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**Misconception in general practitioner, Radix Entomolaris –  
A Case report.**

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**Abstract**

Root canals may be left untreated during endodontic therapy if the dentist fails to identify their presence, particularly in teeth with anatomical variations or extra root canals. Therefore, practitioners must be familiar with all molar abnormalities, as well as their prevalence & a proper radiographic examination for their correct diagnosis must be carried for a successful endodontic treatment. A major anatomical variant of the two-rooted mandibular first molar is a presence of third root. The molar with third root placed distolingually are called as Radix Entomolaris. This report discusses endodontic management of three mandibular molars with a distolingual root. The prevalence, the external morphological variations and internal anatomy of the radix entomolaris and paramolaris are described.

**Key words** - Anatomical variations, endodontic treatment, mandibular molar, radix entomolaris, radix paramolaris.

## Introduction

Thorough debridement of the root canal system and a complete & three dimensional obturation of the pulp space are the primary requisites of a root canal treatment(1). One of the main reasons for failure of root canal treatment in molars is failure in removal of pulpal tissue and microorganisms from the root canal system (2 Cohen & Brown 2002). The primary reason for this to occur is Failure to identify their presence in teeth with Anatomical variations (3). An awareness and understanding of the presence of unusual root canal morphology can thus contribute to the successful outcome of root canal treatment.

It is known that the mandibular first molar can display several anatomical variations. Most Caucasian mandibular 1st and 2nd molars have 2 roots, with 2 mesial canals and 1 distal canal (4,5). A major variant in this group is, the presence of a third root in the permanent first molar, a supernumerary root which is found distolingually. This macrostructure was first reported in the literature by Carabelli in 1844 (6) and is called Radix Entomolaris (RE) (7). If an additional root is present at the mesiobuccal side, it is called the radix paramolaris (RP). De Moor et al (8) has classified radix entomolaris on the basis of morphologic curvature of RE into three types. 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. The current article discusses endodontic therapy of three cases of RE, each case belonging to a different type of RE as described by De Moor et al ( fig 1).

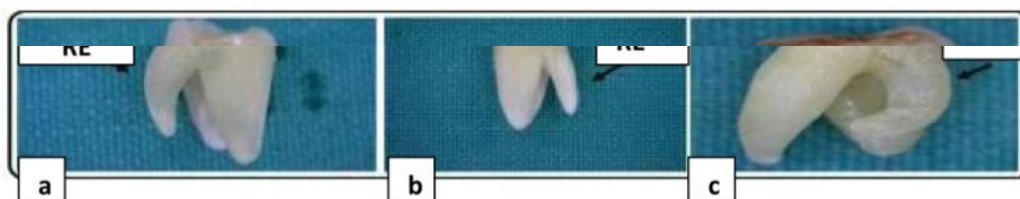


Figure 1. Clinical images of extracted mandibular molars with a radix entomolaris.

(A) first molar with a Type I radix entomolaris (B) first molar with a Type II radix entomolaris (C) first molar with a Type III radix entomolaris

## CASES

### Case I

A 25-year-old female was referred for endodontic treatment of the mandibular right first molar to Department of Conservative Dentistry with complaint of severe discomfort with the same tooth. The clinical and radiographic examinations revealed mandibular right first molar with deep occlusal caries and showed no signs of apical periodontitis. Vitality test were suggestive of pulpal necrosis. Careful examination of the preoperative radiograph revealed the presence of a third distolingual root (RE) with a type I canal morphology. Root canal treatment was planned for the tooth. The access opening was made trapezoidal instead of the traditional triangular form in order to locate the second distal canal (RE) which is located far too distolingually than its usual position (fig 2). Two distal and two mesial canal orifices were located using an endodontic explorer (DG16 Endodontic Explorer, Dentsply). Root canal length was determined and the root canals were shaped with ProTaper rotary instruments (Dentsply Maillefer). During preparation, EDTA GEL was used as a lubricant and the root canals were disinfected with a sodium hypochlorite solution (2.5%).

The root canals were filled with gutta-percha and AH26 (De Trey Dentsply, Germany) using hybrid condensation with gutta-percha condensers (Dentsply Maillefer). Post obturation IOPA was taken, & cavity was sealed with Fuji IX glass ionomer cement. (GC Corp. Japan).



Fig-A



Fig-B



Fig-C

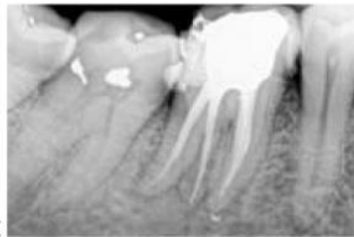


Fig-D



Fig-E

Figure 2. (A) occlusal view of a traditional mandibular molar access cavity. (B) Four files placed in the trapezoidal mandibular molar access cavity revealing orifice of radix entomolaris. (C) Length determination radiograph of first molar with a Type I radix entomolaris. (D) Postobturation radiograph of Type I radix entomolaris (E) Post endodontic restoration with radix.

## Discussion

The high frequency of a fourth canals in mandibular first molars makes it essential to anticipate and find all canals during molar root canal treatment (9). The possibility of an extra root should also be considered and looked for carefully.

## Prevalance

The frequency of this trait varies from 5% to 40% in people of different races (1,10) (table 1). A survey was done in the Department of Conservative dentistry to study the incidence of radix entomolaris in Vidharbh population. In a course of two years (2008-09), out of 1938 mandibular molars which undergone root canal treatment, 62 were diagnosed with radix entomolaris. Thus incidence of 3.2% was found in Vidharbh population.

Table 1. Prevalence of Radix Entomolaris in different populations.

Europeans	3.4–4.2%	Mongoloid traits	5%to >30%.
Africans	3%		
Eurasian & Indian	< 5%.		
Vidharbha population ( Survey done in Dept. of Conservative Dentistry)			3.2%

### Morphology of the Radix Entomolaris

The RE is located distolingually, with its coronal third completely or partially fixed to the distal root. The dimensions of the RE can vary from a short conical extension to a 'mature' root with normal length and root canal. A classification by Carlsen and Alexandersen (12) 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 nonseparate RE.

### Clinical Approach

The treatment begins with an accurate diagnosis of these supernumerary roots which can avoid preoperative radiograph (3). Interpretation of particular marks or characteristics, such as an unclear view or outline of the distal root contour or the root canal, can indicate the presence of a 'hidden' RE. To reveal the RE, a second radiograph should be taken from a more mesial or distal angulation of 30 degrees (3) ( Fig 3). Thorough clinical inspection of the tooth crown and analysis of the cervical morphology of the roots by means of periodontal probing can also facilitate identification of an additional root. An extra cusp (tuberculum paramolare) or more prominent occlusal distal or distolingual lobe, in combination with a cervical prominence or convexity, can indicate the presence of an additional root (1).

The location of the orifice of the root canal of an RE has implications for the opening cavity (Fig. 5). The orifice of the RE is located disto- to mesiolingually from the main canal or canals in the distal root. An extension of the triangular opening cavity to the (disto) lingual results in a more rectangular or trapezoidal outline form. Thorough inspection of the pulp chamber floor and wall, especially in the distolingual region, is necessary. Visual aids such as a loupe, intra-oral camera or dental microscope can be quite useful. A dark line on the pulp chamber floor can indicate the precise location of the RE canal orifice (1). An initial relocation of the orifice to the lingual is indicated to achieve straight-line access. A severe root inclination or canal curvature, particularly in the apical third of the root (as in a type III RE), can cause shaping aberrations such as straightening of the root canal or a ledge, with root canal transportation and loss of working length resulting. 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.

### Conclusion

The high frequency of a fourth canal in mandibular first molars makes it essential to anticipate and find all canals during molar root canal treatment. The possibility of an extra root should also be considered and looked for carefully. Proper angulation and interpretation of radiographs help to

identify chamber and root anatomy. In the case of an RE the conventional triangular opening cavity must be modified to a trapezoidal form in order to better locate and access the distolingually located orifice of the additional root. Straight-line access, in this respect, has to be emphasized as the majority of the radices entomolaris are curved. The morphological variations of the RE in terms of root inclination and root canal curvature demand a careful and adapted clinical approach to avoid or overcome procedural errors during endodontic therapy.

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