

## CASE REPORT

# Endodontic Management of a Rare Anatomic Variation of Radix Entomolaris in Mandibular First and Second Molar using Cone-beam Computed Tomography as a Diagnostic Aid

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## ABSTRACT

Radix entomolaris (RE) is the presence of an extra root in the lingual aspect of the mandibular molars. This is a rare anatomic variant, prevalence of which ranges between 5.96 and 6.67% in the Indian population. For a successful endodontic management, detection of these extra roots is important. In conventional radiography, these extra roots tend to be overlapped; thus, cone-beam computed tomography (CBCT) provides a noninvasive technique to study the internal and external anatomy and aids in proper detection. The endodontic treatment of RE requires some modifications in the endodontic treatment as compared with the common two-rooted anatomic variant. This article presents a clinical case report of successful detection and endodontic management of mandibular first and second molar with extralingual root using CBCT as a diagnostic tool. This case report involves the endodontic treatment and presence of extra roots in both the mandibular first molar and second molar simultaneously in a single patient of Indian origin, which is a rare finding and has not been reported in endodontic literature till date.

**Keywords:** Anatomic variation, Cone-beam computed tomography, Mandibular first and second molar, Radix entomolaris.

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## INTRODUCTION

Teeth do not always have same internal anatomy. A standard model for tooth anatomy should not be followed as variations do exist, which is important to be considered for successful endodontic treatment. Mandibular molars may be present with different anatomic variations like

middle mesial canal, middle distal canal, C-shaped canal, and various other supplementary canals. An extra root canal may be present with or without extra root. Presence of an extra root on the lingual side of mandibular molar is known as radix entomolaris (RE) while on buccal side is radix paramolaris which was first described by Carabelli in 1884.<sup>1</sup> Undetected extra root canals can result in failure of endodontic therapy; thus, a clinician must be aware of these anatomic aberrations that can exist in the mandibular molars to prevent complications from missed canals.<sup>2</sup> The prevalence of RE in mandibular first molar in Indian population ranges between 5.97 and 6.67%, whereas it is rare in second molars; the bilateral occurrence of RE can vary from 37.14 to 67%.<sup>3</sup> The extra root is many times overlapped in conventional radiography; therefore, to prevent such misdiagnosis cone-beam computed tomography (CBCT) can be used. A tooth where such anatomical aberration is suspected, CBCT provides a noninvasive technique that can help in identification of internal and external anatomy of tooth.<sup>4</sup> This article presents a clinical case report dealing with the utilization of CBCT in successful detection and endodontic management of mandibular first and second molar with extralingual root. This case also reports the presence of extra roots in both the mandibular first and second molar concurrently, which is a very rare finding and is being reported for the first time in endodontic literature.

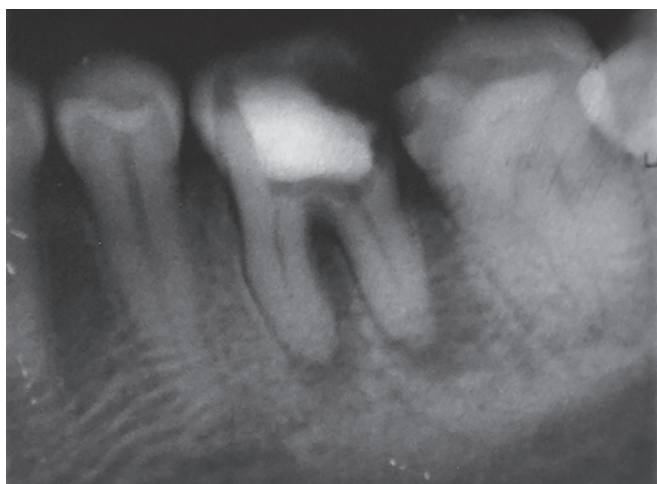
## CASE REPORT

A 24-year-old female patient of Indian origin after initiation of endodontic treatment was referred to the Department of Conservative Dentistry and Endodontics, People's College of Dental Sciences and Research Centre, Bhopal, India, from a private dental clinic. The patient had a chief complaint of pain in lower right back tooth region since 3 months. The pain was aggravated on chewing and on cold and hot food consumption. Clinical examination revealed temporary restoration over 46 and deep dentinal caries with 47. On vertical percussion, 47 was tender and there was no evidence of vestibular or extraoral swelling. The patient had discontinued endodontic treatment 3 months ago and her medical

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**Fig. 1:** Preoperative IOPA radiograph with 46 and 47



**Fig. 2:** 3D reconstruction of right mandibular segment from buccal aspect showing RE root in the lingual aspect of 46



**Fig. 3:** 3D reconstruction of right mandibular segment from lingual aspect showing RE root of 46 and 47 (RE marked with red arrows)



**Fig. 4:** Axial section of CBCT at midapical region showing root canal configuration and presence of RE root in the lingual aspect marked in red arrows in 46, 47, and 36. The presence of bilateral RE in the first molars can also be seen, i.e., 46 and 36

history was noncontributory. Pulp sensitivity tests were performed and intraoral periapical (IOPA) radiographs were taken that led to a diagnosis of a chronic periapical lesion in 46 and irreversible pulpitis with acute apical periodontitis in 47. There was an impression of double periodontal ligament in distal root of 46 and a hazy outline of distal root of 47. The possibility of extra roots was suspected and CBCT was advised to confirm the diagnosis (Fig. 1).

Cone-beam computed tomography revealed the details three dimensionally and slices were obtained in coronal/axial and transverse sections. The presence of extra root was confirmed and viewed in buccal aspect (Fig. 2) and lingual aspect (Fig. 3). The axial section confirmed the root canal configuration and the RE root was present distolingually in the tooth 46, 47, and 36. A bilateral presence of RE in the first molars was seen and unilateral presence of RE in the second molar was seen (Fig. 4). Transverse sections confirmed the root canal

pattern which corresponded to Wein's type I anatomy and type I category of RE as described by De Moor et al.<sup>5</sup>

After the confirmation of findings from CBCT, the endodontic treatment was initiated in 46 and 47. The tooth was anesthetized and isolated under rubber dam and access cavity was prepared. Since the RE was present more distolingually the shape of access cavity was modified to a trapezoidal shape extending in a distolingual direction to approach the RE orifice. Biomechanical preparation was done using ProTaper Universal files and K-file (Dentsply Maillefer, Switzerland) in a crown down fashion and working length was established through electronic apex locator (Root ZX, JMorita, Japan) and confirmed with IOPA radiograph. The canals were irrigated with 2.5% sodium hypochlorite and 17% ethylenediaminetetraacetic acid (Canalarge, Ammdent, Italy) during cleaning and shaping. Calcium hydroxide was placed to disinfect the root canals as an intracanal medicament. The canals were prepared and master cone IOPA radiograph was taken

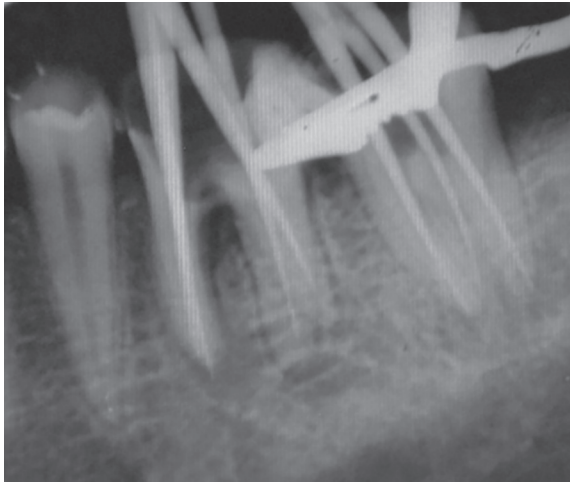


Fig. 5: Master cone radiograph of 46 and 47

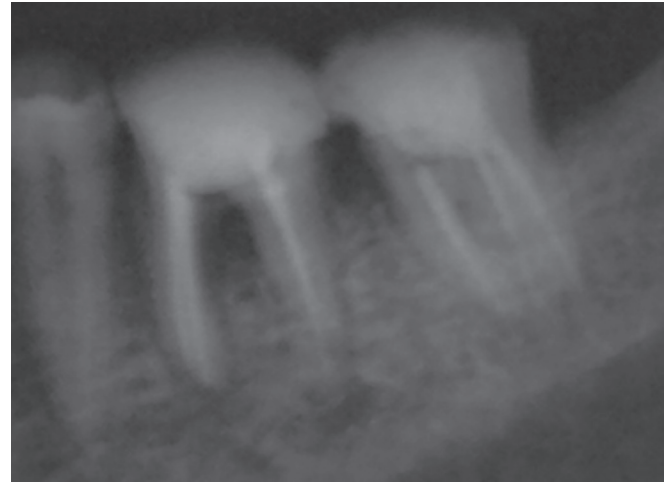


Fig. 6: Obturation radiograph of 46 and 47

(Fig. 5), obturation was done using gutta-percha points (Densply Mallefer, Switzerland) and endodontic sealer (AH Plus, Densply, Mallefer, Switzerland) by single-cone cold condensation technique, and access cavity was sealed with composite (Fig. 6). After 1 month, the patient was recalled for follow-up and was asymptomatic upon clinical examination.

## DISCUSSION

Radix entomolaris shows an ethnic predilection; it is considered to be a Mongolian trait as it is present in maximum frequency in that population, while in Black population the prevalence is 3%.<sup>6</sup> The etiology behind the formation of RE is still unclear; it can be related to external factors during odontogenesis or to the penetration of atavic gene or polygenic system.<sup>7</sup> Cruzon<sup>8</sup> suggested that the molar of three roots has a high degree of genetic penetrance, its domain reflected in the fact of which the trace prevalence was similar in pure Eskimos and in the mixture of Eskimo and Caucasian. Radix entomolaris is a rare clinical entity in Indian population, the prevalence varies from 5.56 to 6.67%<sup>3</sup> and even rare in second and third molars.<sup>9</sup> The bilateral occurrence was reported by Steelman<sup>10</sup> and Yew and Chan<sup>11</sup> to be around 50 to 67%.

Although radiographs at different angulations reveal basic information regarding the anatomy of tooth, Slowley<sup>2</sup> has demonstrated the difficulty to detect extra-cannally by radiographs alone, as they provide a two-dimensional image of a three-dimensional (3D) structure. Cone-beam computed tomography overcomes this disadvantage and depicts the image in three dimensions, which can be viewed in coronal, sagittal, and oblique or curved image frame referred as multiplanar reformation.<sup>12</sup>

The mandibular molars with extra roots have been classified by Carlsen and Alexandersen<sup>13</sup> and DeMoor et al,<sup>5</sup> there is a need to modify the endodontic treatment for different types of RE as they present with a different

morphology, these classifications help to identify the type of radix and case difficulty.

Classification of RE by Carlsen and Alexandersen:

- *Type I*: The RE is located lingually to the distal root complex which has two cone-shaped macrostructures.
- *Type II*: The RE is located lingually to the distal root complex which has one cone-shaped macrostructure.
- *Type III*: The RE is located lingually to the mesial root complex.
- *Type AC*: The RE is located lingually between the mesial and distal root complexes.

Classification of RE by De Moor et al based on root curvature modified from Riberio et al classification:

- *Type I*: A straight root or root canal.
- *Type II*: A curved coronal third which becomes straighter in the middle and apical third.
- *Type III*: An initial curve in the coronal third with a second buccally oriented curve which begins in the middle or apical third.

Endodontic management needs to be modified when RE is detected, which involves a trapezoidal-shaped access cavity outline to approach the distolingually located RE orifice.<sup>14</sup>

## CONCLUSION

While treating the mandibular molars endodontically, it is an important prerequisite to be aware of the prevalence and detection of anatomical variants and the strategies to manage the extra structures. Cone-beam computed tomography provides a noninvasive aid to diagnose the external and internal structural aberrations and can be used to identify the presence of RE. In Indian population, it is a rare occasion to encounter an RE concurrently in first and second mandibular molars; when such an aberrant anatomy is presented, adequate diagnosis should be done and modifications in the conventional endodontic treatment should be done.

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