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# Radix Entomolaris: A Clinical Case Report of Endodontic Treatment on Tooth #46

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***Abstract***

*Radix entomolaris is a rare anatomical variation characterized by the presence of an extra root, most often occurring in mandibular molars. This anatomical anomaly can present significant challenges during endodontic treatment, as it alters the traditional root canal morphology, making diagnosis and treatment more complex. Radix entomolaris is typically found in the mandibular first molar and can complicate canal identification, cleaning, and shaping. This case report describes the endodontic treatment of a 25-year-old male patient with a radix entomolaris in the mandibular first molar, designated as tooth #46. The additional root made it necessary for the clinician to adapt their approach, including careful radiographic assessment and the use of advanced imaging techniques to fully visualize the root canal system. During treatment, particular attention was given to the identification of all canals, proper cleaning, shaping, and sealing to ensure a successful outcome. The report also highlights the importance of understanding the classification system of radix entomolaris to aid in proper diagnosis and treatment planning. Despite the challenges posed by the unusual root anatomy, the treatment was completed successfully, resulting in a positive prognosis for the patient.*

**Keywords:** Radix entomolaris, mandibular molars, anatomical variation, endodontic treatment, root canal anatomy, additional root, tooth #46, classification system, root canal morphology, endodontic challenges

## INTRODUCTION

The success of endodontic treatment is largely dependent on the thorough cleaning, shaping, and obturation of the entire root canal system. Achieving this goal can become particularly difficult when variations in root and root canal anatomy are present. One such variation is the radix entomolaris (RE), an uncommon anatomical condition characterized by the presence of an additional root, typically located on the lingual side of the mandibular first molar. This extra root, if not properly identified and managed, can lead to incomplete treatment, which increases the risk of endodontic failure [1].

In cases where RE is present, clinicians must adapt their approach to account for the complex anatomy. Failure to recognize the additional root during diagnosis can result in incomplete debridement and obturation, potentially leaving infection or debris behind. This case report focuses on the endodontic management of a mandibular first molar with RE. The case was classified as having a Type 3 curvature with Type 1 overlapping according to established classification systems, which further complicates treatment. The report underscores the importance of thorough preoperative radiographic evaluation and the use of appropriate techniques to ensure successful treatment outcomes [2, 3].

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### Prevalence

The prevalence of RE in mandibular first molars has been shown to vary significantly across different populations and studies. In some studies,

 

the occurrence of this anatomical variation was observed in about 27% of cases, with over 60% of these cases involving an additional fourth canal originating from the extra lingual root. The RE can present in a range of forms, from a short, conical extension to a fully developed root that closely resembles the length and structure of other roots, often with a distinct buccolingual curvature in the root canal [4].

In contrast, other research has reported much lower prevalence rates, particularly in Caucasian populations, where it was found in less than 1% of cases. African populations have shown a slightly higher prevalence of around 3%. However, the frequency of RE is significantly higher in Mongoloid and Asian populations, where studies have recorded rates ranging from approximately 5.8% to over 30%. This variation in prevalence across different ethnic groups highlights the importance of considering patient demographics when assessing root canal anatomy, as recognizing such anomalies is crucial for effective endodontic treatment [5].

## CLASSIFICATION OF RE

### Classification Based on Cervical Part Location

- *Type A:* The RE is located lingually to the distal root complex, characterized by two cone-shaped macrostructures.
- *Type B:* The RE is also positioned lingually to the distal root complex, but in this case, it features a single cone-shaped macrostructure.
- *Type C:* The RE is situated lingually to the mesial root complex.
- *Type AC:* The RE is found lingually between the mesial and distal root complexes.

### Classification Based on Buccolingual Orientation

- *Type 1:* The root or root canal is straight throughout its length.
- *Type 2:* The root canal displays an initial curve at the entrance, which subsequently straightens out in the middle and apical thirds.
- *Type 3:* The root canal exhibits an initial curve in the coronal third, followed by a second curve that begins in the middle and extends through to the apical third.

### Classification Based on Radiographic Appearance

- *Type 1:* The RE is easily identifiable on radiographs.
- *Type 2:* Identification requires significant beam angulation, either mesially or distally.
- *Type 3:* The RE is difficult to identify due to overlapping with the adjacent distobuccal root.

## CASE REPORT

A 25-year-old male patient visited the clinic, reporting pain and sensitivity in the lower right back tooth area. Upon conducting a thorough clinical examination, tooth #46 was identified as the primary source of his discomfort. Further investigation through radiographic analysis revealed significant carious involvement that had progressed into the pulp chamber, indicating an urgent need for treatment [6].

Additionally, the radiographs highlighted the presence of an extra root canal orifice characterized by an asymmetric distal orifice. This anomaly suggested the existence of a RE, an anatomical variation that can complicate endodontic procedures due to its atypical root canal anatomy. The combination of the carious damage and the unique root canal configuration necessitated a carefully tailored treatment plan to address both the infection and the complexities posed by the additional canal. The findings underscored the importance of thorough diagnostic imaging in identifying such anatomical variations, which can significantly impact the success of endodontic treatment [7].

## DIAGNOSIS AND CLASSIFICATION

The radiographic assessment revealed the presence of RE, characterized by an extra root exhibiting a Type 3 curvature. This curvature was noted to have an initial bend in the coronal third of the root

 

canal, which was then followed by a secondary curve that oriented buccally in the apical third. Such variations in curvature can pose challenges during endodontic procedures, requiring careful consideration and skillful techniques to navigate the complex anatomy effectively [8].

In addition to the root canal curvature, the analysis also evaluated the degree of overlap between the distolingual and distobuccal roots. The findings indicated a Type 1 classification, signifying only a slight overlap between these roots. This level of overlap, while manageable, still necessitates meticulous attention during treatment to ensure that all canals are adequately debrided and obturated [9].

Overall, these radiographic findings underscore the importance of detailed imaging in endodontic practice, particularly in cases involving anatomical variations, such as RE. Proper identification and classification of these unique features are essential for developing an effective treatment plan and ensuring favorable outcomes for the patient (Figure 1) [10].

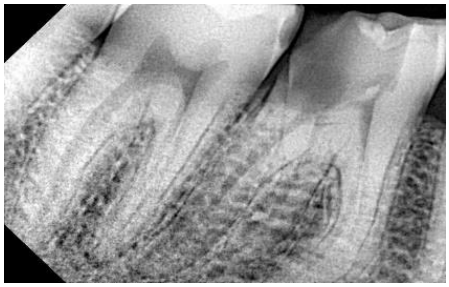

**Figure 1.** Radiograph of tooth #46 showing RE with Type 3 curvature.

## TREATMENT PROCEDURE

### Access Cavity Preparation

The access cavity preparation involved creating a trapezoidal shape to facilitate optimal visibility and access to the additional distolingual canal. This specific design was chosen to provide a clear line of sight to the complex root canal anatomy and ensure efficient instrumentation [4].

To enhance the accuracy of the procedure, magnification tools, such as dental loupes or an operating microscope were utilized. This allowed for a more detailed examination of the tooth structure, making it easier to identify the extra canal orifice associated with the RE. The combination of a well-planned access cavity and magnification aids significantly improved the likelihood of successfully locating and treating the additional canal, thereby contributing to the overall effectiveness of the endodontic treatment (Figure 2) [5].

**Figure 2.** Access cavity preparation revealing carious involvement in the mandibular first molar.

 

**Shaping and Cleaning**

The process of shaping and cleaning the canal system began with careful negotiation of the root canals. A D finder was utilized to locate all the canals and confirm their patience, which is crucial for effective treatment. This initial step is essential, especially in cases where anatomical variations like RE complicate the canal system [3].

Once the canals were identified, shaping was performed using the Neoendo rotary system. This advanced system is designed to offer both flexibility and precision, making it particularly advantageous for navigating the severe curvature often associated with RE. The rotary instruments were employed meticulously, ensuring that the canals were shaped appropriately without risking any damage to the surrounding dentin [6].

To complement the shaping process, thorough irrigation was conducted with a solution of 5.25% sodium hypochlorite followed by EDTA. Sodium hypochlorite is well-known for its efficacy in disinfecting the canal system, while EDTA aids in the removal of the smear layer, ensuring a clean and debris-free environment. This dual irrigation strategy was instrumental in addressing the complex anatomy of the canals, facilitating optimal cleaning and preparation for the subsequent obturation phase. Overall, this meticulous approach to shaping and cleaning is critical for achieving successful endodontic outcomes in challenging cases (Figure 3) [7].

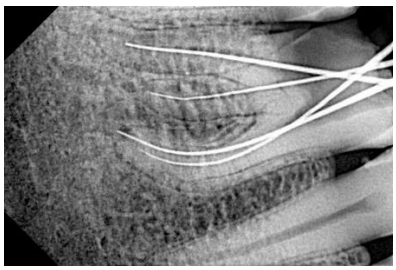

**Figure 3.** Radiographic image illustrating the shaped canal system of the mandibular first molar with RE.

**Obturation**

Following the shaping and cleaning phases, the next crucial step in the endodontic procedure was obturation. The canals were meticulously dried using paper points to ensure the complete removal of any remaining moisture, which is essential for the effectiveness of the filling materials. For this case, gutta-percha was selected as the primary filling material due to its favorable properties, such as biocompatibility and ease of handling [8].

To enhance the sealing ability of the gutta-percha, a Kerr Seal resin-based sealer was applied. This sealer aids in filling any potential voids within the canal system, thus providing a more secure seal and reducing the risk of future reinfection. Given the complex anatomy of the RE and the significant curvature of the canal, a warm vertical condensation technique was employed during the obturation process. This method involves heating the gutta-percha to improve its flowability, allowing it to adapt more effectively to the intricate canal walls. The vertical condensation technique ensured a homogeneous fill within the canal, thereby enhancing the overall quality of the obturation and contributing to a successful treatment outcome (Figure 4) [9].

**Restoration**

A zirconia crown was carefully selected for the restoration of tooth #46 to ensure both durability and aesthetic appeal. After preparing the tooth, the crown was meticulously shaped to restore its natural form and function. Special attention was given to the fitness, ensuring it conformed seamlessly to the surrounding teeth and the patient's bite. Once the fit and occlusion were confirmed to be ideal, the crown was permanently cemented in place. This process not only restored the tooth's structural

 

integrity but also provided long-term protection and functionality, offering the patient a natural-looking and robust solution (Figure 5) [10].

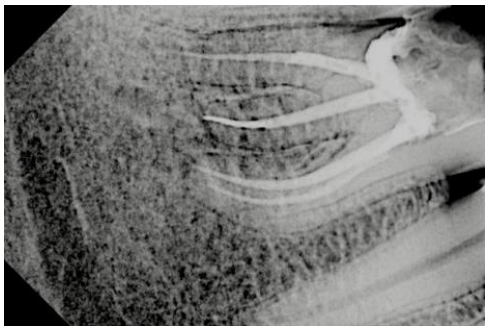

**Figure 4.** Radiographic image showing completed root canal treatment with filled canals using gutta-percha.

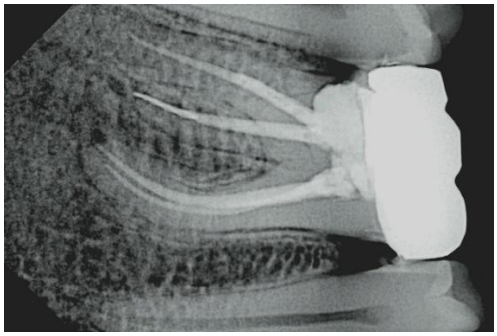

**Figure 5.** Postoperative radiograph showing tooth #46 with completed root canal treatment and zirconia crown placement.

**Outcome**

The treatment was completed over three sittings. Follow-up radiographs confirmed the complete obturation of all canals, including the distolingual canal associated with the RE. The patient reported the resolution of symptoms, and the zirconia crown provided a durable restoration of function.

## DISCUSSION

RE poses a unique challenge in endodontic treatment due to its complex root canal anatomy. In this case, the identification and management of the additional root were facilitated by thorough radiographic analysis and careful canal negotiation using advanced endodontic techniques. The successful outcome underscores the importance of recognizing anatomical variations and adapting treatment protocols accordingly to prevent missed canals and ensure long-term success [7–10].

## CONCLUSIONS

This case highlights the critical role of accurate diagnosis and meticulous endodontic treatment in managing complex anatomical variations, such as RE. Awareness and understanding of such variations are essential for minimizing errors and achieving optimal treatment outcomes.

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