

Navigating The Unseen: Radix Entomolaris (Type B) and Decoding Aberrant Canal System in Mandibular Molar

¹Dr. Bhargavi Krishnaraj, Third Year Post Graduate Student, Department of Conservative Dentistry and Endodontics, Krishanadevaraya College of Dental Sciences, Rajiv Gandhi University of Health Sciences, Bangalore, Karnataka, India

²Dr. Sujatha I, Professor, Department of Conservative Dentistry and Endodontics, Krishanadevaraya College of Dental Sciences, Rajiv Gandhi University of Health Sciences, Bangalore, Karnataka, India

³Dr. Jayalakshmi K.B, HOD, Department of Conservative Dentistry and Endodontics, Krishanadevaraya College of Dental Sciences, Rajiv Gandhi University of Health Sciences, Bangalore, Karnataka, India

⁴Dr. Neha N.C, Third Year Post Graduate Student, Department of Conservative Dentistry and Endodontics, Krishanadevaraya College of Dental Sciences, Rajiv Gandhi University of Health Sciences, Bangalore, Karnataka, India

Corresponding Author: Dr. Bhargavi Krishnaraj, Third Year Post Graduate Student, Department of Conservative Dentistry and Endodontics, Krishanadevaraya College of Dental Sciences, Rajiv Gandhi University of Health Sciences, Bangalore, Karnataka, India.

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Abstract

The clinician’s knowledge and familiarity with root canal anatomy play a pivotal role in identifying variations such as extra canals and roots. Failure to recognize these variations often leads to endodontic failure. The mandibular first molar is one of the most commonly treated teeth and exhibits considerable anatomic variability. One such variation is an additional distolingual root known as Radix Entomolaris (RE). This case report describes the endodontic management of a mandibular first molar with a (Type B) RE, in which the canal of *Radix Entomolaris* bifurcated from the

distolingual canal at the middle third of the distal root. Also presence of three distal canals with middle distal canal in type VIII vertucci configuration, a rare entity. Diagnosis was confirmed by cone-beam computed tomography (CBCT) and visualized under an operating microscope. This report highlights the diagnostic and clinical strategies used to decode this aberrant canal morphology and emphasizes the importance of magnification and advanced imaging in successful management.

Keywords: Aberrant Canal, Cone-Beam Computed Tomography, Endodontic Treatment, Mandibular Molar, Radix Entomolaris

Introduction

Anatomic variations present a formidable challenge during endodontic therapy. The success of endodontic treatment depends on proper identification of all canals, thorough chemomechanical preparation, and three-dimensional obturation¹. Failure due to unrecognized tooth morphology can compromise prognosis². The permanent mandibular first molar typically presents with two roots (mesial and distal) and three canals^{3,4}. Variations, such as a third distolingual root (*Radix Entomolaris*, RE), have been documented⁵. Its prevalence varies: less than 5% among Indian and Eurasian populations, 3.4–4.2% among Caucasians, and up to 30% in Mongoloid populations^{6,7}. Bilateral occurrence is reported in 50–67% of cases⁸. RE may arise due to genetic atavistic traits or environmental influences during odontogenesis⁹. Awareness of RE morphology, prevalence, and diagnostic features is vital for clinical success. This case presents a rare Type B *Radix Entomolaris* with a bifurcating canal in the middle third, and presence of three distal canals with middle distal canal in type VIII vertucci configuration, a rare entity, emphasizing the role of CBCT and magnification in its management.

Case Report

An 18-year-old female patient presented with pain in her lower right back tooth region for one month. Pain was moderate, continuous, and aggravated by mastication. The patient had undergone composite restoration on tooth 46 six months prior. On examination, tooth 46 was tender on percussion. IOPA radiograph revealed coronal radiolucency beneath the restoration suggestive of secondary caries and radiolucency was involving pulp

with periapical widening. The tooth was nonresponsive to cold testing. Based on clinical and radiographic findings a diagnosis of pulpal necrosis with symptomatic apical periodontitis was given for 46.

Access cavity preparation revealed an unusual distal canal configuration. Three canal orifice was located which were distobuccal canal, middle distal canal, distolingual canal and was successfully negotiated as well, yet we couldn't find the orifice of radix entomolaris. That's when CBCT assessment was done and we confirmed a Type B Radix Entomolaris, where the canal of Radix Entomolaris which was bifurcating from the distolingual canal, where its orifice was located at the level of middle third of distal root. Working lengths were determined by inserting a size 15 K-file (Mani, Inc, Japan) using an apex locator (Root ZX mini, J Morita, Japan), and radiographs. Cleaning and shaping used NiTi rotary HERO shaper instruments with 2.5% NaOCl and 17% EDTA irrigation. Obturation of 5 canals was completed with single cone obturation using gutta percha and AD seal sealer. The tooth was restored with composite resin.



Figure 1: Preoperative radiograph

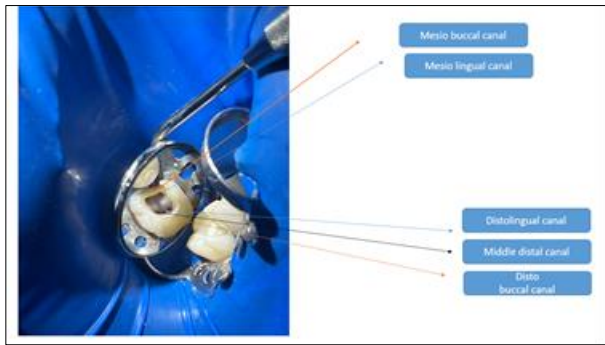


Figure 2a: Access Cavity of 46

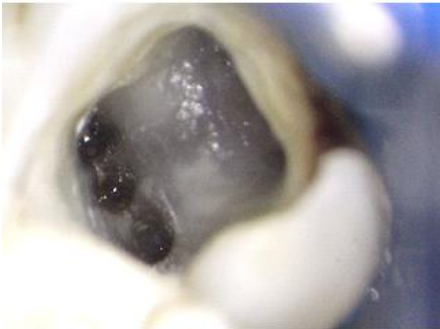


Figure 2b: access cavity with three distal canal accessed through operating microscope. Note the wider distolingual canal.

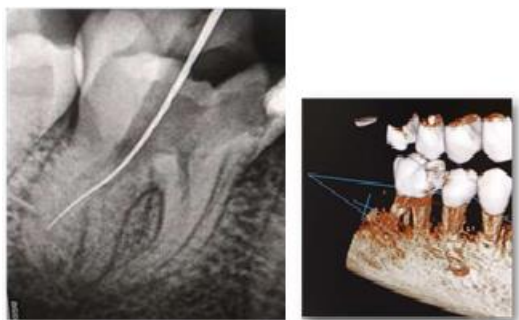


Figure 3: Pecularity of this case, bifurcation of distolingual canal evident at the level of middle third of the distal root

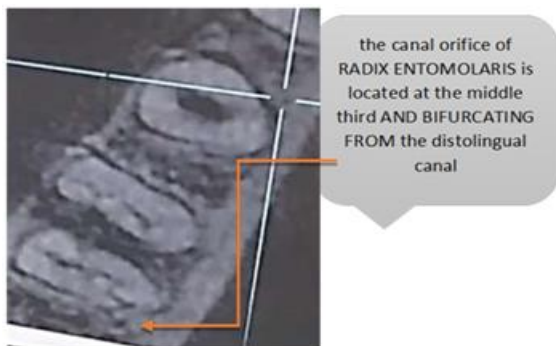


Figure 4: CBCT assessment



Figure 5: Working Length Determination



Figure 6: Master cone selection

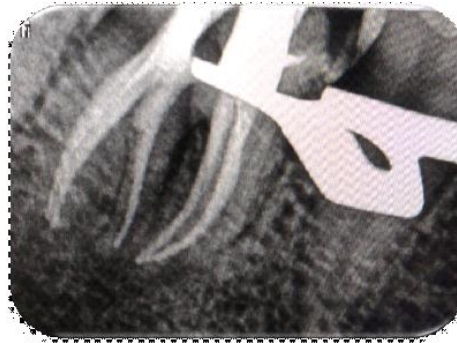


Figure 7: Obturation of 5 canals



Figure 8: follow up after 1 year

Discussion

Anatomic variations in mandibular molars are frequent causes of endodontic failure when unrecognized. The presence of a third distolingual root (RE) significantly

influences cleaning, shaping, and obturation¹⁰. RE prevalence varies by ethnicity: Indian and Eurasian <5%, Caucasian 3.4–4.2%, Mongoloid up to 30%¹¹. Two hypotheses explain its origin: genetic atavism and developmental/environmental factors.

Understanding RE morphology is crucial. Carlsen and Alexandersen¹² classified RE based on the cervical location: Type A (distal cervical with two distal roots), Type B (distal cervical with one distal root), Type C (mesial cervical), and Type AC (central cervical). De Moor et al.¹³ described curvature types: Type I (straight canal), Type II (curved entrance continuing straight), and Type III (coronal curve with apical buccal curve).

Preoperative detection of RE requires careful clinical and radiographic examination. Clinically, inspection of crown morphology, cervical convexities, and the presence of a tuberculum paramolare may suggest an additional root¹⁴.

Radiographically, extra PDL spaces adjacent to distal roots should be evaluated, and angulated radiographs at 20° mesial or distal views help identify the extra root¹⁵.

The canal orifice is usually distolingual, necessitating an extension of the triangular access cavity distolingually to produce a rectangular or trapezoidal outline. When the orifice is not visible after deroofting, careful inspection of the pulp chamber floor under the dental operating microscope (DOM) is recommended¹⁶. Krasner and Rankow's laws (symmetry and orifice location) assist in proper localization. Straight-line access, magnification, and illumination are critical because RE roots are often curved.

Locating missed canals relies on a thorough understanding of the dentinal map and canal bleeding points. Tactile exploration with Pathfinder files, DG-16 explorers, and Micro-openers is beneficial. Advanced imaging modalities, such as CBCT¹⁷, micro-CT, fiberoptic illumination, oroscopy, and digital radiography,

enhance detection and confirmation of extra canals and roots^{14–16}.

There have been various investigations conducted on the peculiar root canal anatomy of the mandibular first molar. Baugh and Wallace reported in a review of the literature that the middle mesial canal in the mandibular first molar has been recorded in 1%-15% of instances, and there are very few case reports in the literature with the middle distal canal, which is extremely rare¹⁸.

Quackenbush et al reported the existence an unusual case is presented in which there were three canals in the distal root of a mandibular first permanent molar¹⁹.

According to various authors in various countries, the incidence of three canals in the distal root of the mandibular first molar is 1.7% in the populations of India and Turkey, 0.2% in Senegal, 0.7% in Burma, 1.6% in Thailand, 0.3% in Jordan, and 3% in Sudan²⁰.

Hitherto, only three case reports and one study, as mentioned above, have published with three separate distal canals (Vertucci's type VIII). In this case, there were three separate distal canals, i.e. Vertucci's type VIII, which is very unique in itself²¹.

As a result, there are just a few reported cases of middle distal canals with Vertucci's type VIII root canal architecture.

This case report details the successful identification and treatment of three distal root canals with the Middle Distal Canal. Additionally, a RARE CONFIGURATION of Radix Entomolaris (type B) with type II curvature, whose canal was bifurcating from the distolingual canal and whose orifice was situated at the level of the middle third of the distal root, was described.

CBCT and DOM facilitated accurate diagnosis, allowing modified access and visualization, complete debridement, and proper obturation. Such meticulous evaluation prevents procedural errors and improves prognosis.

Conclusion

Failure to identify and negotiate additional canals remains a significant cause of root canal failure. This report emphasizes the importance of CBCT, DOM, and anatomical knowledge in managing complex variations. The peculiar feature of this case was, rarely reported in literature and was challenging. Early detection, modified access design, and magnification enabled successful treatment and favorable long-term prognosis.

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