

Twin Radix Entomolaris – A Case Report

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Citation of this Article: Dr. S. Balagopal, Dr. Nazrin M, Dr. Charanya Chandrasekaran, Dr. Senthil Nathan Natarajan, “Twin Radix Entomolaris – A Case Report”, IJDSIR- April - 2020, Vol. – 3, Issue -2, P. No. 52 – 57.

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Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

Due to the complexity of root canal anatomy, it is not uncommon to miss the canals during root canal treatment. This might lead to complications in the endodontic management of the tooth, if it is misdiagnosed or maltreated. Mandibular molars may or may not have an additional root located lingually (Radix entomolaris) or buccally (Radix paramolaris). Hence, an awareness and a thorough understanding of the root canal morphology can lead to successful treatment. This case report discusses endodontic treatment of two mandibular molars with radix entomolaris. The tooth morphological variations and internal anatomy of the radix entomolaris are described. Avoiding procedural errors during endodontic treatments

necessitate a proper clinical approach to diagnosis and treatment plan.

Keywords: Mandibular molars, root canal therapy, radix entomolaris.

Introduction

The earliest permanent posterior tooth to erupt is the mandibular first permanent molar. It is responsible for development of occlusion and for physiologic functions like mastication. Also, it is most frequently in need of endodontic treatment.(1) Thus, it is of utmost importance for the clinicians to be familiar with variations in the root and root canal anatomy of the mandibular first molar. Two roots placed mesially and distally and three root canals are usually present but variations are not uncommon.(2) The presence of a third root of the permanent first molar is the

major variant which has an additional third root, first mentioned in the literature by Carabelli (1844), is called as radix entomolaris (RE), when located distolingual and is called the radix paramolaris (RP) when located on the mesiobuccal side.(1)

The main therapeutic strategy to eliminate microbes from the root canal system is by thorough biomechanical preparation and 3-D obturation to ensure complete coronal and apical seal. Root canal anatomy is highly complex and hence, understanding the presence of additional root or unusual root canal morphologies determine the success of endodontic treatment.

Case Report

A 20- year old female patient came to our department complaining of pain in the lower right and left back teeth for the past 15 days. On intra-oral examination, she had dental caries in 46 and 36 showing early response to cold test and electric pulp test suggestive of symptomatic irreversible pulpitis and tenderness on percussion suggestive of apical periodontitis. Radiographically, radiolucency involved enamel, dentin and approximating pulp with periodontal space widening. On further evaluation of the radiographs in various angulations, there was a presence of an extra root on the distal aspect of both 36 and 46, suggestive of bilateral radix endomolaris. So, the final diagnosis was symptomatic irreversible pulpitis with apical periodontitis in 36 and 46. Treatment plan decided was Root Canal Treatment (RCT) followed by metal-ceramic crown placement in 36 and 46.

Firstly, RCT was performed in 46. The tooth was anesthetized and rubber dam isolation was done. Access opening was done using Endo access bur (Dentsply, USA) and two mesial canal orifices (mesiobuccal, mesiolingual) and one distal canal orifice (distobuccal) were located. Another orifice was located on distolingual part of the pulpal floor on further exploration with DG 16 (GDC,

India). The root canals orifices were enlarged using gates glidden drills # 2, 1 (Mani Inc., Japan) and the shape of access cavity was modified from a triangular form to a trapezoidal form to locate the distolingual root using endo Z bur (Dentsply, USA). The root canals were explored with a K-file (Mani Inc., Japan) ISO number 10 and working length of the root canals were determined. Biomechanical preparation was carried out using the PROTAPER-GOLD rotary files (Dentsply, Switzerland) in all the canals upto F2 with intermittent irrigation using 5 ml of 3% sodium hypochlorite (Prime dental products Pvt, Ltd., India), 5 ml of 17% EDTA (Prevest DenPro, India) and 5 ml of 0.9% saline (Fresenius Kabi Private Limited, India).Canals were dried using paper points (DiaDent, Europe) and single cone obturation of the root canals was performed using the corresponding gutta percha points (PROTAPER-GOLD, Dentsply, Switzerland) and zinc oxide eugenol sealer (DPI, India). Temporary coronal seal was given using double seal technique and the patient was asked to report after a week. Once the patient was asymptomatic, the access cavity was sealed with silver amalgam restoration (DPI alloy fine grain, India). Similarly, 36 was treated after a week.

Figure 1: RCT - 46

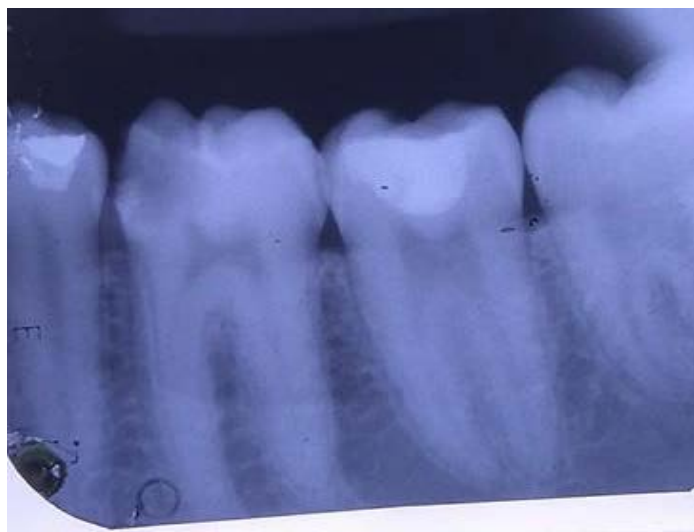


Fig. A :PRE - OP

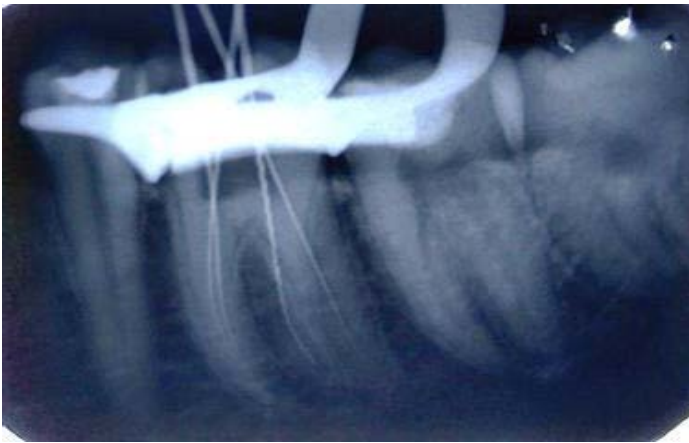


Fig B: Working Length



Fig A: PRE - OP

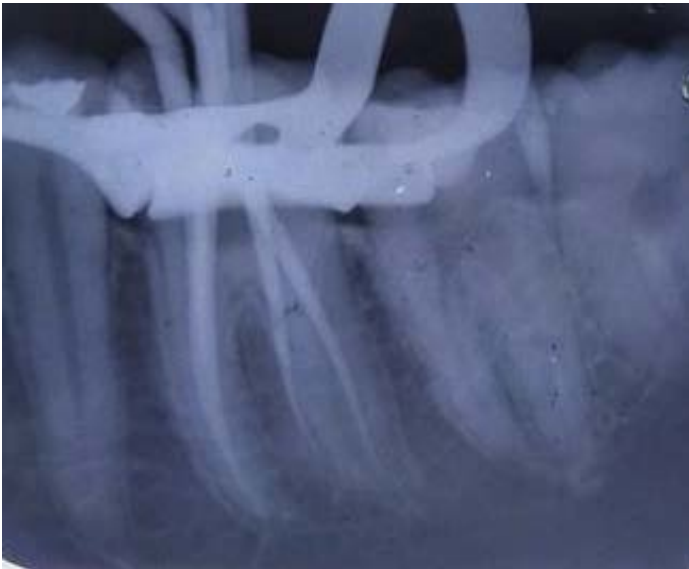


Fig. C: Master Cone

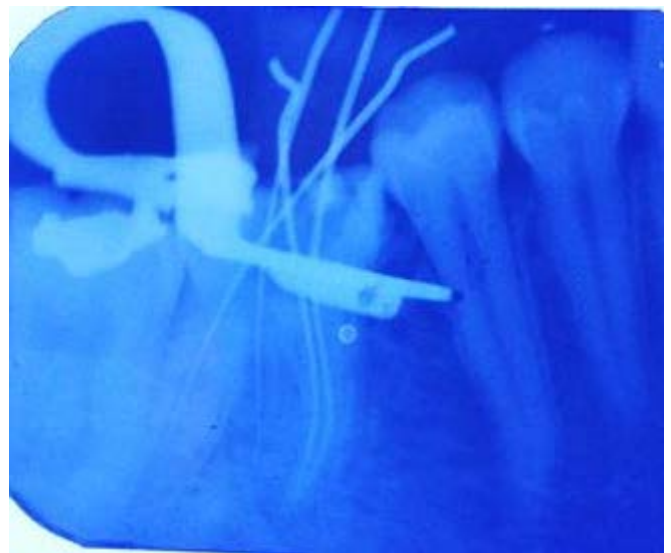


Fig. B:



Fig. D:

Figure 2: RCT - 36



Fig. C: Master Cone



Fig. D: Post Obturation

Discussion

RE in the first mandibular molar is present in some ethnic groups. In African population, a maximum frequency of 3% is found, while in Eurasian and Indian population, it is less than 5%.^(3,4) In populations with Mongoloid traits such as the Chinese, Eskimo and American Indians, the frequency ranges from 5% to 30%.^(5, 6) Because of its high frequency in these populations, the RE is considered to be a normal morphological variant (eumorphic root morphology). In Caucasians, RE is not very common with a maximum frequency of 3.4 to 4.2%, is considered to be an unusual or dysmorphic root morphology.^(7,8)

The etiology of the RE is still unclear. In dysmorphic, supernumerary roots, it could be due to external factors during odontogenesis or because of penetrance of an atavistic gene or polygenetic system. In eumorphic roots, the racial genetic factors influence expression of a particular gene that results in more pronounced phenotypic manifestation.⁽⁹⁾ Three-rooted molar trait has genetic penetrance as its dominance.⁽¹⁰⁾ An RE can be found on the first, second and third mandibular molar, occurring least frequently on the second molar. Some studies report a bilateral occurrence of the RE from 50 to 67 %.⁽¹¹⁾ This present case was reported with such bilateral occurrence.

Based on the location of its cervical part, Carlsen & Alexandersen (1990) classified radix entomolaris (RE) into - Type A: RE is located lingually to the distal root complex which has two cone-shaped macrostructures, Type B: RE is located lingually to the distal root complex which has one cone-shaped macrostructures, Type C: RE is located lingually to the mesial root complex, Type AC: RE is located lingually between the mesial and distal root complexes.⁽¹²⁾

Based on the curvature of the root or root canal, De Moor et al. (2004) classified RE as,

Type 1: Straight root or root canal, Type 2: Curved coronal third which becomes straighter in the middle and apical third, Type 3: Curved coronal third with a second buccally oriented curve beginning in the middle or apical third.⁽¹³⁾

Song JS et al. (2010) further added two more variants of RE, Small type: Length shorter than half the length of distobuccal root, Conical type: Smaller than small type and having no root canal within it. ⁽¹⁴⁾

RE is located distolingually and may be a short conical extension or normal mature root with its coronal third partially or completely fixed to distal root. Usually, its smaller than mesial and distobuccal roots and may contain pulpal tissue.⁽⁹⁾ Externally, the distal furcation is slightly lower (1 mm) than the furcation between mesial and distal roots.⁽¹⁵⁾ Tooth with an extra distolingual root may present a more bulbous crown structure, an extra cusp, a well-defined distolingual lobe or cervical prominence. Radiographically, RE is visible in 90% of cases.⁽¹⁶⁾ Occasionally, its missed because of its slender dimension or overlapping with distal root. An unclear outline of distal root or root canal may be appreciated in certain cases. Additional radiographs taken 20 degree from mesial and 20 degree from distal may elaborate the basic information about the anatomy of additional third

root.(17) Intraoral camera, magnifying loupes and dental microscope help in diagnosis. Cone-beam computed tomography (CBCT) is an advanced tool to aid in the diagnosis of teeth with complex root anatomies. But, cost and accessibility are the main limiting factors till now.(18)

Clinical Implications

Accurate clinical and radiographic diagnosis can curtail failures because of missed canals. An important basic principle for successful RCT is the principle of 'straight-line access'.(19)

Ultimate objective is to provide access to the apical foramen. The shape of access cavity of RE should be modified from classical triangular form to trapezoidal or rectangular form to better locate the orifice of distolingual root. Root canal orifices follow the laws of symmetry which help in locating RE. The canal orifices are equidistant from a line drawn in a mesiodistal direction through the pulpal floor and lie perpendicular to this mesiodistal line across the centre.(20, 21)

Straight line access is essential as majority of RE are curved. Proper precautions must be taken to prevent excessive removal of dentin or gauging during access cavity preparation as this may weaken the tooth structure. SLOB technique i.e., Same Lingual, Opposite Buccal Also known as: 1) Cone shift technique 2) Tube shift technique. 3) Clark's technique. 4) Buccal object is also trust-worthy in detecting RE. The principle states that the object closest to the buccal surface appears to move in the direction opposite the movement of the cone or tube head, when compared with a second film. Objects closest to the lingual surface appear to move (on a film) in the same direction that the cone moved; thus the "same lingual, opposite buccal" rule. For example, if the tube head is shifted mesially, the lingual or palatal root will also be shifted mesially (in the same direction as the shifted tube head) on the developed film and the buccal or

mesiobuccal root will be shifted distally (in the opposite direction as the shifted tube head).(12) CBCT may aid in the diagnosis of RE.(18)

Conclusion

A thorough knowledge about the various anatomical morphologies is of utmost importance before jumping onto the treatment. Proper diagnosis is a mandatory step to be followed for each and every case in order to increase the success of a treatment. Clear radiographs at multiple angulations might aid in proper identification of all the features of a tooth in question.

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