



A RARE CASE REPORT SERIES OF RADIX ENTOMOLARIS WITH MIDDLE MESIAL CANAL IN PERMANENT MANDIBULAR FIRST MOLAR

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ABSTRACT

Morphological and anatomical variations are frequent in human dentition. Mandibular first permanent molars frequently have two roots and three root canals. A variation in number of roots as well as canal morphology is not scarce. The third root usually appears in the disto-lingual position. An obvious understanding of these anatomic variations is extremely important for success of endodontic procedure as this can affect the treatment outcome.

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INTRODUCTION

Mandibular first molar is the only multirrooted mandibular tooth that constantly presents two entirely differentiated roots, one mesial and other distal. Presence of a third root is rare, but does occur.¹ The prevalence of these three-rooted mandibular first molars has been reported to be less than 5%.² Vertucci & Williams (1974) as well as Barker *et al* described the presence of middle mesial canal. Clinical studies have reported an incidence of 2.6%-10% for negotiable MM canals.³ It is of foremost importance to locate all the root canals and scrupulous mechanical and chemical cleansing of the entire pulp space followed by three-dimensional obturation with an inert filling material.

This additional root when found lingually was first mentioned in the literature by Carabelli (1844)⁴ and was labeled *Radix entomolaris* by Bolk (1915)⁵. The extra root when found distolingually was first mentioned by De Moor *et al*.⁶ Presence of a supernumerary root located disto-lingually is termed radix entomolaris (RE) or mesio-buccally is termed radix paramolaris (RP).

Case Report 1

A 25-year-old male patient reported to the department of Conservative dentistry and Endodontics, presented with a chief complaint of pain in his right mandibular region. Pain was continuous and aggravated on biting with tooth no. 36. Clinical examination revealed tenderness on vertical percussion.

Pulp testing with cold and electric pulse tester (EPT) was nonresponsive. Radiographic examination revealed deep caries with pulpal involvement and distinct supplemental distal root was identified (Figure 1A). On the basis of clinical and radiographic interpretation, it was decided to perform endodontic therapy.

The tooth was anaesthetized followed by rubber dam (Hygenic) isolation. Access cavity was prepared using a round diamond bur in a high speed arotor hand piece. A sharp DG16 explorer was used to locate the canal orifices, and the access was modified accordingly using #2 Gates Glidden Drill (Mani, Japan) to enhance access and visualization Pulp extirpation was done, after checking the patency of all the five canals (three mesial and two distal), with #10K file (Dentsply-Maillefer), the working length was confirmed with the help of electronic apex locator (Propex II), and further it was confirmed with the help of radiograph using #15K file (Figure 1B). Biomechanical preparation was performed using ProTaper Gold File system (Dentsply-Maillefer) with crown-down technique. During the preparation 5% sodium hypochlorite solution and 17% EDTA (Ethylenediaminetetraacetic acid) was used as irrigant alternatively after every instrument change. Apical Preparation was done till F1 size for all the canals, after completion of chemo-mechanical preparation closed dressing was given and patient was reappointed after three days for obturation. In follow-up appointment as the tooth was completely asymptomatic master cone radiograph was taken (Figure 1C). The canals were dried using paper point. Obturation was done using corresponding ProTaper F1 cones; sealapex (Kerr, SybronEndo) was used as a sealer. Radiograph after obturation

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is taken (Figure 1D). Post-obturation restoration was done using composite (Filtek Z250, 3M) and post-operative radiograph was taken (Figure 1E).



Figure 1A Pre-operative diagnostic radiograph

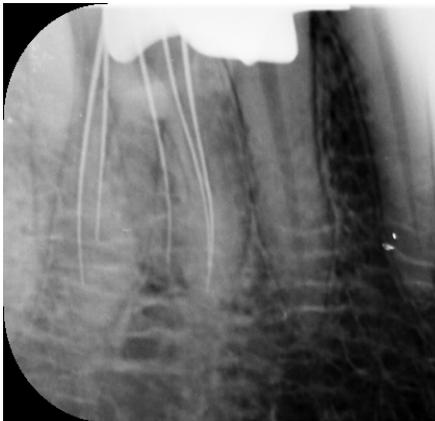


Figure 1B Working length confirmation radiograph



Figure 1C Master cone radiograph



Figure 1D Radiograph after obturation

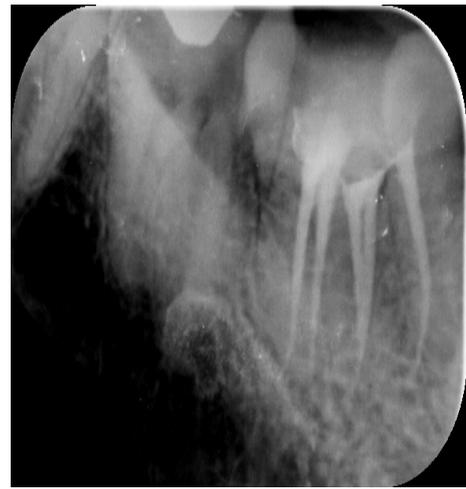


Figure 1E Radiograph with post obturation restoration

Case Report 2

A 22-year-old female patient reported to the department of Conservative dentistry and Endodontics with pain in the left mandibular region. History of present illness showed periodic pain in that region for the past one year which aggravated on biting with tooth no. 36. Clinical examination revealed tenderness on vertical percussion. Radiographic examination revealed deep caries with pulpal and periapical involvement and separate supplemental distal root was identified (Figure 2A). On the basis of clinical and radiographic interpretation, treatment plan was explained to the patient and endodontic treatment was initiated. The tooth was anaesthetized followed by rubber dam (Hygenic) isolation. Access cavity was prepared using a round diamond bur in a high speed airtor hand piece. A sharp DG16 explorer was used to locate the canal orifices, and the access was modified accordingly. Pulp extirpation was done, after checking the patency of the all the five canals (three mesial and two distal), with #10K file (Dentsply-Maillefer), the working length was assessed with the help of electronic apex locator (Propex II), and further it was confirmed with the help of radiograph using #15K file (Figure 2B). ProTaper Gold File system (Dentsply-Maillefer) was used for chemo-mechanical preparation with crown-down technique. During the preparation 5% sodium hypochlorite solution and 17% EDTA was used as irrigant alternatively after every instrument change. Apical Preparation was done till F1 size for all the canals, after completion of chemo-mechanical preparation closed dressing was given and patient was reappointed after three days for obturation. In follow-up appointment as the tooth was completely asymptomatic master cone radiograph was taken (Figure 2C). The canals were dried using paper point. Obturation was done using corresponding ProTaper F1 cones; sealapex (Kerr, SybronEndo) was used as a sealer. Radiograph after obturation is taken (Figure 2D). Post-obturation restoration was done using composite (Filtek Z250, 3M) and post-operative radiograph was taken (Figure 2E).



Figure 2A Pre-operative diagnostic radiograph



Figure 2B Working length confirmation radiograph

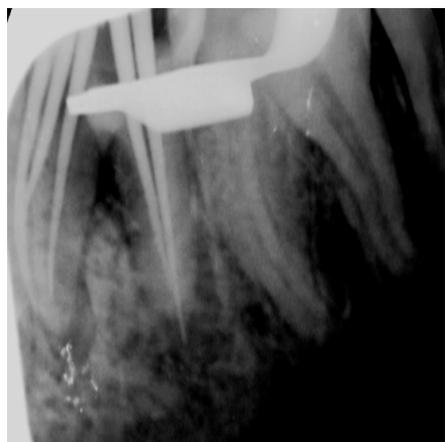


Figure 2C Master cone radiograph



Figure 2D Radiograph after obturation



Figure 2E Radiograph with post obturation restoration

DISCUSSION

This case report highlights the importance of understanding of variations in tooth anatomy and morphology. Anatomical variations are an acknowledged characteristic of mandibular permanent molars. Mandibular molars can have an additional root known as radix entomolaris. This condition is considered to be unusual or dysmorphic root morphology. The shape, position, and relative root outline must be carefully determined radiographically. According to various studies it was concluded that broad, flat roots are more likely to have multiple canals and intracanal ramifications, multiple angled radiographs will reveal the true dimensions of the root canal.⁷ A sudden radiographic disappearance of a canal can be a prediction of a dividing canal.

According to a study done in African populations, it was reported that radix molaris had a maximum frequency of 3%, while in Eurasian and Indian populations it was reported less than 5% in. Radix Entomolaris (RE) is rare in Caucasians with a maximum frequency of 3.4%- 4.2%, which is considered unusual or dysmorphic root morphology. Radix Paramolaris (RP) is reported in 1.5-3% of African population whereas it is less frequent in Indian population. Its frequency of existence is approximately 2%.

In a survey regarding occurrence of Radix Entomolaris conducted in patients in India frequency was reported to be 3.2%.

Vertucci (1984) in an in-vitro study reported 1% presence of middle mesial canals in permanent mandibular first molar. Ahmed *et al* in a study reported prevalence of 4% of middle mesial canal using clearing technique.⁸ Pomeranz *et al* classified middle mesial canals into three morphologic categories as: Fin, Confluent and Independent. Fin, where there is free communication between all three canals and confluent, where MM canal joins one of the main canals.⁹ Yesilsoy *et al* in a study reported that the groove between the MB and ML can be as deep as 3.5 mm from the orifice and between 4 and 6 mm from the apical foramen. The groove is a potential area to be addressed and there is a requirement to modify the access for effective chemo-mechanical preparation of root canal system. Cautious probing of this area show a "catch" or a "stick" feeling if there is a canal in the isthmus.¹⁰

Navarro *et al* in a study mentioned that if preparing a 'canal' in an isthmus assist in cleaning and reshaping it, as many canals as necessary (without damaging the root structure) may be prepared so as to divide the isthmus and make it easier for the disinfectants to penetrate the spaces that cannot be reached with a file.¹¹ Caution should be taken while instrumenting confluent canals with nickel-titanium rotary instruments, as they tend to break where two canals join at a sharp angle into one small canal.

CONCLUSION

It is generally accepted that a major cause of the failure of root canal therapy is an inability to localize and treat all of the canals of the root canal system. The risk of missing anatomy during root canal treatment is high because of the complexity of the root canal system. Adequate knowledge of aberrancies, the will to search for them, combined with usage of magnification, and modern imaging techniques will beget us greater success. This case report series describes the successful management of an aberrant morphology in a mandibular molar with extra canals and roots.

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