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# Bilateral Radix Entomolaris in Mandibular First Molars: Diagnostic Considerations and Endodontic Management: A Case Report

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**Abstract: Radix entomolaris (RE) is a rare anatomical variation characterized by the presence of an additional distolingual root in mandibular molars. Failure to identify such root morphology may lead to missed canals and endodontic treatment failure. Bilateral occurrence of radix entomolaris in mandibular first molars is uncommon and poses a significant diagnostic and therapeutic challenge for clinicians. This case reprt highlights the importance of thorough radiographic assessment and a comprehensive understanding of root canal anatomy for the successful management of mandibular first molars exhibiting radix entomolaris.**

***Keywords****: Radix Entomolaris; Mandibular First Molar; Anatomical Variation; Extra Root; Root Canal Treatment; Bilateral Occurrence.*

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## I. INTRODUCTION

A thorough understanding of root canal anatomy and its variation is essential for success of endodontic treatment. Failure to identify additional roots or canals may result in inadequate debridement, persistent microbial infection, and ultimately treatment failure.[6] Mandibular first molars usually present with two roots, one mesial and one distal, and commonly contain three or four root canals.[6,8] However, several anatomical variations have been reported, among which the presence of an additional distolingual root, known as radix entomolaris (RE), represents one of the most clinically significant anomalies.[1,2]

Radix entomolaris was first described by Carabelli in 1844[1] and is characterized by the presence of a supernumerary root located lingually to the distal root of mandibular molars.[2] The prevalence of Radix Entomolaris varies considerably among different ethnic populations, occurring in less than 5% of Caucasian, African, and Indian populations, whereas a much higher prevalence has been reported among Mongoloid populations, including Chinese, Eskimo, and Native American groups.[2,5].The bilateral occurrence has also been documented, suggesting a possible genetic or hereditary influence on its development.[2,3] The presence of radix entomolaris presents considerable diagnostic and technical challenges during root canal treatment because the additional root is frequently narrow and severely curved.[3] Consequently, accurate diagnosis requires careful interpretation of preoperative radiographs obtained at different horizontal angulations and, when indicated, cone-beam computed tomography (CBCT), which provides three-dimensional assessment of root canal morphology.[9–13]

Successful management further depends on modification of the conventional access cavity design, meticulous exploration of the pulp chamber floor, and careful biomechanical preparation using flexible nickel-titanium instruments.[,16] The present case report describes the successful nonsurgical endodontic management of bilateral radix entomolaris in mandibular first molars diagnosed using CBCT.

This report highlights the importance of comprehensive radiographic evaluation, access cavity modification, and careful canal negotiation for achieving predictable treatment outcomes in teeth exhibiting this uncommon anatomical variation.[17,20]

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## II. CASE REPORT

A 28-year-old patient reported to the Department of Conservative Dentistry and Endodontics with the chief complaint of spontaneous pain and sensitivity to hot and cold stimuli in both the right and left mandibular posterior regions for the past two weeks. Clinical examination revealed deep occlusal caries involving the mandibular right first molar (tooth #46) and left mandibular first molar (tooth #36). The affected teeth were tender on percussion, and vitality testing elicited an exaggerated lingering response. Based on the clinical and radiographic findings, a diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis was established, and nonsurgical root canal treatment was planned.[15]

Preoperative intraoral periapical radiography demonstrated an unusual distal root morphology suggestive of an additional distolingual root. Careful evaluation of radiographs taken at different horizontal angulations confirmed the presence of a supernumerary root consistent with radix entomolaris..[3] After obtaining informed consent from the patient, a limited field-of-view CBCT scan was performed. The CBCT images provided three-dimensional visualization of the tooth and clearly demonstrated the presence of an additional distolingual root in the mandibular first molar, confirming the diagnosis of radix entomolaris. Axial sections revealed the independent nature of the supernumerary root, while coronal and sagittal reconstructions facilitated assessment of its curvature, length, and relationship with the adjacent roots.[17] (Figure 1)

Furthermore, examination of the contralateral mandibular first molar on CBCT revealed a similar distolingual supernumerary root, confirming the bilateral occurrence of radix entomolaris.[20] After obtaining informed consent, local anesthesia was administered and rubber dam isolation was achieved. An endodontic access cavity was prepared using a endo-access bur (Dentsply, USA). Upon exploration of the pulp chamber floor with a DG-16 endodontic explorer, four canal orifices were initially identified. Further inspection of the distolingual aspect of the chamber floor revealed an additional canal orifice corresponding to the radix entomolaris.[14] The access cavity was modified from the conventional triangular form to a trapezoidal configuration to facilitate straight-line access to all canals, as recommended for teeth exhibiting radix entomolaris.[3,4] Biomechanical preparation was carried out using HyFlex CM (Coltene) Ni-Ti rotary instruments under copious irrigation with 3% sodium hypochlorite and 17% EDTA.[15,16].The canals were recapitulated periodically, and final irrigation was performed to ensure effective disinfection. Following complete cleaning and shaping, the canals were dried with sterile paper points and obturated using gutta-percha and MTA Fillapex sealer (Angelus, Brazil).

A postoperative radiograph confirmed satisfactory obturation of all canals, including the canal within the radix entomolaris. In the contralateral mandibular first molar (tooth #36), a similar additional distolingual root was identified. Radiographic and CBCT assessment confirmed the presence of radix entomolaris on the left side, thereby establishing the bilateral occurrence of this rare anatomical variation.[3,4,12,20] Appropriate endodontic management was performed following the same treatment protocol.(Figure 2)

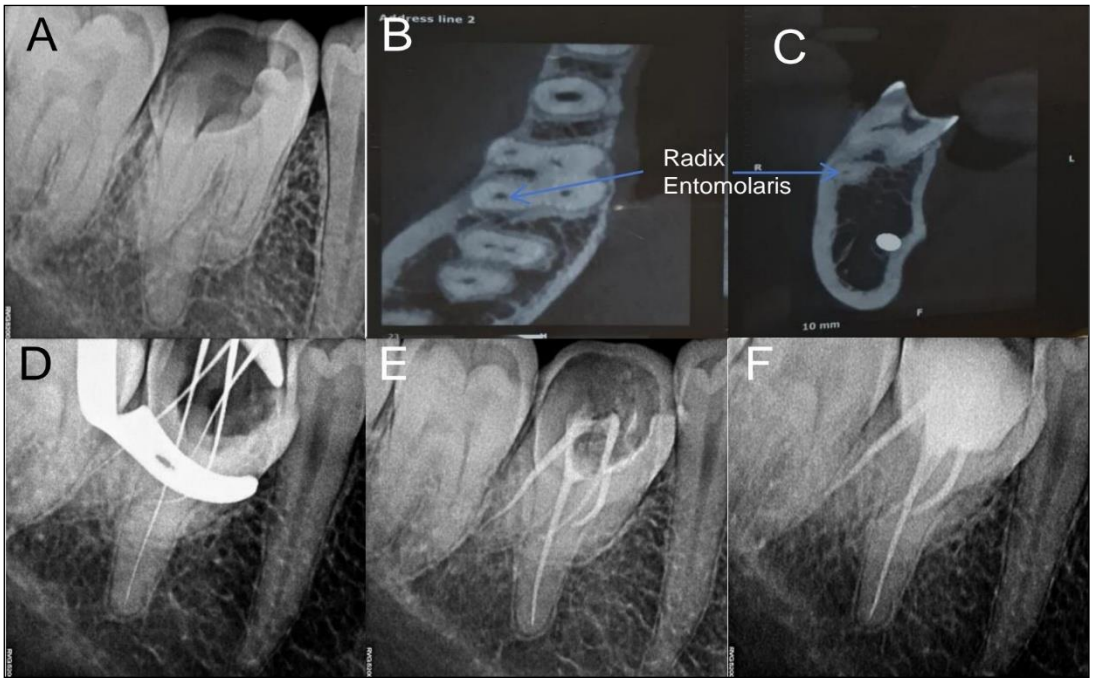


Fig 1. Endodontic Management of the Right Mandibular First Molar (#46) Exhibiting Radix Entomolaris.(A) Preoperative Radiograph. (B, C) CBCT Images Confirming the Presence of a Distolingual Supernumerary Root (Radix Entomolaris). (D) Working Length Determination. (E) Obturation Radiograph. (F) Postoperative Radiograph.

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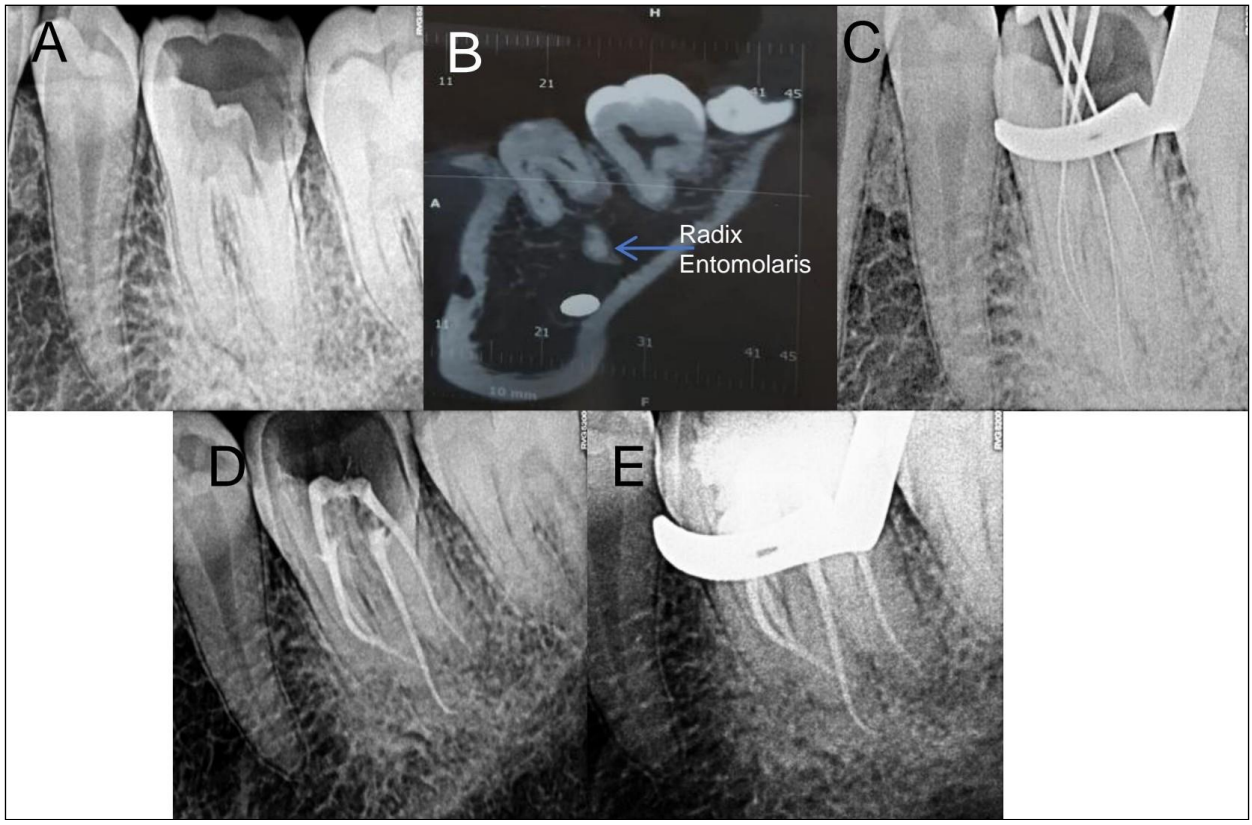


Fig 2. Endodontic Management of the Left Mandibular First Molar (#36) Exhibiting Radix Entomolaris. (A) Preoperative Radiograph. (B) CBCT Image Confirming Radix Entomolaris. (C) Working Length Determination. (D)Obturation Radiograph. (E) Postoperative Radiograph.

## III. DISCUSSION

Successful endodontic treatment depends on a thorough understanding of root canal anatomy and its possible variations. Anatomical complexities often present significant challenges during diagnosis and treatment, and failure to recognize such variations may result in missed canals, persistent infection, and eventual treatment failure..[6,7].Radix entomolaris (RE), characterized by the presence of an additional root located lingually to the distal root of a mandibular molar, is one such clinically important anatomical variation..[2,3]

The present case describes the successful endodontic management of bilateral radix entomolaris in mandibular first molars, highlighting the importance of careful diagnosis and treatment planning. Mandibular first molars typically possess two roots, one mesial and one distal, with three or four root canals.[6,8] The occurrence of an additional distolingual root significantly alters the conventional root canal anatomy and may complicate endodontic procedures. The frequency of RE is reported to be less than 5% in Caucasian, African, and Indian populations, whereas a significantly higher prevalence has been observed among Mongoloid populations, including Chinese, Eskimo, and Native American groups.[2] The variation in prevalence among different ethnic groups suggests a strong genetic influence on the development of this supernumerary root.[17].

The exact etiology of radix entomolaris remains unclear. However, several theories have been proposed, including external factors affecting odontogenesis, genetic penetrance, and the expression of atavistic genes.[2,5] The bilateral occurrence observed in the present case further supports the possibility of a hereditary or developmental influence on root morphology.[3,17] Previous studies have reported that when radix entomolaris is detected on one side, clinicians should carefully evaluate the contralateral tooth because bilateral occurrence is not uncommon among affected individuals.[20] Several classification systems have been proposed for radix entomolaris. De Moor et al. classified RE according to root curvature into Type I (straight root), Type II (initial curvature followed by a straight course), and Type III (double curvature with a second buccally directed curvature in the apical third).[3] Understanding root curvature is clinically important because severe curvatures increase the risk of procedural errors such as ledge formation, canal transportation, instrument separation, and perforation during biomechanical preparation.[16]

Accurate diagnosis of radix entomolaris is often challenging because conventional periapical radiographs provide only a two-dimensional representation of a three-dimensional structure.[9] Superimposition of the distobuccal root may obscure the presence of an additional distolingual root, leading to misinterpretation. Therefore, radiographs obtained at different horizontal angulations are recommended whenever unusual root morphology is suspected.[3] In the present case, careful radiographic examination using multiple angulated views facilitated the identification of the additional root. Advanced imaging modalities such as cone-beam computed tomography (CBCT) may further enhance diagnostic accuracy by providing three-dimensional visualization of root and canal morphology.[9–13] CBCT has

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been increasingly recognized as a valuable adjunct in the diagnosis of complex anatomical variations and can aid in treatment planning, particularly in cases with unusual root configurations.

The clinical detection of radix entomolaris requires meticulous examination of the pulp chamber floor. The location of the canal orifice associated with the additional root is generally found distolingual to the main distal canal.[14] In the present case, careful exploration of the chamber floor and modification of the conventional triangular access cavity to a trapezoidal form facilitated the location and negotiation of the additional canal. This finding is consistent with previous reports emphasizing the importance of access cavity modification in teeth exhibiting Radix Entomolaris.[3],

The management of radix entomolaris presents several technical challenges. The use of flexible nickel-titanium instruments, electronic apex locators, magnification devices, and adequate irrigation protocols contributes significantly to successful treatment outcomes.[15],[16],[17] In the present case, thorough cleaning and shaping, combined with effective irrigation and obturation techniques, enabled complete management of all canals, including the canal associated with the radix entomolaris. Early recognition and appropriate management of such anatomical variations are essential for achieving predictable endodontic success.[15],[16],[17]

This case contributes to the growing body of literature documenting bilateral radix entomolaris and reinforces the significance of comprehensive radiographic assessment, careful access cavity modification, and meticulous canal exploration. Awareness of such variations can help clinicians avoid missed canals and improve the prognosis of endodontically treated teeth[6]

## IV. CONCLUSION

Bilateral occurrence of Radix Entomolaris in mandibular first molars is an uncommon anatomical variation that can significantly influence endodontic diagnosis and treatment. Failure to recognize this additional distolingual root may result in missed canals and compromised treatment outcomes. This case highlights the importance of meticulous preoperative radiographic assessment, careful clinical exploration of the pulpal floor, and modification of the access cavity to facilitate identification and management of the extra root. Advanced imaging modalities such as CBCT, when indicated, can provide valuable three-dimensional information regarding root morphology and canal configuration, thereby enhancing treatment predictability. Awareness of such anatomical variations and adherence to sound endodontic principles are essential for achieving successful nonsurgical root canal treatment and long-term clinical success.

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