

The Radix Entomolaris and Paramolaris: Clinical Approach in Endodontics



Medical Science

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ABSTRACT

Mandibular molars can have an additional root located lingually (the radix entomolaris) or buccally (the radix paramolaris). If present, an awareness and understanding of this unusual root and its root canal morphology can contribute to the successful outcome of root canal treatment. This report discusses endodontic treatment of two mandibular molars with a radix entomolaris or paramolaris, both of which are rare macrostructures in the permanent human dentition. The prevalence, the external morphological variations and internal anatomy of the radix entomolaris and paramolaris are described.

Introduction

The prevention or healing of endodontic pathology depends on a thorough chemomechanical cleansing and shaping of the root canals before a dense root canal filling with a hermetic seal. 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. In most cases the mesial root has two root canals, ending in two distinct apical foramina. Or, sometimes, these merge together at the root tip to end in one foramen. The distal root typically has one kidney-shaped root canal, although if the orifice is particularly narrow and round, a second distal canal may be present (3). A number of anatomical variations have been described in the mandibular first molar: Fabra-Campos (4, 5) and Bond (6) reported the presence of three mesial canals and Stroner (7) noted the presence of three distal canals. Like the number of root canals, the number of roots may also vary. An additional third root, first mentioned in the literature by Carabelli (8), is called the radix entomolaris (RE) (9). This supernumerary root is located distolingually in 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 lingual or buccal supernumerary root, are described by Carlsen and Alexandersen (10, 11). The prevalence, external morphological variations and internal anatomy of the radix entomolaris and paramolaris are described. The clinical approach to diagnosis and endodontic treatment are also discussed and illustrated.

Case Report 1

A 24-year-old male patient reported to Department of Conservative Dentistry & Endodontics of Bharati Vidyapeeth Deemed University Dental College and Hospital, Pune with a history of severe pain in the lower-right posterior tooth for few days. Clinical examination revealed bad amalgam restoration on the tooth 46 with recurrent caries on the mesial side of tooth (Figure 1). Pain on percussion was positive. The medical history of the patient was noncontributory. A diagnosis of necrotic pulp with acute apical periodontitis was performed. The Diagnostic X-rays were taken from various horizontal angles (Figures 2), which showed an additional distal root. Local anaesthesia was administered, and the tooth was isolated by a rubber dam. Access cavity preparation was done with an endo access bur no. E0123 and Endo Z (Dentsply Maillefer, Ballaigues, Switzerland). As the first distal canal was buccal, access was modified to locate the other distal canal, on the lingual side.



Figure 1



Figure 2

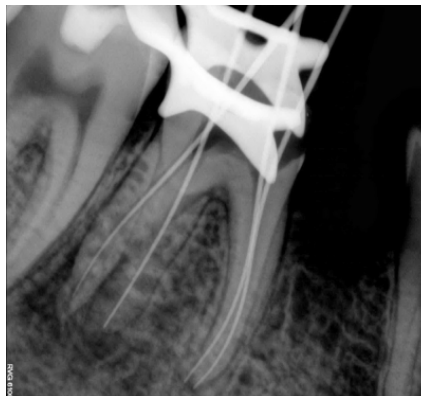


Figure 3



Figure 4



Figure 5

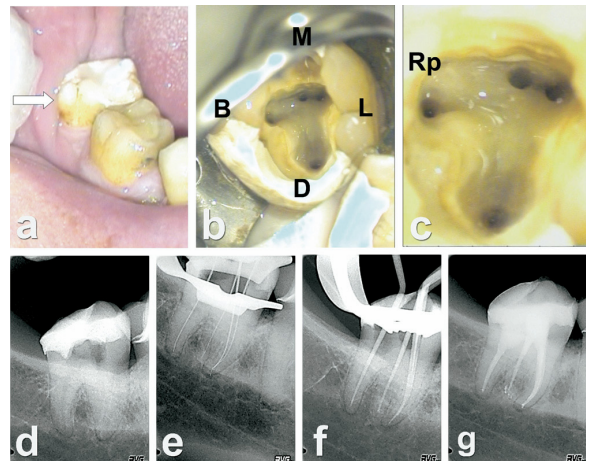
Figure 1 & 2 – Preoperative radiographs, Figure 3 – Working length radiograph, Figure 4 – Master cone radiograph, Figure 5 – Post-obturation Radiograph

The root canals were explored with a precurved K-file ISO number 15 (Dentsply Maillefer). The working length was determined electronically with an apex locator (Root ZXII. JMorita, Suita City, Osaka, Japan) and confirmed by periapical radiography (Figure 3). The root canals were shaped with ProTaper rotary instruments till F1 File (Dentsply Maillefer) and Glyde (Dentsply Maillefer) was used as the lubricant. 5%NaOCl was used for irrigation. Following this a closed dressing of CaOH₂ was given for fourteen days. The CaOH₂ paste was removed by irrigation, and the canals were shaped with F2 instruments. The canals were dried, and a gutta- percha master cone was confirmed radiographically (Figure 4). Then, the canals were obturated (Figure 5) by vertical compaction with an Obtura III device and AH plus Sealer (Dentsply Maillefer), and the access was closed with

glass ionomer cement (Ketac Fil, 3M ESPE, Seefeld, Germany). The post-obturation restoration was done with dental amalgam.

Case report 2

A 45-year-old male patient was referred for endodontic treatment of the lower left second molar before restoration of the crown. The tooth was sensitive to percussion and extensive tooth decay had caused fracture of the distal part of the crown. A temporary coronal filling was placed by the referring dentist. An extra cusp was present on the buccal side of the crown (Fig. A). Radiographically, no signs of periapical pathosis were observed (Fig. D). Upon opening the pulp chamber, three root canals were found; these were enlarged coronally with Gates Glidden burs. The distal part of the temporary filling was left in place, to allow proper rubberdam clamp placement and to prevent leakage during endodontic treatment. Inspection of the pulp chamber wall with a microscope and an angled probe revealed an overlying edge of the pulp chamber roof on the mesiobuccal. The opening cavity was enlarged and another root canal orifice was found (Fig. B, C). Radiographical length determination showed a separate buccal root, identified as an RP (Fig. E). The four root canals were disinfected with sodium hypochlorite solution (5.25%) and EDTA (Salvazol) and shaped with K-files and ProTaper instruments. A temporary calcium hydroxide paste (UltraCal XS, Ultradent) and temporary filling (Ketac Fil) were put in place. Symptoms of pain disappeared and two weeks later the root canals were filled with gutta percha and AH-Plus sealer (thermomechanical condensation) (Fig. F, G). The pulp chamber was sealed with Ketac Fil glass ionomer cement. The patient was referred to his dentist for the permanent restoration of the crown



(A) An extra cusp on the buccal side of the crown (arrow) could indicate the possible presence of a supernumerary root. (B, C) clinical images of the opening cavity with extension to the mesiobuccal to reveal the orifice of the radix paramolaris (M, mesial; B, buccal; L, lingual; Rp, radix paramolaris). (D) Preoperative radiograph. (E) Length determination. (F) Gutta cone fit. (G) Postoperative radiograph.

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 (13), while in Eurasian and Indian populations the frequency is less than 5% (14). 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% (14 – 20). 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% (21, 22), 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 (19, 23). An RE can be found on the first, second and third mandibular molar, occurring least frequently on the second molar (25). Some studies report a bilateral occurrence of the RE from 50 to 67% (26, 18).

Bolk (27) reported the occurrence of a buccally located additional root: the RP. This macrostructure is very rare and occurs less frequently than the RE. The prevalence of RP, as observed by Visser (25), was found to be 0% for the first mandibular molar, 0.5% for the second and 2% for the third molar. Other studies have, however, reported RP in first mandibular molars (11, 13).

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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