ENDODONTIC MANAGEMENT OF A MANDIBULAR SECOND MOLAR WITH RADIX PARAMOLARIS: A CASE REPORT

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Abstract:
Mandibular molars can have an additional root located lingually i.e Radix Entomolaris(RE) or buccally i.e Radix Paramolaris(RP). 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. In the present case, Radix Paramolaris was identified in mandibular second molar from preoperative radiographs and confirmed using CBCT. The presence of RP in the mandibular first molar has been extensively evaluated in the literature, but only a few studies have evaluated the morphology of mandibular second molars. The success of endodontics lies in the careful exploration of the canals and debridement of it. “Expect the unexpected though it is rare.”

Key Words: Cone-beam computed tomography; Radix paramolaris; Second molar

INTRODUCTION

The primary objective of the endodontic treatment relies on identification and complete cleaning of the root canal system. Root canal morphology possesses anatomical variations that might contribute to endodontic failures. Thus, the success of endodontic treatment relies on thorough knowledge of the root canal anatomy.1-3

Vertucci and William described the presence of independent three canals in mesial root of mandibular first molar. Since then, the unusual middle mesial and middle distal canals associated with mandibular first molar has been reported in many clinical studies and case reports. Similarly, there has been significant increase in the detection of no of roots and root canals.

by Carabelli is called as RADIX ENTOMOLARIS (RE)4-5 i.e. supernumerary root located distolingually in mandibular molars (mainly in first molars). If additional root is located in the mesiobuccal side then it is called as RADIX PARAMOLARIS (RP).

According to Manning, 22% of mandibular second molars have one root, 76% have 2 roots, and 2% have 3 roots. It has been noted that a patient’s age, sex, and race have a direct relationship with second molar anatomy.6

The most common root morphology in the second molars of Indians was found to be the two-rooted morphology with three canals and Type IV and Type I canals predominating in the mesial and distal roots. These teeth showed both Mongoloid and Caucasian traits, with 8.98% of the teeth having three roots.7

The number of roots on the mandibular first molar is related to certain ethnic groups. The prevalence of RE in the
mandibular first molar is 40% in Mongolian traits, 3.4 - 4.2% in Europeans, 3% in Africans and less than 5% in Indians and Eurasians\textsuperscript{8-14}.

The introduction of cone-beam computed tomography (CBCT) has proved to be a valuable aid in endodontics because of its non-invasive nature and the ability to reconstruct an image three-dimensionally\textsuperscript{15-18}. CBCT is an appropriate tool for investigating the prevalence and morphologic features of distolingual roots in molars.

Identification and treatment of RP is important because a missed canal remains a nidus for infection and can compromise the treatment outcome.

This is a case report of RP of a mandibular second molar with three roots and four canals confirmed with the help of CBCT.

**CASE REPORT**

A 27-year-old male patient reported to the Department of Conservative Dentistry and Endodontics, Modern Dental College and Research Centre, Indore with the chief complaint of pain in the lower right back tooth region.

The patient reported with a history of intermittent pain for the past one month. On clinical examination, there was a carious mandibular right second molar (tooth #47). Coronal portion was lost due to deep caries involving enamel, dentin and approaching pulp. The tooth was tender to percussion and vestibular palpation did not reveal any tenderness.

There was no mobility, and periodontal probing was within the physiological limits. On radiographical examination there was loss of coronal structure involving enamel, dentin, pulp and in radicular portion widening of PDL was seen, suggestive of chronic apical periodontitis.(Figure 1a) Hence, root canal treatment was advised.

A 2% lignocaine in 1:100000 adrenaline local anesthesia was given as inferior alveolar nerve block. The treatment was started with complete caries excavation and canal exploration was done after rubber dam isolation. On exploration of the floor of the pulp chamber a canal was found present between mesial and distal roots on buccal side (figure1b).

On radiographic examination, the file was placed in the canal and extra root like RP was so confirmed. RE is an extra third root in mandibular molars present on the lingual side, which is shorter in length than other two roots. However, here, it was seen on buccal side hence called as RP.

The distal root had single canal. To confirm RP, CBCT imaging of the tooth was performed after obtaining consent from the patient. The transverse, axial, and sagittal CBCT sections of the involved tooth were taken. The CBCT scan slices confirmed the presence of RP(Figure 2).

After working length estimation(figure 1c), all the canals were enlarged upto 20 size K-file and biomechanical preparation was completed by protaper rotary systems. Both mesial canals were enlarged upto F2, distal canal upto F2 and the extra third root on buccal side with master apical file no 25.

Irrigation was performed with 2.5% sodium hypochlorite solution, 17% EDTA and normal saline solution (0.9%) as the final irrigant. Canals were dried with paper points and obturated with Gutta-percha cones of respective sizes with AH Plus sealer by using a lateral compaction technique.(figure1d). Finally, tooth was restored with pre fabricated fiber post.
DISCUSSION:

Accurate diagnosis of supernumerary roots like RP can contribute to the successful outcome of endodontic treatment. The presence of RE in the mandibular first molar has been extensively evaluated in the literature, but only a few studies have evaluated the morphology of RP in mandibular second molars. The etiology behind the formation of RP remains unknown. This unusual morphology of mandibular molars could be related to the penetrance of an atavistic gene or polygenetic system or due to external factors during odontogenesis. The mandibular molars usually have two roots with two canals in mesial root and one canal in distal root. It is more common
that mandibular molars having four canals with two in mesial and distal root viz. the first molar.  

The isthmus connecting the mesiobuccal and lingual or distobuccal and lingual is debrided and left uninstrumented in most of the cases. In this case (47) with two mesial canals, both files and Gp points went until full working length independently without any fusion at the apex to exit as one. RE is an extra third root in mandibular molars, which is shorter than the mesial and distal roots; seen in distolingual corner like a distolingual canal in the floor of the chamber. However, in this case, the extra root was seen in buccal version. The buccal version of the extra third root is commonly termed as RP.

The RP occurrence rate is about 0%, 2%, and 5% in mandibular first, second and third molars respectively. 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 is present on the buccal side. This present case belongs to Type B of RP.

Periapical radiography is the most frequently used method for working length determination. But there are some limitations of periapical radiographs include anatomical noise, the two-dimensional nature of the resulting image and superimposition of structures.

CBCT overcomes these limitations by enabling us to visualize the third dimension and also eliminating superimpositions. It also aids in-depth understanding of the true morphology of root canals. CBCT in the present case guides the assessment of severity of the curvature of the root canals, the number of roots and root canals, and identifying separated or unseparated root canals. Therefore, a cautious approach is required for clinicians in diagnosing and treating RP, which may present from mild to severe curvature leading to increased risk of shaping aberrations.

CONCLUSION:
The complex root canal anatomy stresses the operator to observe the canal morphology with care without underestimating it and missing the extra root and roots canals. Thus, the success of endodontics lies in the careful exploration of the canals and debridement of it.

“Expect the unexpected though it is rare.”

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