

Endodontic Management of a Rare Anatomic variation Radix Entomolaris of Mandibular I Molar- Case Report

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ABSTRACT

Introduction: For successful endodontic treatment a comprehensive knowledge of the root canal anatomy is a basic prerequisite. Usually the permanent mandibular first molar has 2 roots mesial and distal. But they can show considerable anatomic variations which can affect the crown, number of roots and number of canals. Radix entomolaris (RE) is a form of additional root present disto lingually.

Case Report: We present a case of radix entomolaris in a 12 year old child patient which was successfully treated endodontically and emphasised its early diagnosis radiographically and knowledge about its prevalence, diagnosis, morphology, canal configuration, and clinical approach.

Conclusion: RE is an uncommon anatomical variation and can be easily detected on oral radiograph (IOPA-Intraoral Periapical) if evaluated properly. Misdiagnosis of such a morphological variation can leads to incomplete biomechanical preparation of the tooth leading to endodontic failure. Also if such a tooth is indicated for extraction it can lead to procedural difficulties.

Keywords: Mandibular Molars, Anatomical Variations, Radix Entomolaris.

and Maxillofacial Surgery, School of Dental Sciences. Pain aggravated on taking hot substances and even on mastication. There was no extra oral swelling in that region. On intraoral examination patient had a deep class-I cavity in 46. The tooth was tender on apical percussion. The pre-treatment radiograph showed widening of the periodontal ligament space and an additional root distolingually (Figure-1). Pulp testing was done; and a diagnosis of apical periodontitis due to pulp necrosis was made. The patient was suggested to undergo root canal treatment. The tooth was anesthetized. Access opening was made, and two mesial canal orifices (mesiobuccal, mesiolingual) and one distal canal orifice (distobuccal) were initially located. Another orifice was located on distolingual part of the pulpal floor on further exploration with the help of endodontic explorer. In the subsequent visits, canals were explored and negotiated using #08 and #10 size K-files. The working length of the canals were determined electronically using an apex locator and confirmed radiographically (Figure-2). Canals were cleaned and shaped using Ni-Ti files using crown-down technique. Canals were irrigated using 2.5% sodium hypochlorite solution and flushed with 17% EDTA solution to remove smear layer. Canal disinfection was carried out using calcium hydroxide. In the follow up visits, when the patient was found asymptomatic, gutta-percha master cones were selected. Obturation was carried out with master cones and sealer (Figure 3). The access opening was restored with Glass Ionomer Cement.

INTRODUCTION

An aberration in root canal systems of tooth is a commonly occurring phenomenon. Carabelli was first to describe entomolaris radix, an anatomical variation found in mandibular molars.¹ All three types of mandibular molars can have this anatomical variation, occurring rarely in second molars.^{2,3} Presence of a supernumerary root located distolingually is called as radix entomolaris (RE) and mesio-buccally is called as radix paramolaris (RP).⁴ Successful endodontic treatment requires complete cleaning and shaping of the root canal systems and 3 dimensional obturation. Therefore the clinician should be aware of anatomical variations of canal system morphology. The additional root of radix entomolaris is usually curved and smaller, it may contribute to root canal treatment failure because of a "missed" canal or incomplete root canal preparation and obturation. It is also reported that the extraction of permanent first molar with RE is difficult compared to the molar without RE.

De Moor et al classified RE into three types. Type I: a straight root or root canal, Type II: an initially curved entrance which continues as a straight root or root canal. Type III: an initial curve in the coronal third of the root canal and a second curve beginning in the middle and continuing to the apical third.⁵

The aim of this study was to describe a clinical case of a mandibular first molar (Type I De Moor classification) with four canals and three roots: one mesiobuccal, one mesiolingual, one distobuccal, and one distolingual (radix entomolaris).

CASE REPORT

A 12 year old male patient consulted with chief complaint of pain in lower right back region of the jaw for the past one week in Department of Oral

DISCUSSION

Mandibular I molar is the first permanent posterior tooth to erupt. Usually it has two roots- mesial and distal. However, sometimes a third root is also found. RP is very rare and occurs less frequently than RE.⁶ RE is usually smaller than the mesial and distal roots. It is totally or partially fixed to the distal root located distolingually. Recently Song et al. have suggested a new classification based on morphological characteristics: Type I, Type II, Type III, Small type and Conical type.⁷ Tratman suggested that the additional root is not simply a division of the distal root, but rather is a true extra root with a separate orifice and apex.⁸ Frequency of radix entomolaris is less than 5% in white Caucasian, African, Eurasian and Indian populations, but commonly present in races of Mongoloid traits such as the Chinese, Eskimos, and Native Americans with a frequency of 5-30 %.⁸⁻¹⁰ The relationship between radix entomolaris (RE) and gender predilection as well as side distribution is not clear. Etiology of RE is uncertain. It may be due to external factors during odontogenesis or because of

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Figure-1: Pre operative IOPA

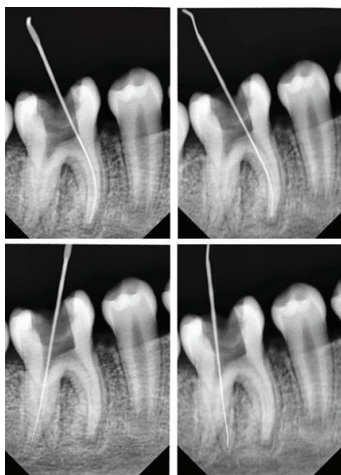


Figure-2: Locating canal orifice and determination of working length



Figure-3: Obturation

an atavic gene or polygenic system. Common problems encountered during the treatment of radix entomolaris includes difficulty in diagnosis, radiographic interpretation, inability to locate the fourth canal, modification in access cavity preparation, confusion in working length determination and biomechanical preparation and obturation. Detection of RE can be based on clinical examination, radiographic and imaging techniques and other accessories. Clinically presence of a more prominent disto-lingual lobe or an extra cusp in combination with a cervical prominence or convexity may indicate the presence of

an additional root. Radiographically the tooth with RE shows unclear outline of the distal root contour. If RE is suspected then buccal object rule may be helpful to confirm the anatomic variation in most of the cases. Advanced imaging modalities like micro-computed tomography and spiral computed tomography have been also utilized for diagnosis of RE. Cone beam computed tomography (CBCT) also has become a promising tool to diagnose morphological variations of the tooth. Other accessories include, clues observed during access cavity preparation like a dark line on the pulp chamber floor which can indicate the precise location of the RE canal orifice, also if the orifice of distal root is narrow and round, RE can be suspected by a phenomena caused by remaining pulp tissue in extra root called as “champagne effect” due to bubbling when sodium hypochlorite is used. In some cases staining the chamber floor with 1% methylene blue dye may be helpful. After RE is confirmed, an extension of the triangular opening cavity distolingually is recommended which results in a more rectangular or trapezoidal outline form. If the radix entomolaris canal entrance is not clearly visible after removal of the pulp chamber roof, a more thorough inspection of the pulp chamber and wall, especially in the distolingual region is necessary.⁵

Diagnostic aids such as magnifying loupes, surgical microscope, endodontic explorer, path finder, DG 16 probe and micro-opener helps in better identification and visualization of all the canals. During biomechanical preparation severe root inclination or canal curvature, as in a type III RE can cause shaping aberrations like straightening of the root canal or ledge formation, resulting in root canal transportation and loss of working length. Flexible nickel-titanium rotary files allow a more centered preparation of shape in these cases. For obturation vertical compaction technique is recommended.

CONCLUSION

Correct diagnosis leads to correct treatment is the saying, therefore the clinician should be aware of variations in the root canal morphology of tooth for endodontic success. A case of radix entomolaris may be challenging but can be easily diagnosed by a careful evaluation of pre-operative radiographs when taken at different angulations and careful examination of the floor of the pulp chamber reveals clues for locating any extra canals. With advent of modern techniques and instruments tooth with morphological variations such as RE can be successfully treated endodontically provided that these variations are known to the clinician.

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