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Case Report

The Radix Entomolaris: Clinical Approach in Endodontics

Dr. Supriya[1], Dr. Shivani[2], Dr. Ameerudheen Poozhithara[3], Dr. Kirti[4], Dr. Kanupriya[5], Dr. Gagandeep Singh[6]

[1,2,3,4,5]Post Graduate Student, Department of Conservative Dentistry and Endodontics, Genesis Institute of Dental Sciences and Research, Ferozepur, Punjab, India
[6]Senior Lecturer, Department of Conservative Dentistry and Endodontics, Genesis Institute of Dental Sciences and Research, Ferozepur, Punjab, India

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. The purpose of this study was to report a clinical case of successful endodontic treatment in mandibular molar characterized as radix entomolaris.
Key learning points
• Clinicians should be aware of this unusual root morphology in mandibular first molars in Caucasian people.
• Radiographs exposed at two different horizontal angles are needed to identify this additional root.
• The access cavity must be modified in a distolingual direction in order to visualize and treat the RE, this results in a trapezoidal access cavity.
Keywords: Endodontic treatment; Anatomic variations; Radix entomolaris; Radix paramolaris

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Corresponding Author: Dr. Gagandeep Singh, Senior Lecturer, Department of Conservative Dentistry and Endodontics, Genesis Institute of Dental Sciences and Research, Ferozepur, Punjab, India

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INTRODUCTION

The main objective of root canal treatment is the thorough mechanical and chemical cleansing of the entire pulp cavity and its complete obturation with an inert filling material and a coronal filling preventing ingress of microorganisms.[1] One of the main reasons for failure of root canal treatment is inadequate removal of all the pulp tissue and microorganisms from the root canal system **[2]**.

Clinician should be well aware about morphology and anatomy of the teeth. The majority of first mandibular molars are two-rooted with two mesial and one distal canal . In most cases the mesial root has two root canals, ending in two distinct apical foramina. 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 as various studies have been reported with 3 mesial canals[4] and 3 distal canals[5].

The number of roots may also vary in mandibular molars, in which a third additional root, already mentioned in the literature by Carabelli , is called radix entomolaris. This supernumerary root is located in distolingual position, mainly in the mandibular first molars. When located in the mesiobuccal surface, the anomaly is called radix paramolaris. The identification and external morphology of this anomaly containing a supernumerary lingual or buccal root, are described by Carlsen and Alexandersen .[6]

CASE REPORT

A 27 years old male patient reported to department of Conservative Dentistry and Endodontics at Genesis Institute of Dental Sciences and Research , Ferozepur with pain in right mandibular first molar i.e 46, since a week. The pain was aggravated on taking hot and cold food and during mastication. Medical history was nothing relevant

reported. Clinical examination of 46 revealed deep class 1 caries and was tender on percussion. Intra oral periapical radiograph revealed deep caries approaching pulp and slight widening of periodontal ligament space .

Close inspection of intraoral periapical radiograph revealed presence of additional periodontal ligament space besides distal root leading to suspicion of extra root (Fig. 1) . Based on radiological and clinical examination diagnosis was made symptomatic irrerversible pulpitis with acute apical periodontitis w.r.t 46 . Patient was advised to undergo with root canal treatment. Root canal treatment in 46 was initiated under rubber dam, following local anesthesia .Access opening (Fig. 2) was followed by careful exploration of the pulp chamber floor. It revealed four canal orifices (two mesial & two distal), confirming the presence of additional distal canal. The pulpal tissue remnants were extirpated from the canals using K file no.10 & no.15 (Dentsply Maillefer, Switzerland). . Working length was determined using an apex locator (Root ZX, Morita, Tokyo, Japan). The radiograph was taken with a mesial angulation to verify the working length confirmed the presence of extra distolingual root(Fig. 3). Four root canals were cleaned using EDTA (File Eze; Ultradent Products Inc.) and sodium hypochlorite, and shaped with NiTi Rotary files (Neo Endo) and Obturation was done with gutta percha and Prevest Denpro zical (zinc oxide eugenol based sealer) followed by post endo restoration (Fig. 4).

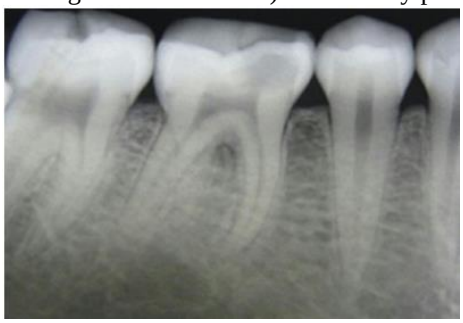

Figure 1

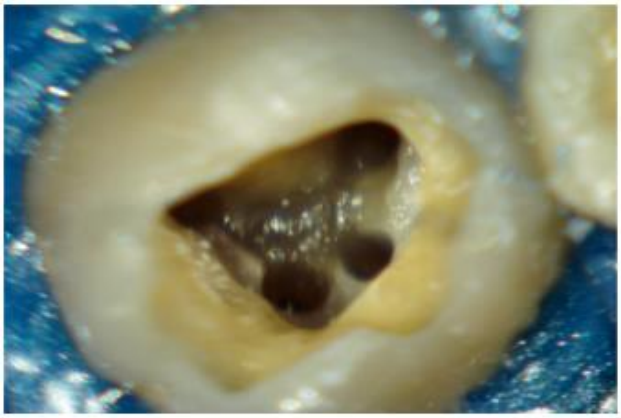

Figure 2

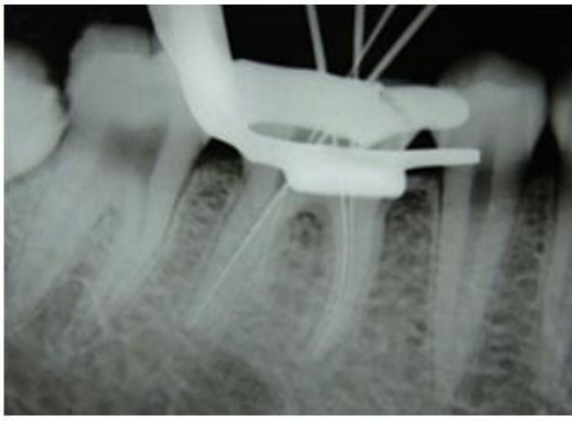

Figure 3

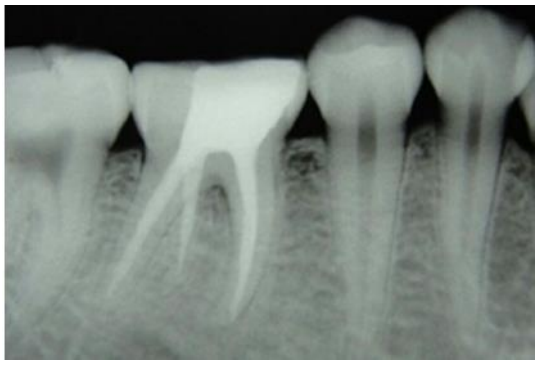

Figure 4

Clinical Approach

The presence of an radix entomolaris or an radix paramolaris has clinical implications in endodontic treatment. An accurate diagnosis of these supernumerary roots can avoid complications or a ‘missed canal’ during root canal treatment. Because the (separate) radix entomolaris is mostly situated in the same buccolingual plane as the distobuccal root, a superimposition of both roots can appear on the preoperative radiograph, resulting in an

inaccurate diagnosis. A thorough inspection of the preoperative radiograph and interpretation of particular marks or characteristics, such as an unclear view or outline of the distal root contour or the root canal, can indicate the presence of a 'hidden' radix entomolaris. To reveal the radix entomolaris, a second radiograph should be taken from a more mesial or distal angle (20 degrees). This way an accurate diagnosis can be made in the majority of cases. Apart from a radiographical diagnosis, clinical inspection of the tooth crown and analysis of the cervical morphology of the roots by means of periodontal probing can facilitate identification of an additional root. An extra cusp (tuberculum paramolare) or more prominent occlusal distal or distolingual lobe, in combination with a cervical prominence or convexity, can indicate the presence of an additional root. If an radix entomolaris or radix paramolaris is diagnosed before endodontic treatment, one knows what to expect or where to look once the pulp chamber has been opened.[7]

DISCUSSION :

The presence of a single radix entomolaris in the mandibular first molar has been associated with determined ethical groups. In Black populations, the maximum frequency found is 3%[8] , while in Caucasians and Indians, the occurrence is lower than 5%[9] . In Chinese, Eskimos, and American Indian population, studies have shown that radix entomolaris occurs in a constancy ranging from 5% to more than 30% . Because of its high frequency in these populations, the radix entomolaris is considered normal.

These variations in distal root anatomy may be identified through various radiographs at different angulations . Radix can be discovered by a careful correlation between clinical and radiographical examination . Clinically , additional cusp (tuberculum paramolare) or cervical convexity noted by probing indicates the presence of radix. Completing a thorough radiographic study of the involved tooth with exposure from three different horizontal projections, the standard buccal-to-lingual projection, 20^0 from the mesial, and 20^0 from the distal reveals the basic information regarding the anatomy of the tooth in order to perform endodontic treatment [10]. However, using the buccal object rule with two radiographs with different horizontal angulations may suffice to determine the position of a lingual root [11,12]. One of these radiographs is taken in the ortho radial position and the other taken either 20^0 mesially or distally. This buccal object rule has also been called Clark's rule, the same lingual, opposite buccal (SLOB rule) and Walton's projection [10].

In this patient , the additional fourth canal orifice led into the extra distolingual root which displayed Vertucci type 1 canal configuration .Radiographic features like double images or unclear view of distal root / canal indicate possibility of radix entomolaris .In the present case , all the radiographs taken during root canal procedure were clearly suggestive of radix entomolaris and prevented the need of further investigations like cone beam computed tomography and 3- dimensional reconstruction which are useful to study the morphology of RE in a non – invasive manner .Good illumination and use of accessories like magnifying loupes , microscopes etc are valuable in locating and managing radix entomolaris.

CONCLUSION :

The high frequency of a fourth canal in mandibular first molars makes it essential to anticipate and find all canals during molar root canal treatment. The possibility of an extra root should also be considered and looked for carefully. Proper angulation and interpretation of radiographs help to identify chamber and root anatomy. In the case of an RE the conventional triangular opening cavity must be modified to a trapezoidal form in order to better locate and access the distolingually located orifice of the additional root.The detection of RE and its thorough cleaning, shaping and obturation would contribute significantly towards success of endodontic treatment.Mandibular first molars have low success rate following root canal due to factors like missed canal, etc and awareness about radix entomolaris help in diagnosis and better overall prognosis for endodontic retreatment.

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