

# Radix Entomolaris: Management of Distinctive Anatomy

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**Abstract:** *It is of utmost importance that the clinician is familiar with root and root canal anatomy. Radix entomolaris (RE) is considered to be an Asiatic trait. However, its prevalence in Indian population is found to be lower than in other Asian races. The initial diagnosis of a radix entomolaris or paramolaris before root canal treatment is important to facilitate the endodontic procedure, and to avoid 'missed' canals. This article presents a case record on the detection and endodontic management of distinctive anatomy; RE in Mandibular first molar. Radix entomolaris was detected by identifying the presence of a double or extra root outline in the preoperative radiograph, modifying the access opening and closely inspecting the pulp chamber and was endodontically treated following cleaning, shaping, and obturation of the canals. Achieving the endodontic success in the presence of an RE requires knowledge about its prevalence, diagnosis, morphology, canal configuration, and clinical approach.*

**Keywords:** Radix Entomolaris, canal configuration, Distinctive anatomy.

## 1. Introduction

The prevention or healing of endodontic pathology depends on a thorough chemo-mechanical cleansing and shaping of the root canals before a dense root canal filling and hermetic seal obtained<sup>1</sup>. Thus, it is of utmost importance that the clinician is familiar with root and root canal anatomy. One of the main reasons for failure of root canal treatment in molars is because the clinician has not removed all the pulp tissue and microorganisms from the root canal system (Cohen & Brown 2002)<sup>2</sup>. Generally flare-ups occur due to improper cleaning and shaping of canals, lack of understanding of root canal morphology, failure of establishment of hermetic seal, underfillings, overfillings and also due to improper identification of canals.<sup>3</sup> Most Mandibular first molar have two roots located mesially and distally and three root canals, but variations in the number of roots and in canal morphology are not uncommon<sup>4</sup>. Mandibular first molar can display several anatomical variations in the number of root canals and roots. The major variant is the occurrence of an additional third root; this extra root was first reported by Carabelli and was called Radix Entomolaris (RE). A tooth with a third root that is a distolingual; named as the Radix Entomolaris and if this root is placed buccally then it is called Radix Paramolaris<sup>5</sup>. Fabra-Campos and Bond reported the presence of three mesial canals and Stroner noted the presence of three distal canals.

De Moor et al classified RE into three types. Type I: a straight root or root canal, Type II: an initially curved entrance which continues as a straight root or root canal. Type III: an initial curve in the coronal third of the root canal and a second curve beginning in the middle and continuing to the apical third.<sup>6</sup>

The incidence of a separate RE in the first Mandibular molar is associated with certain ethnic groups as follows: European 3.4 to 4.2%, African 3%, Eurasian and Indian less than 5%,<sup>3</sup> Caucasians 4.2%, Mongoloids such as Chinese, Eskimo and

American Indians have 5% to more than 30% and the overall incidence in German dental school patient was 1.35%.<sup>7</sup>

Although both macrostructures are rare in the Indian population, knowledge of their occurrence and location are important. This article describes the diagnosis and management of a case with a Radix Entomolaris.

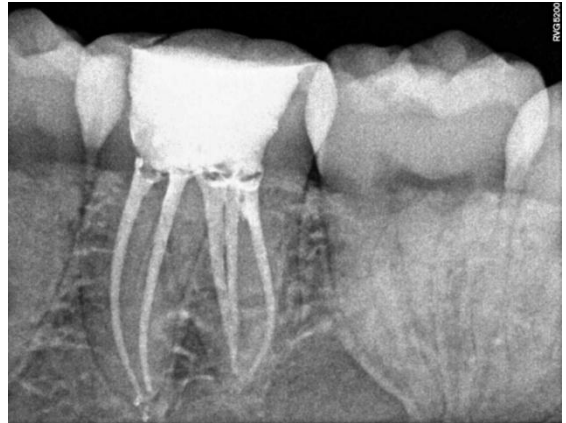
## 2. Case Report 1

A 21 year old female patient reported in the department of conservative dentistry and endodontics with the chief complaint of pain in lower left back teeth region of jaw since 2 months. A thorough clinical examination is carried out including vitality test. Routine radiographic examination of the tooth revealed the presence of an extra root. Additional radiographs were taken increasing the mesial and distal angulations which suggested the presence of properly developed root distolingually. The case was diagnosed as a Radix Entomolaris with chronic irreversible pulpitis.

The root canal treatment was planned after administration of local anaesthesia, rubber dam isolation was obtained. The proper access was made. After removal of the coronal pulp, 5 canal orifices were located; 2 mesial and 3 distal. The canal patency was checked using no. 10 K files. The electronic apex locator was used for determination of working length which later was confirmed radiographically. The cleaning and shaping was carried out using 4% tapered rotary file system with copious irrigation. On successive appointment, when the tooth was found to be completely asymptomatic, the canals were dried after sufficient preparation and obturated. The access cavity was then restored with composite resin.



**Figure 1:** intraoral picture of access opening; showing 2 mesial and 3 distal orifices



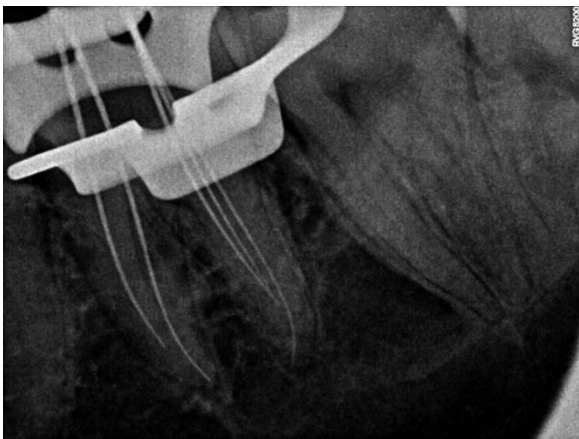
**Figure 5:** Postoperative Radiograph



**Figure 2:** Preoperative radiograph



**Figure 6:** Postoperative Radiograph (Mesial Angulation)

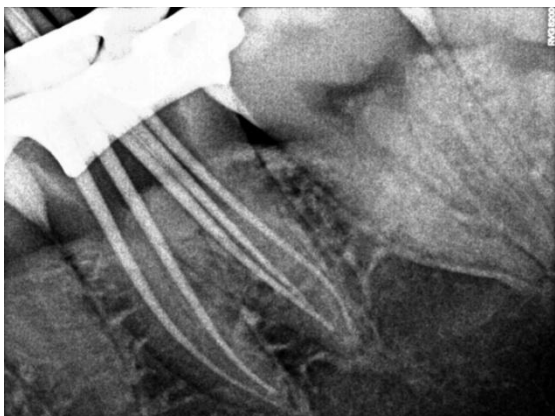


**Figure 3:** Working length determination

**Case Report 2**



**Figure 7:** Preoperative radiograph



**Figure 4:** Mastercone Radiograph





Figure 8: Working length determination



Figure 9: Master cone radiograph



Figure 10: post obturation



Figure 11: Mesial Angulation

### 3. Discussion

Endodontic success in the presence of RE depends on its diagnosis, anatomy or morphology, canal configuration and clinical approach employed. An accurate diagnosis of RE can avoid complications like missed canal which is a common reason for endodontic failure<sup>8</sup>. Clinically a missing canal is one of the major reasons for post-treatment disease<sup>1</sup>.

A classification by Carlsen and Alexandersen describes four different types of RE according to the location of the cervical part of the RE: types A, B, C and AC. Types A and B refer to a distally located cervical part of the RE with two normal and one normal distal root components, respectively. Type C refers to a mesially located cervical part, while type AC refers to a central location, between the distal and mesial root components. This classification allows for the identification of separate and non separate RE. Anatomically, RE is most often found curved in a bucco-lingual plane. Depending on the amount of this curvature, it is classified into types I, II, and III. Type I refers to a straight root/root canal, while type II refers to an initially curved entrance which continues as a straight root/root canal. Type III refers to an initial curve in the coronal third of the root canal and a second curve beginning in the middle and continuing to the apical third<sup>8</sup>.



Figure 12: Classification of the extracted mandibular first molars with a radix entomolaris (RE) and occlusal view on the pulp chamber and root canal orifices<sup>4</sup>

The etiology behind the formation of the RE is still unclear. External factors during dentin formation or presence of an atavistic gene could affect the formation of dysmorphic supernumerary roots. 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<sup>5</sup>.

An RE can be found on the first, second and third Mandibular molar, occurring least frequently on the second molar. Some studies report a bilateral occurrence of the RE from 50 to 67%.<sup>2</sup> Bolk reported the occurrence of a buccally located additional root: the RP. This macrostructure is very rare and occurs less frequently than the RE. The prevalence of RP, as observed by Visser, was found to be 0% for the first mandibular molar, 0.5% for the second and 2% for the third molar. Other studies have, however, reported RP in first mandibular molars.

Some of the common problems encountered during the treatment of Radix Entomolaris are

- 1) Difficulty in Radiographic interpretation.
- 2) Inability to locate the fourth canal.
- 3) Modification in access cavity preparation.
- 4) Confusion in working length determination.

Apart from these difficulties clinicians are prone to commit some iatrogenic errors like straightening of a root canal resulting in loss of working length, ledge formation, zipping, transportation or even perforation.<sup>10</sup>

In this case report, the presence of an extra root was confirmed by radiographs at two different angulations that are mesial and distal. Working length was carefully measured to avoid procedural errors in successive appointments. Minimal preparation was carried out using flexible niti rotary files and obturated. The coronal seal was obtained with composite resin which afterwards restored by full ceramic crown.

After relocation and enlargement the use of flexible nickel-titanium rotary files allows a more centered preparation shape with restricted enlargement of the coronal canal third and orifice relocation. Thus, initial root canal exploration with small files (size 10 or less) together with radiographical root canal length and curvature determination, and the creation of a glide path before preparation, are step-by-step actions that should be taken to avoid procedural errors.<sup>5</sup>

#### 4. Conclusion

The initial diagnosis of a radix entomolaris or paramolaris before root canal treatment is important to facilitate the endodontic procedure, and to avoid 'missed' canals. Preoperative periapical radiographs exposed at two different horizontal angles are required to identify these additional roots. Knowledge of the location of the additional root and its root canal orifice will result in a modified opening cavity with extension to the distolingual. A thorough understanding of the prevalence of RE, its anatomical variations as well as radiographic and clinical diagnosis will provide the clinician with a better understanding of its complexity in order to ensure successful treatment outcomes.

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