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INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/14600
DOI URL: http://dx.doi.org/10.21474/IJAR01/14600

*RESEARCH ARTICLE*

# ENDODONTIC MANAGEMENT OF RADIX ENTOMOLARISIN PERMANENT MANDIBULAR FIRST MOLAR: A CASE REPORT

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## Manuscript Info

***Manuscript History***
Received: 25 February 2022
Final Accepted: 27 March 2022
Published: April 2022

***Key words:-***
Anatomical Variations, Endodontic Treatment, Mandibular Molars, Radix Entomolaris, Radix Paramolaris

## Abstract

Mandibular first molars show most of the anatomical variations not only in the number of canals but also in the presence of number of roots and their morphology. The presence of additional root either lingually or buccally in addition to two roots is one of the complex morphological variations. Diagnosis, identification, and treatment of these variations needadequate knowledge of root and root canal anatomy and configurations which can contribute to the better outcome. This case report discusses the endodontic treatment of two mandibular first molars with a radix entomolaris (RE), which are rare macrostructures. The prevalence, the external morphological variations, and internal anatomy of the RE are described.



## Introduction:-

A successful outcome of root canal treatment is determined by the awareness, knowledge, and thorough cleaning and shaping of all the root canals before the root canal filling. Like the number of root canals, the number of roots may also vary.[1]

A thorough understanding of root canal anatomy and morphology is required to succeed in endodontic treatment. Failure to recognize variations in root or root canal anatomy can result in unsuccessful endodontic treatment. Hence, it is imperative that the clinician be well informed and alerted to the most unexpected possible variations. Hoen and Pink, in their analysis of teeth requiring re-treatment, found a 42% incidence of missed roots or canals.[2]

The permanent mandibular first molar commonly has two roots, a flattened mesial root, and a mostly straight and rounded distal root.[3] Concerning the number of roots, the most relevant variable is the presence of a third distolingual root.[3,4] This macrostructure was first described in 1844.[4] It was called as “Radix entomolaris”.[4,5]

This is a supernumerary root located distolingually in mandibular molars.[5] It is usually smaller than the distobuccal and mesial roots, and it can be separated from or partially fused with these roots.[4] This variant has a frequency of less than 5% in the white Caucasians, Africans, Eurasians, and Indians, whereas in Mongoloids, it has been observed in 5–40% of the cases.[6]

The preliminary diagnosis of these variations is made routinely with radiographic techniques. Radiographic diagnosis plays a vital role in successful endodontic treatment. Radiograph taken from different angulations gives information about extra canals or roots and aid in better understanding the anatomy of the root canal system and the

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treatment approach with sufficient knowledge and absolute clinical thoroughness for successful root canal treatment.[7,8]

This case report discusses the diagnosis and successful endodontic management of a case showing unusual root canal configuration in a mandibular first molar showing three roots and four canals.

**Case Report:**
A 20-year-old male patient reported to the Department of Conservative Dentistry and Endodontics with a chief complaint of pain in the lower left back tooth region for one month.

The patient revealed a history of mild intermittent pain for the past one month, which had increased in intensity during the past week. The pain aggravated on the consumption of hot and cold substances and persisted even after removing the stimulus.

Clinical examination revealed deep occlusal carious lesions on the mandibular first molar. Tooth #36 was tender to vertical percussion. The preoperative radiograph revealed radiolucency of carious lesion involving the pulp concerning #36 [Figure-1]. Based on the clinical and radiographic findings, a diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis concerning #36 was made, informed consent was obtained, and endodontic treatment was initiated.

**Clinical management:**
The preoperative periapical radiograph revealed the presence of two completely formed roots with no sign of any variation in the root canal anatomy in #36. The treatment was then initiated; left IANB anesthesia was injected with 2% lignocaine with 1: 100,000 adrenaline. A rubber dam was used to isolate a single tooth. Excavation of the caries was done with tooth #36. Access cavity preparation was done with BR-45 (Mani Inc, Japan) round bur and modified using EX-24 (Mani Inc, Japan). Pulp tissue on the floor was removed, and the canal was copiously irrigated with 5.25% NaOCl (Prime Dental Products Private Limited, India) for hemostasis. On inspection of the pulpal floor with DG-16 endodontic explorer, the pulp chamber floor revealed three mesiobuccal, mesiolingual, and distal canals. Exploration for the second distal canal was done by further exploring the pulpal floor with a DG-16 endodontic explorer. A catch disto-lingually revealed the presence of a second distal orifice, and the access cavity was altered from a triangular form to a trapezoidal shape to include the distolingual canal.

The patency of the canal was checked with 10 number K-file [Mani Japan]. Working length was determined by the Dentaport ZX electronic apex locator [J. Morita, Suita City, Osaka, Japan] and confirmed radiographically.

The working length radiograph was taken with different horizontal angulations, revealing the presence of a third root located distolingually [Fig. 2]. Cleaning and shaping of the radicular space were done using the Neohybrid (Neoendo, Orikam Health Care Solutions, Haryana) rotary files concerning #36.

In all the canals, the cleaning and shaping procedure was performed with EDTA gel (Prime Dental Products Private Limited, India) as a lubricant and a 5.25% NaOCl solution was used for the irrigation of the canal. Recapitulation and verification of canal patency were frequently performed during this procedure. Final irrigation was performed using 17% EDTA (Prime Dental Products Private Limited, India), after which the canal was dried using sterile absorbent paper points. The snug fit of an F2 master gutta-percha cone was evaluated radiographically [Fig. 3].

The canal was then obturated with gutta-percha cone and AH Plus sealer (DentsplyMaillefer) using a cold lateral compaction technique [Fig. 4].

Access cavity was restored with Tetric N – Ceram Bulk Fill with self-etch bond [Ivoclar]. The patient was recalled after three months; no sign of pain was present, and radiographs were taken, showing no periapical pathology. [Fig. 4].

## Discussion:-

A thorough knowledge of internal and external anatomy coupled with a correct diagnosis, adequate cleaning, and shaping of the root canal system will normally lead to a successful outcome.[9] Therefore, practitioners should be familiar with the existence as well as the prevalence of teeth abnormalities.

Mandibular first molars seem to be the most frequent teeth in need of root canal treatment as they are the first permanent teeth to erupt. Nonetheless, anatomical variations of the root canal system in molars are not appreciated by a great number of general practitioners.[10]

The presence of a third root (Radix Entomolaris) may complicate the endodontic treatment and lead to failure as a result of canal missing. Clinically a missing canal is one of the major reasons for post-treatment disease.Failure in recognize the presence of an extra DL root in root canal treatment may lead to incomplete debridement of the root canal system and eventually treatment failure. Therefore, a thorough inspection of the pre-treatment radiograph and interpretation of certain characteristic, such as an unclear view of the distal root/canal, could assist in identifying the presence of DL roots.[11]

The presence of a separate Radix Entomolaris in the mandibular firstmolar is associated with certain ethnic groups.[12] In African populations, a maximum frequency of 3% is found , while in Eurasian and Indian populations the frequency is less than 5%. In populations with Mongoloid traits (such as the Chinese, Eskimo and American Indians) reports have noted that the RE occurs with a frequency that ranges from 5% to more than 30%.[13-19] Because of its high frequency in these populations, the RE is considered to be a normal morphological variant (eumorphic root morphology). In Caucasians, the RE is not very common and, with a maximum frequency of 3.4 to 4.2% [20,21], is considered to be an unusual or dysmorphic root morphology.

The etiology behind the formation of the RE is still unclear. In dysmorphic, supernumerary roots, its formation could be related to external factors during odontogenesis, or to penetrance of an atavistic gene or polygenetic system (atavism is the reappearance of a trait after several generations of absence). In eumorphic roots, racial genetic factors influence the more profound expression of a particular gene that results in the more pronounced phenotypic manifestation.[22,23]

The presence of radixentomolaris or radixparamolaris has a clinical impact on endodontic treatment, and an accurate diagnosis of these supernumerary roots can avoid complications during root canal treatment. Since Radix Entomolaris is usually located on the same buccolingual plane as the distobuccal root, preoperative radiographs can overlap both roots, leading to an inaccurate diagnosis. A thorough examination of the preoperative radiographs and interpretation of specific markers such as the outline of the distal root contour. Distal root contours can reveal the presence of "hidden" RE. The second radiograph should be taken from a more mesial or distant angle (30°) to visualize the RE. The location of the Radix entomolaris's orifice of the root canal also affects the access cavity preparation. The orifice of the radix entomolaris is located distolingually to mesiolingually from the main canals. An extension of triangular access cavity preparation distolingually results in a more rectangular or trapezoidal outline form. This way, an exact diagnosis can be made in most cases.[9,24-27]

**Classification of Radix Entomolaris:**

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

1. Type A: The RE is located lingually to the distal root complex which has two cone-shaped macrostructures
2. Type B: The RE is located lingually to the distal root complex which has one coneshaped macrostructure
3. Type C: The RE is located lingually to the mesial root complex
4. Type AC: The RE is located lingually between the mesial and distal root complexes.[27-29]

De Moor et al. (2004) classified RE based on the curvature of the root or root canal:

1. Type 1: A straight root or root canal
2. Type 2: A curved coronal third which becomes straighter in the middle and apical third
3. Type 3: An initial curve in the coronal third with a second buccally oriented curve which begins in the middle or apical third.[27-29]

In this case report, DG-16 Endodontic Explorer for location and identification of the orifices of the root canals, and conventional root canal radiography to determine canal configuration. The position and identification of the root canal opening were performed by the method. In the present case, radix entomolaris was found to be with a straight root, and the root canal (Type-1 De Moors classification) was successfully treated.

## Conclusion: -

Dentists should be aware of extra root in permanent mandibular first molars. The diagnosis of the presence of a third root before root canal treatment is essential during the endodontic treatment and to avoid 'missed canals' and treatment failure. Proper angulations and radiographic interpretation help to identify several roots and morphology. During access opening, the conventional triangular cavity must be modified to a trapezoidal form to locate and access the distolingually located orifice of the additional root, and the possible misinterpretation of the extra third (distolingual) root during root canal treatment by dentists may contribute to the high molar extraction rate in children.

## List of Figures:-

**Fig. 1:-** Pre-Operative Radiograph #36.

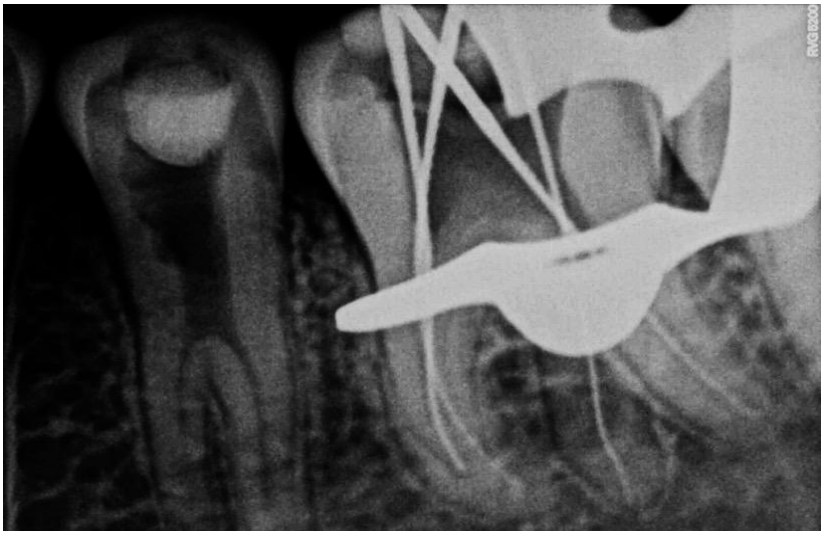

**Fig. 2:-** Working length determination.

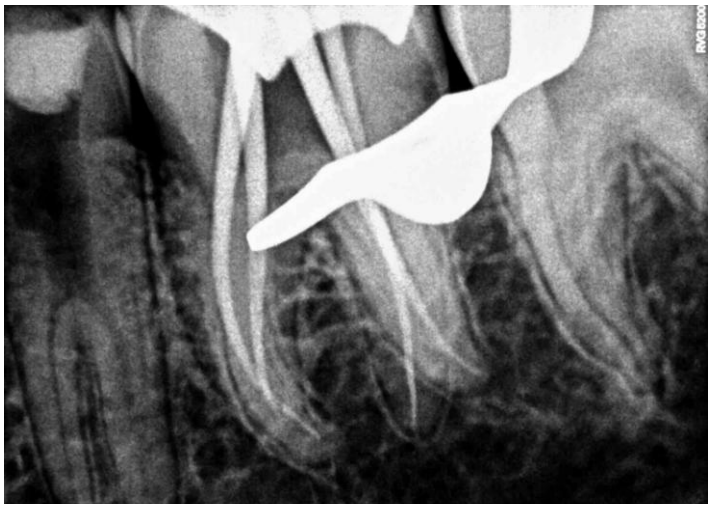

**Fig. 3:-** Master cone selection.

**Fig. 4:-** Post obturation radiograph.

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