Three Rooted Mandibular Molar; Radix Entomolaris and Paramolaris
Sujatha Irodi, Aamina Zoya Farook

Abstract
Mandibular molars can have an additional root located lingually (the radix entomolaris) or buccally (the radix paramolaris). This report discusses endodontic treatment of three rooted mandibular molars with Radix Entomolaris and Paramolaris, both of which are rare macrostructures.

Key Words: Anatomical Variations; Mandibular Molars; Radix Entomolaris; Radix Paramolaris; Endodontic Treatment.

Introduction
The majority of mandibular first molars are two rooted with one mesial root and one distal root.(1) The number, location of roots and root canals of these teeth may vary. An additional third root in mandibular molar was first mentioned in the literature by Carabelli, is called the Radix Entomolaris (RE).(2) In RE the supernumerary root is located distolingual to the mesial root of the mandibular molars. Similarly an additional root at the mesiobuccal side of the distal root of the mandibular molar is called the Radix Paramolaris (RP).(3)

The prevalence of these three-rooted mandibular first molars appears to be less than 3% in African populations, not to exceed 4.2% in Caucasians, to be less than 5% in Eurasian and Asian populations, and to be higher than 5% (even up to 40%) in populations with Mongolian traits(3) and 5.97% in Indian population.(4) Because of its high frequency in these populations, the RE is considered to be a normal morphological variant.(4, 5) In this report morphology, clinical approach to diagnosis and endodontic treatment of RE and RP are presented.

Case Report 1
A 28 year old female patient reported to the Department of Conservative Dentistry and Endodontics, with a complaint of pain in the right lower back tooth region. She gave a history of intermittent pain for the past one month, which had increased in intensity since two days. On examination, the right mandibular first molar displayed a restoration with tender on percussion. Thermal and electrical pulp testing of the tooth elicited a negative response. The pre-treatment radiograph showed widening of the periodontal ligament space and an additional root between the mesial and distal roots. Two radiographs with different horizontal angulations were made which confirmed that the additional root was located distolingual to the mesial root. A diagnosis of a nonvital right mandibular first molar with apical periodontitis was made and endodontic treatment was planned.

The tooth was anaesthetized and then isolated under rubber dam. The restoration was removed and access cavity was prepared using an endo access bur. One distal and two mesial canal orifices were located using an endodontic explorer. Upon close inspection a dark line was observed between the distal canal orifice and the distolingual corner of the pulp chamber floor. At this corner overlying dentin was removed and a second distal canal orifice was detected. The canal lengths were determined using radiograph and an apex locator. Cleaning and shaping was performed using protaper rotary instrument in crown down technique. Irrigation between each instrument was done using 2.5% sodium hypochlorite and 17% EDTA. After the master cone selection canals were obturated with laterally condensed gutta-percha and AH plus sealer (Fig 1). Post endodontic restoration was placed and patient was recalled for follow up and placement of full coverage crown.

Case 2
A 52 year old female patient reported to the department with the complaint of pain in the lower left back tooth region. Patient gave a history of pain since two weeks and had a temporary restoration done by a private dentist. Pre-operative radiograph revealed a restoration close to the pulp with a faint outline of an additional root overlapping the mesial and distal roots. Clinical, radiographic examination and pulp testing of left mandibular second molar revealed that the tooth was symptomatic and endodontic treatment was planned.
The tooth was anaesthetised and isolated under rubber dam. The temporary restoration was removed and the access cavity was prepared. On inspection of the pulp chamber floor centrally placed two canal orifices (one mesial and one distal) were detected initially. A small hemorrhagic spot was noted buccally between the distal and the mesial orifices on the pulp chamber floor. Bubbles were noted when a drop of sodium hypochlorite was placed on the hemorrhagic spot (Champagne bubble test) and the opening was confirmed as a buccal canal orifice. Working length determined using radiographs and an apex locator, cleaning and shaping was done using rotary protaper files. Canals were irrigated with 2.5% sodium hypochlorite and 17% EDTA. After selecting the master cones, canals were obturated with gutta-percha and AH plus sealer using lateral condensation technique (Fig 2). The access cavity was restored and patient was recalled for follow up and further treatment.

**Fig 1 Case 1**  
**Fig 2 Case 2**

**Discussion**

RE and RP can be found on the first, second and third mandibular molar, occurring least frequently on the second molar. Bilateral occurrence of the RE ranges from 50 to 67%.(2) In this report a case of mandibular first molar with one mesial root, two distal roots and one case of mandibular second molar with one mesial, one distal and one buccal root are described.

Morphology of the RE and RP: The dimensions of RE and RP root may vary from a short conical extension to a ‘mature’ root with normal length and root canal. A classification by Carlsen and Alexandersen describes four different types of RE according to the location of the cervical part of the RE which allows for the identification of separate and non-separate RE.(2, 6) Type A and Type B refer to a distally located cervical part of the RE with two normal and one normal distal root components, respectively. Type C: a mesioly located cervical part. Type AC: a central location, between the distal and mesial root components.(6)

Similarly Carlsen and Alexandersen described two different types of RP: Type A: RP in which the cervical part is located on the mesial root complex; Type B: RP in which the cervical part is located centrally, between the mesial and distal root complexes, an additional cusp was present on the buccal side. In the present case reports, case 1 is of Type AC and case 2 is of Type B.(6)

A thorough inspection of the preoperative radiograph and 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. A second radiograph should be taken from 30° mesial or 30° distal angulations.

If an RE or RP is diagnosed before endodontic treatment, a modified access cavity can be prepared and the clinician knows what to expect or where to look for the additional canal once the pulp chamber has been opened. With a good knowledge of law of symmetry and law of orifices, various methods like, visualizing the dentinal map and canal bleeding points, using DG-16 explorer, micro-opener, troughing of the grooves with ultrasonic tips, staining the chamber floor with 1% methylene blue dye, champagne bubble test, magnetic resonance microscopy and micro computed tomography will be useful to locate the canals.(7)

The orifice of the RE is located disto- to mesioly from the main canal or canals in the distal root. In RP the orifice of the buccal root is located mesiobuccally from the distal canal (center of the line connecting mesiobuccal and distal canal orifices). A severe root inclination or canal curvature, particularly in the apical third of the root can cause shaping aberrations such as straightening of the root canal, ledge formation, root canal transportation resulting in loss of working length. Therefore, after the canal location, orifice enlargement and working length determination, flexible nickel-titanium rotary files should be used which allows a more centered preparation with restricted enlargement of the coronal third of the root canal.

**Conclusion**

Clinicians should be aware of the morphological variations of the tooth like additional roots, root canals and their incidence. The morphological variations of
the radix entomolaris and paramolaris in terms of root inclination and root canal curvature demand careful, adapted clinical approach to avoid procedural errors during endodontic therapy.

**Authors Affiliations:** 1. Dr. Sujatha Irodi, M.D.S, Associate Professor, 2. Dr. Aamina Zoya Farook, B.D.S, Postgraduate Student, Department of Conservative Dentistry and Endodontics, Krishnadevaraya College of Dental Sciences, Bangalore, India.

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**Address for Correspondence**

Dr. Sujatha I, M.D.S, 
No 513, 12th Main Road, Sector A, Yelahanka Newtown, Bangalore. Pin- 560106 
Karnataka, India. 
Email: bhatsujatha@ymail.com

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