturation, final radiographs were obtained (Figure 1E).

**Case 2:**

A 29-year-old man visited the outpatient department, complaining of difficulty chewing with his lower left posterior teeth over the past few days. Clinical examination revealed distoproximal caries and percussion sensitivity in the lower left first molar (#36). A preoperative radiograph showed a radiolucent carious lesion affecting the pulp of tooth #36, as well as the presence of mesial, distal, and an additional root (Figure 2A). With informed consent obtained, endodontic treatment was initiated, diagnosing the tooth with symptomatic apical periodontitis.

Following the administration of a local anesthetic solution containing 2% lidocaine with 1:100,000 epinephrine, rubber dam isolation was established. For preparing the access cavity, a round, safe-end tapered fissure bur was employed. After completely removing the pulp chamber roof, two mesial canal orifices and a single distal orifice were discerned. Following the identification of the RE orifice positioned on the lingual aspect of the distal root canal orifice (Figure 2B), the working length was determined using an apex finder. Subsequently, radiographic confirmation of the apex locator readings was obtained (Figure 2C). Glide paths for the rotary instruments within the root canals were established using K-files. Throughout the cleaning and shaping procedure, the root canals were thoroughly irrigated with a substantial volume of 3% sodium hypochlorite solution (I-Dent, Rohini, Delhi, India).

Following that, 17% EDTA was used to rinse the canals. Every canal was prepared till F2 ProTaper files (Maillifer, Dentsply). Next, saline was used to flush the canals. The working length of the four canals was determined by radiography, and the similarly sized gutta-percha master cones were selected and implanted to that length (Figure 2D). After using paper points to dry the canals, the gutta-percha cone of choice was put inside the canal and sealed with AH Plus sealer (Dentsply De Trey, Germany).

Obturation was followed by postobturation restoration. To determine the quality of the obturation, final radiographs were obtained (Figure 2E).

## DISUSSION

The Radix Entomolaris (RE) often goes undiagnosed due to the distal root overlapping in preoperative radiographs, which can lead to inaccurate diagnoses. Therefore, a thorough examination of the preoperative radiograph is essential, paying close attention to distinctive indicators like blurred or obscured outlines of the distal root contour or root canal, which could indicate the presence of a concealed RE. To detect RE, it is recommended to take a second radiograph at a more mesial or distal angle (approximately 30°). The typical placement of the RE orifice is generally situated in the distolingual to mesiolingual direction compared to the primary distal root canal(s). Expanding the triangular access cavity towards the distolingual side alters its configuration to a shape that is more rectangular or trapezoidal in nature. This approach ensures an accurate diagnosis in most cases[9, 10].

The Radix Entomolaris (RE) may exhibit diverse lengths, ranging from a minor extension to a complete root, either on one side or both sides of the tooth. Despite its typically small and conical shape, the root can still contain pulpal tissue [11, 12].

There are various Classification of RE, described below:

(i) Based on Cervical Placement of RE[11]

1. Type A: Position: Lingual to the distal root complex.

   Root Structure: Comprises cone-shaped macrostructures.

2. Type B: Position: Lingual to the distal root complex.

   Root Structure: Consists of two cone-shaped macrostructures.

3. Type C: Position: Lingual to the mesial root complex.

4. Type AC: Position: Lingual between the mesial and distal root complexes.

(ii) De Moor's Alternative Classification (Curvature-Based)[8]

1. Type 1: Straight root or root canal.

2. Type 2: Bent in the coronal third, while the middle and apical thirds exhibit a more linear course.

3. Type 3: The cervical portion of the root displays the initial bend, succeeded by a second bend oriented towards the buccal aspect in the middle or apical portion.

A study investigating the morphology of Radix Entomolaris revealed that the canals exhibited curvature in the majority of cases. To minimize procedural errors, it is essential to establish straight-line access and prepare a gliding path after the initial exploration of the root canal with small files (size 10K) and determination of the working length and curvature through radiographs[8].

One study reported an incidence of 6% for Radix Entomolaris (RE) among the Saudi population, while another study found that 27% of teeth examined had RE[13, 14]. The occurrence of RE in the Indian population varies slightly across different studies, with reported percentages ranging from 5.97% to 13.3%[13, 15, 16]. Furthermore, there is a discussion on whether RE occurs more commonly on the right or left side, with conflicting claims from different authors[17]. Additionally, bilateral occurrence, where both mandibular first molars have three roots, has been reported in a significant percentage of cases, ranging from 50% to 69%[16].

These findings highlight the variability in the prevalence and distribution of RE among different populations and emphasize the importance of thorough anatomical knowledge for dental practitioners.

## CONCLUSION

Absolutely, early detection of RE is essential to ensure successful endodontic treatment and prevent complications such as missed canals. Preoperative periapical radiographs captured from distinct horizontal angles can be instrumental in discerning supplementary root structures and gaining insights into their curvature and configuration.

In addition to radiographs, clinical diagnosis and the use of diagnostic instruments are crucial. However, it's important to apply these tools sparingly to avoid unnecessary trauma to the tooth and surrounding tissues. Endodontic skills play a vital role in navigating complex root canal systems like those with RE, and a cautious approach can help ensure thorough treatment while minimizing risks.

**CONFLICT OF INTEREST:** Nil

**SOURCE OF FUNDING:** Nil

**ETHICAL CLEARANCE:** Not required for case report

## REFERENCES

1. Pawar AM, Kokate SR, Hegde VR. Contemporary approach in successful endodontic intervention in radix entomolaris. World J Dent. 2013 Jul;4(3):208-13.
2. affSinha DJ, Mahesh S, Jaiswal N, Vasudeva A. Radix Entomolaris: A Report of Two Cases. Bull Tokyo Dent Coll. 2016;57(4):253-258.

3. Thomas BJ, Nishad A, Paulaian B, Sam JE. Case reports and clinical guidelines for managing radix entomolaris. J Pharm Bioallied Sci. 2016 Oct;8(Suppl 1):S160-S163.

4. Arunajatesan S, Wesly S, Ramachandran T, Newbegin SG. Radix: The third Root In Mandibular Molars-A Case Series. Indian Journal of Public Health Research & Development. 2019 Nov 1;10(11):3075-9.

5. Subbiya A, Mitthra S, Banu S, Malarvizhi D. Radix Distolingualis: A Case Report, Review and Endodontic Treatment Guidelines. J Clin Diagn Res. 2017 Jun;11(6):ZD10-ZD13.

6. Parashar A, Gupta S, Zingade A, Parashar S. The radix entomolaris and paramolaris: A review and case reports with clinical implications. J Interdiscipl Med Dent Sci. 2015;3(1):161-6.

7. Van der Vyver PJ, Vorster M. Radix Entomolaris: Literature review and case report. South African Dental Journal. 2017 Apr 3;72(3):113-7.

8. Kuzekanani M, Walsh LJ, Haghani J, Kermani AZ. Radix Entomolaris in the Mandibular Molar Teeth of an Iranian Population. Int J Dent. 2017;2017:9364963.

9. Rajaram Naik DR, Narayanan A. Radix entomolaris: A case series. IJADS 2021; 7(3): 445-449

10. Sarangi P, Uppin VM. Mandibular first molar with a radix entomolaris: An endodontic dilemma. Journal of Dentistry (Tehran, Iran). 2014 Jan;11(1):118.

11. Nagaveni, NB; Umashankara, KV1. Radix entomolaris and paramolaris in children: A review of the literature. Journal of Indian Society of Pedodontics and Preventive Dentistry. Apr–Jun 2012, 30(2): 94-102,.

12. Aung NM, Myint KK. Three-rooted permanent mandibular first molars: a meta-analysis of prevalence. International Journal of Dentistry. 2022 Mar 28;202; 2022: 9411076: 1-30..

13. Mukhaimer R, Azizi Z. Incidence of Radix Entomolaris in Mandibular First Molars in Palestinian Population: A Clinical Investigation. Int Sch Res Notices. 2014 Nov 24;2014:405601: 1-5.

14. Gang Y, Ling Y, Dingming H. Clinical investigation of radix entomolaris in mandibular first molars. West China Journal of Stomatology. 2012 Jun 1;30(3):259-261.

15. Karale R, Chikkamallaiah C, Hegde J, Aswathanarayana S, Santhosh L, Bashetty K, Susheela SR, Panchajanya S. The prevalence of bilateral three-rooted mandibular first molar in Indian population. Iranian endodontic journal. 2013;8(3):99.

**16.** Chandra SS, Chandra S, Shankar P, Indira R. Prevalence of radix entomolaris in mandibular permanent first molars: a study in a South Indian population. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology. 2011 Sep 1;112(3):e77-82.

**17.** Gupta A, Duhan J, Wadhwa J. Prevalence of Three Rooted Permanent Mandibular First Molars in Haryana (North Indian) Population. Contemp Clin Dent. 2017 Jan-Mar;8(1):38-41.

**FIGURES**

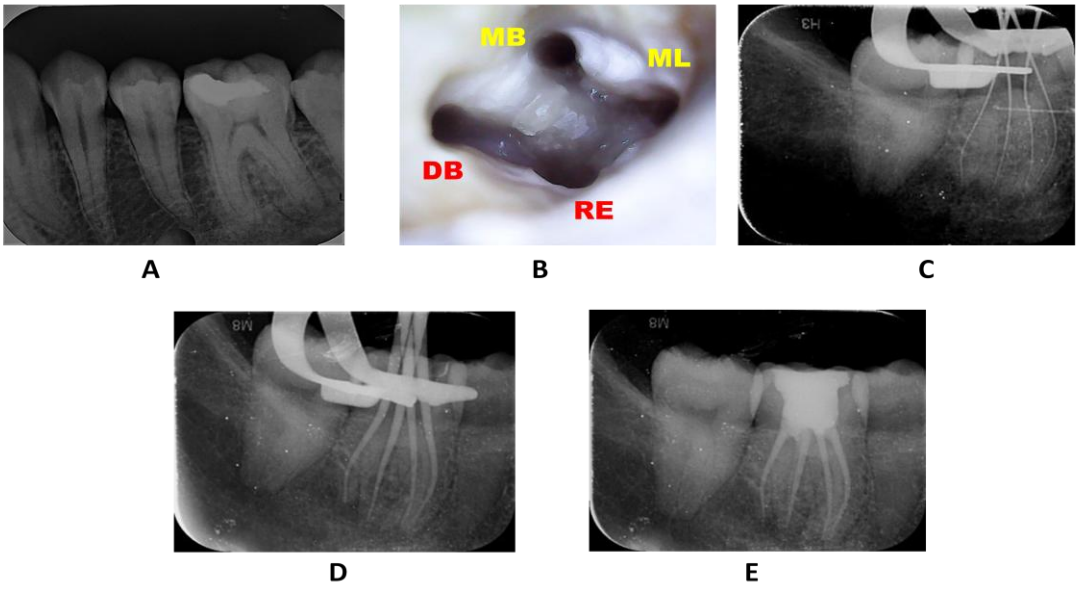


**Figure 1:** A- Preoperative radiograph, B- Intraoral photograph, C- Working length determination, D- Master cone radiograph, E- Obturation. MB- Mesiobuccal canal, ML- Mesiolingual canal, DB- Distobuccal canal, RE- radix entomolaris

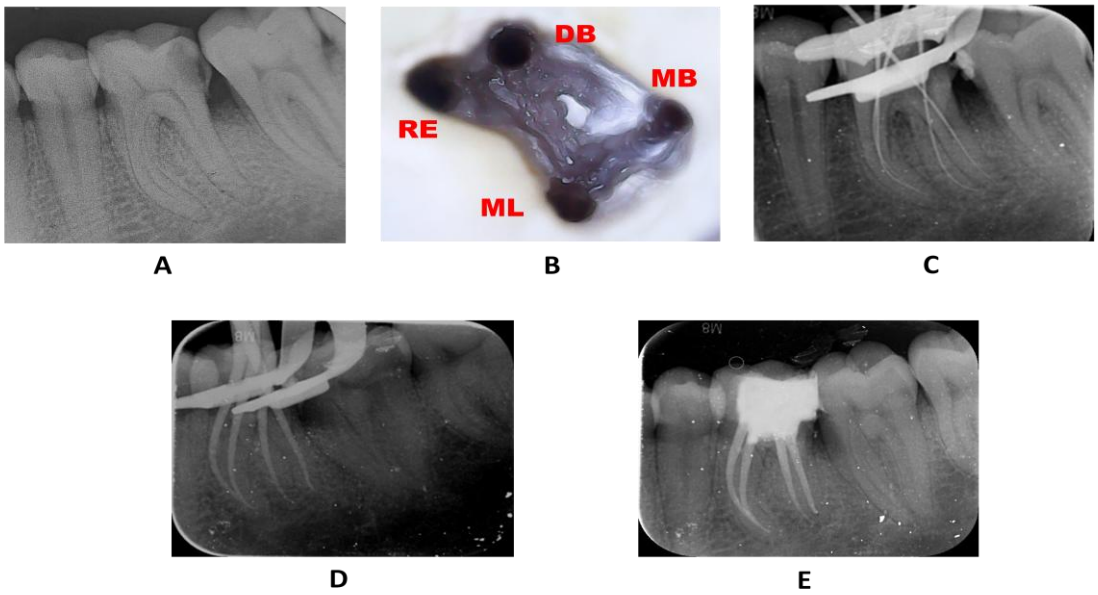


**Figure 2:** A- Preoperative radiograph, B- Intraoral photograph, C- Working length determination, D- Master cone radiograph, E- Obturation. MB- Mesiobuccal canal, ML- Mesiolingual canal, DB- Distobuccal canal, RE- radix entomolaris