

## Case Report

# Radix Entomolaris in mandibular molars: An Endodontic Challenge

\*Shirin Sultana Chowdhury,<sup>a</sup> Md. Nazmul Hasan,<sup>b</sup>

a. Associated Professor, Department of Conservative Dentistry & Endodontics, Update Dental College & Hospital, Dhaka.

b. Assistant Professor & Head, Department of Orthodontics & Dentofacial Orthopedics, Update Dental College & Hospital, Dhaka.

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### ABSTRACT:

Mandibular molars can have additional root located (lingually) the radix entomolaris). If present, an awareness and understanding of this unusual root canal morphology can contribute to the successful outcome of root canal treatment. The root is typically smaller than the distal root and is usually curved, requiring special attention when root canal treatment is being considered for such a tooth. The aim of the paper is to present a case of permanent mandibular first molar with additional third root.

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### Introduction:

A thorough understanding of root canal anatomy and morphology is required for achieving high level of success 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 commonest possible variations. The majority of mandibular first molars are two-rooted with one mesial and one distal root with two mesial and one distal canal. The major variant in this tooth type is the presence of an additional third root: a supernumerary root is found lingually (referred as distolingual root). This rare macrostructure, which is first mentioned in the literature by Carabelli<sup>1</sup>, is called Radix Entomolaris

The identification and external morphology of these root complexes, containing a lingual supernumerary root, often create problem in non-surgical management resulting an uncertain treatment outcome.<sup>2</sup> One of the main reasons for failure of root canal treatment and even tooth loss of molars is because of incomplete removal of pulp tissue and microorganisms from all the root canals.<sup>3</sup> The prevalence varies in different races and populations, and can range from about 3% in the Caucasians<sup>4</sup>, to about 20% in the Mongoloid groups and 5-30% in Americans and<sup>5-11</sup> and less than 5% in Indian populations. Although this macrostructure is rare in our population, knowledge of their occurrence and location are important.<sup>2</sup>

### Case Report:

A 13-year-old male patient reported to the Department of Conservative Dentistry and Endodontics, Update Dental College, complaining of pain in the left lower back tooth. On clinical examination, gross carious lesion in the permanent mandibular left first molar was found. The tooth was sensitive to percussion, but there was no referred pain. Periapical radiograph was taken from mesial angulation, which revealed presence of an additional distolingual

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#### \*Address of Correspondence:

**Dr. Shirin Sultana Chowdhury**

Associate Professor,

Department of Conservative Dentistry & Endodontics,

Update Dental College & Hospital,

Turag, Dhaka-1711

Email: [shumi1177nnn@gmail.com](mailto:shumi1177nnn@gmail.com)

Phone: 01716435598

root, which was curved and shorter than the main distal root (Figure 1). Based on the literature evidence this supernumerary distolingual root was diagnosed as Radix Entomolaris. The tooth was anesthetized. The pulp chamber was opened. When the floor of the pulp chamber was reached, three canal orifices were initially identified. On further exploration, a second distal canal was found which was located more lingually (Figure: 2). To have proper location of orifice, and straight line access of this third root, access cavity was modified from conventional triangular to trapezoidal form with more extension to lingual side. Initial negotiation of the root canals was performed with a K-file ISO 15. Although the coronal enlargement and relocation of the canal orifices allowed straight-line access in three (2 mesial, 1 distal) canals, insertion of the file in the fourth, distolingual canal showed a more



**Figure 1:** Pre operative radiograph showing hazy root outline at distal aspect.



**Figure 2:** Intra oral photograph showing four canal orifices clearly.

lingually oriented access inclination. Radiographic length measurement was performed (Figure 3). All canals were prepared in crown – down method with pro-taper hand instruments. After canal preparation, root canals were irrigated with 2.5% sodium hypochlorite solution. The gutta-percha cone fit, with, confirmed the presence of third root (RE) (Figure 3). The root canals were filled with gutta-percha which was revealed by radiographical exposure 30 degrees from the mesial where the radix entomo radiographical exposure 30 degrees from the mesial was clearly evident.) figure: 4) and after obturation the access cavity also showed four points of gutta percha. Endodontic access cavity was then sealed with amalgam restoration. After one year follow up, there was no change in the root canal treated 36 both clinically and radiographically.



**Figure 3:** Photograph of working length determination. Two separate roots can be distinguished when radiograph is exposed 30° from mesial arrow.



**Figure 4:** Post operative radiograph of Radix Entomolaris.



**Figure 5:** Intra oral photograph after obturation of root canal showing four sealed canal orifices.

### Discussion:

The presence of a separate RE in the first mandibular molar is associated with certain ethnic groups. In African populations a maximum frequency of 3% is found<sup>4</sup>, 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%.<sup>5-11</sup> 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%<sup>12,13</sup>, 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.<sup>14,15</sup>

Curzon suggested that the 'three-rooted molar' trait has a high degree of genetic penetrance as its dominance was reflected in the fact that the prevalence of the trait was similar in both pure Eskimo and Eskimo/ Caucasian mixes.<sup>16</sup>

Radix entomolaris can be found in first, second and third molar occurring least frequently in

second molar.<sup>17</sup> Some studies report a bilateral occurrence of RE from 50-67%.<sup>18,9</sup>

The RE is located distolingually, with its coronal third completely or partially fixed RE can vary from a short conical extension to a 'mature' root with normal length and root canal. In apical two thirds of the RE, a moderate to severe mesially or distally oriented inclination can be present.<sup>19</sup>

The presence of third root (RE) has clinical implications in endodontic treatment. An accurate diagnosis of this supernumerary root can avoid complications or a 'missed canal' during root canal treatment. There may be some identification tools which can help us to find out the structure. These are some anatomical landmarks) Extra cusp, Prominent disto-lingual lobe, Cervical convexity, Complex external contour of furcation) careful examination of pre operative radiograph, dentinal mapping and some advancements for diagnosis. A thorough inspection of pre-operative radiograph and interpretation of particular marks such as unclear view or outline of distal root contour can indicate the presence of hidde RE) To reveal RE, a second x-ray should be taken from a more mesial or dista angle ) 30 degrees).

Apart from these clinical of the tooth crown and analysis of the cervical morphology by means of periodontal probing can facilitate identification of an additional root. An extra cusp )tuberculum paramolare) or most prominent distolingual lobe can indicate RE.<sup>20</sup> Predictably successful root canal treatment is dependent on following the basic principles: access, cleansing and shaping, and obturation of the entire root canal system. Of the three, perhaps the most important is the principle of 'straight-line' access (19). It should be emphasized that the ultimate objective of endodontics is to provide access to the apical foramen and not merely to locate the canal orifice. The location of the orifice of the root canal of the RE has implications for the opening cavity also. With the distolingually located orifice of the RE, a modification of the classical triangular opening cavity to a trapezoidal form in order to better locate and access the root canal is essential; straight line access in this respect, has to be emphasized as majority of Radices

Entomolaris are curved. Visual aids such as loupe, intra-oral camera or dental microscope can be helpful. Without Successful diagnosis of RE there is every chance of endodontic failure as well as risk of perforation and stripping at coronal third.<sup>20</sup> Other clinical difficulties envisaged would relate to extraction and orthodontic procedures, where the extra root would render extraction difficult and possible fracture of the distolingual root, because of its curvature and movement difficult because of its presence.<sup>21</sup>

### CONCLUSION:

Clinicians should be aware of these unusual variation of root morphology in mandibular molars. The initial diagnosis of radix entomolaris before root canal treatment is most important to facilitate the endodontic procedure and to avoid missed canal. Preoperative periapical radiograph at two different horizontal angles are required to identify these additional root. Proper knowledge of the location of RE and its root canal orifice will result in modified access cavity with extension to the disto-lingual. The morphological variation of the mandibular molars demand a careful and adapted approach to avoid or overcome procedural errors during endodontic therapy.

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