

# Radix Entomolaris: An Endodontic Challenge

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## ABSTRACT

Variation of root canal anatomy is always a challenge for accurate diagnosis and successful endodontic therapy. A thorough knowledge of most common anatomic characteristics and their possible variations is essential for the clinician. The hard tissue repository of the human dental pulp takes on numerous configurations and shapes. These aberrations occur so often that they can be considered as normal anatomy. Radix Entomolaris (RE) is one such aberration where an extra root is present on the distolingual aspect of mandibular first molar (molar with 3 roots). This article presents two case reports of mandibular first molars with extra roots which was successfully treated.

**Key words:** *Radix entomolaris, anatomic variations, extra roots, endodontic treatment.*

## INTRODUCTION :

The treatment of the entire root canal system is essential to maximize the possibility of obtaining success in the endodontic therapy. It is necessary for the clinician to have a thorough knowledge of the dental anatomy as well as of its variations.<sup>1</sup> Anatomical variations are an acknowledged characteristic of mandibular permanent molar. Most mandibular first and second molars in Caucasians have two roots with two mesial canals and 1 distal canal. The presence of a third root in the permanent first molar is the major variant in this group.<sup>2</sup> This additional third root, first mentioned in the literature by Carabelli (1844), is called the Radix Entomolaris (RE), located distolingually in the mandibular molars, mainly first molars. An additional root at the mesiobuccal side is called the Radix paramolaris (RP). The identification and external morphology of these root complexes containing a buccal or lingual supernumerary root are described by Carlsen and Alexandersen.<sup>3</sup> The frequency of this trait is less than 5% in Caucasian, African, Eurasian and Indian populations, whereas it occurs in 5% to more than 40% of people of Mongolian origin. Gulabivala and others recently reported that 13% of mandibular first molars in people of Thai origin have a third distolingual root. Such a variant has not been reported for a mandibular second molar, but it is found (rarely) in a mandibular third molar.<sup>2</sup> The present report describes endodontic treatment in two cases of mandibular first molar with three roots (1 mesial and 2 distal) and four canals (2 mesial and 2 distal).

## CASE REPORTS:

### Case 1:

A 35-year-old male patient reported to the Deptt. of Conservative dentistry, H.P.G.D.C. Shimla with complaints of pain on chewing in left lower posterior tooth.

On clinical examination, there was a deep occluso-mesial caries in mandibular left first permanent molar (36). Tooth was tender on percussion. Radiograph revealed the presence of widened periodontal ligament space (PDL) space in the mesial roots. (Fig. A). The condition was diagnosed as acute periapical periodontitis and the treatment plan was endodontic therapy followed by full coverage restoration.

After achieving adequate local anesthesia with 2% lidocaine, conventional triangular access cavity preparation was done and the root canal orifices were located. An additional bleeding spot was observed distolingual to the distal canal orifice. The access cavity was then modified to a trapezoidal outline and the distolingual canal orifice was located and negotiated with a size 10 K file. The canal lengths were determined radio-graphically. The canals were then cleaned with 3% sodium hypochlorite and shaped with Protaper rotary system (Dentsply, Maillefer) till size F2 using Glyde (Dentsply, Maillefer) as a lubricant.

The canals were dried with paper points and were obturated with protaper gutta percha points and AH plus sealer (Dentsply DeTrey, Konstanz, Germany) using lateral condensation technique. Initially, the distolingual root canal was thought to be a second canal in one distal root since radiographically the outlines of the distal roots were unclear. However, the unusual location of the orifice far to the distolingual indicated a supernumerary root and the presence of an RE was confirmed in a postoperative radiograph (Fig.B).

### Case 2:

A 25-year-old female patient had come to the Deptt. of Conservative dentistry, H.P.G.D.C. Shimla with complaint of decay in lower right posterior tooth which was painful on taking hot beverages. Clinical examination revealed deep

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disto-occlusal caries in mandibular right first permanent molar (46) and the tooth was tender on percussion. Intraoral periapical (IOPA) revealed the presence of deep caries involving the pulp, widening of PDL space in relation to the mesial and distal roots. IOPA also revealed the presence of a third root between the mesial and distal roots (Fig. C). Diagnosis was acute periapical periodontitis in 46 and the treatment planned was endodontic treatment followed by full coverage restoration.

Under local anesthesia with 2% lidocaine access opening was done in 46. The first distal canal was found slightly away from the center (buccally) indicating the presence of the other canal on the lingual side. The access cavity preparation was modified from a triangular to trapezoidal outline form and the fourth canal was located. The root canals were located with DG16 endodontic explorer and the patencies of the canals were verified with an size 15 K file. The canal lengths were determined radiographically. The canals were then cleaned with 3% sodium hypochlorite and shaped with protaper rotary system (Dentsply, Maillefer) till size F2 using Glyde (Dentsply, Maillefer) as a lubricant.

The canals were dried with paper points and were obturated with protaper gutta percha points and AH plus sealer (Dentsply DeTrey, Konstanz, Germany) using lateral condensation technique.(Fig.D)

## DISCUSSION:

### Prevalence of the radix entomolaris and paramolaris

The presence of a single Radix Entomolaris in the mandibular first molar has been associated with determined ethnic groups. In Black populations, the maximum frequency found is 3%<sup>4</sup>, while in Caucasians and Indians, the occurrence is lower than 5%<sup>5</sup>. In Chinese, Eskimos, and American Indian population, studies have shown that radix entomolaris occurs in a constancy ranging from 5% to more than 30%<sup>6</sup>. Because of its high frequency in these populations, the radix entomolaris is considered normal (eumorphic root morphology). In Caucasians, the radix entomolaris is not common with maximum occurrence from 3.4 to 4.2%,<sup>7, 8</sup>. The aetiology behind the formation of radix entomolaris is still uncertain; it can be related to external factors during odontogenesis or to the penetration of an atavistic gene or polygenic system (atavism is the reappearance of a trace after several generations of absence). In eumorphic roots, racial genetic factors influenced the deepest expression of a particular gene which results in the most accentuated phenotypic manifestation<sup>9, 10</sup>. Curzon<sup>11</sup> suggested that the “molar of three roots” has a high degree of genetic trace penetrance; its domain reflected in the fact of

which the trace prevalence was similar in pure Eskimos and in the mixture of Eskimos with Caucasians. The radix entomolaris may be found in the first, second and third mandibular molar; its less occurrence is in the second molar<sup>12</sup>. Some studies reported a bilateral occurrence of radix entomolaris of 50-67%<sup>13,14</sup>. Bolk<sup>15</sup> reported the presence of an additional root located at the buccal surface: the radix paramolaris. This macrostructure is very rare and occurs less frequently than the radix entomolaris. The prevalence of the radix paramolaris, as observed by Visser<sup>12</sup>, was of 0% for the mandibular first molar, 0.5% for the second molar, and 2% for the third molar. Other studies<sup>4</sup>, however, reported the radix paramolaris in mandibular first molars.

### Morphology of radix entomolaris

The radix entomolaris is located distolingually, with its total or partial coronal third fixed to the distal root. The dimensions of the radix entomolaris varied from a short tapered extension to a mature root with normal length.

In most of the cases, the pulp extension is radiographically visible. Generally, the radix entomolaris is smaller than the disto- and mesiobuccal roots and may be separated from the other roots, or partially fused to them. Visual magnifications, such as magnifying glasses and operating microscopes<sup>16</sup>, as well as the use of computed tomography are important tools for the identification of extra canals by the clinicians<sup>17</sup>.



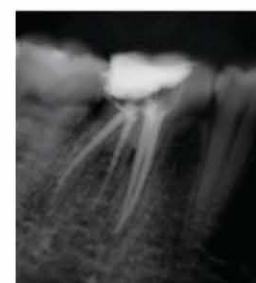
A. Preoperative IOPA 36



B. Post-obturation IOPA 36



C. Preoperative IOPA 46



D. Post-obturation IOPA 46

## CONCLUSION:

Clinicians should be aware of these unusual root morphologies in the mandibular first molars in Caucasian people. 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. 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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