Radix Entomolaris: An Endodontic Challenge

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ABSTRACT : Success of endodontic treatment depends on the proper identification of all the canals, thorough chemo mechanical preparation followed by three-dimensional obturation with hermetic seal. Failure of any of these steps may occur due to unusual tooth morphology. Usually, mandibular molars have two roots with three canals but in few teeth, the number of roots and canals vary. The variation in the number of roots, if extra root located lingually called radix entomolaris (RE) or located buccally called radix paramolaris (RP). This article presents successful endodontic treatment of a mandibular first molars with extra root with radix entomolaris and which is a rare microstructure.

INTRODUCTION

A thorough knowledge of dental anatomy and an understanding of the potential for variations from the normal are required to achieve success in endodontics. Incomplete instrumentation and cleaning of the root canal space and faulty obturation are the main reasons for failure of endodontic treatment. Root canals are often left untreated because the operator fails to recognize their presence, especially in teeth exhibiting anatomic irregularities or accessory or aberrant root canals.[1]

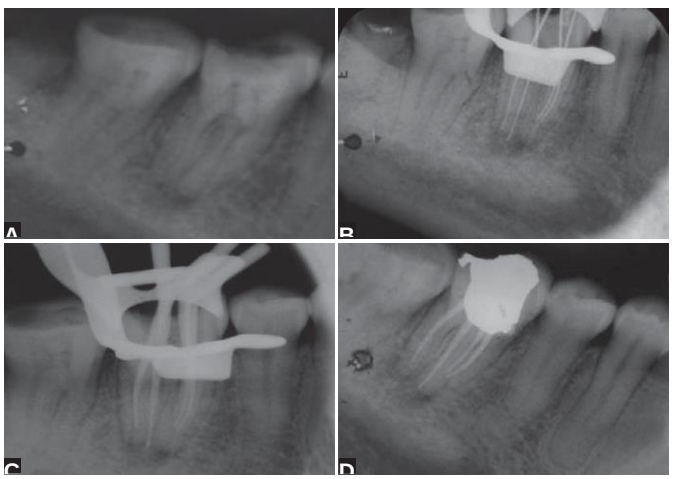
Anatomical variations are an acknowledged characteristic of mandibular permanent molars. Permanent mandibular first molars usually have 2 roots placed mesially and distally and 3 root canals, but variations in the number of roots and in canal morphology are not uncommon. The presence of a third root in the permanent first molar is the major variant in this group.[2,3] This additional third root, first mentioned in the literature by Carabelli (1844), is called the radix entomolaris (RE), located distolingually in the mandibular molars, mainly first molars.[4] The permanent mandibular first molar is the earliest permanent posterior tooth to erupt, responsible for development of occlusion and important physiologic functions like chewing. Commonly, it is the most frequently in need of endodontic treatment. Thus, it is of utmost importance that the clinician be familiar with variations in the root and root canal anatomy of the mandibular first molar.[5,6]

Incidence of Mandibular Molar with Three Roots, presence of a separate RE in the first mandibular molar is associated with certain ethnic groups. In African populations a maximum frequency of 3% is found, while in Europeans and Indian populations the frequency is less than 5%. In populations with Mongoloid traits (such as the Chinese, Eskimo and American Indians) reports have noted that the RE occurs with a frequency that ranges from 5% to more than 30%. Because of its high frequency in these populations, the RE is considered to be a normal morphological variant. In Caucasians the RE is not very common and, with a maximum frequency of 3.4 to 4.2%, is considered to be unusual or dysmorphic root morphology.[13-15] An RE can be found on the first, second and third mandibular molar, occurring least frequently on the second molar.[16]

Etiology- The etiology behind the formation of third root in a mandibular molar is still unclear. In dysmorphic, supernumerary roots, its formation could be related to external factors during odontogenesis, or to penetrance of an atavistic gene or polygenetic system (atavism is the reappearance of a trait after several generations of absence). In eumorphic roots, racial genetic factors influence the more profound expression of a particular gene that

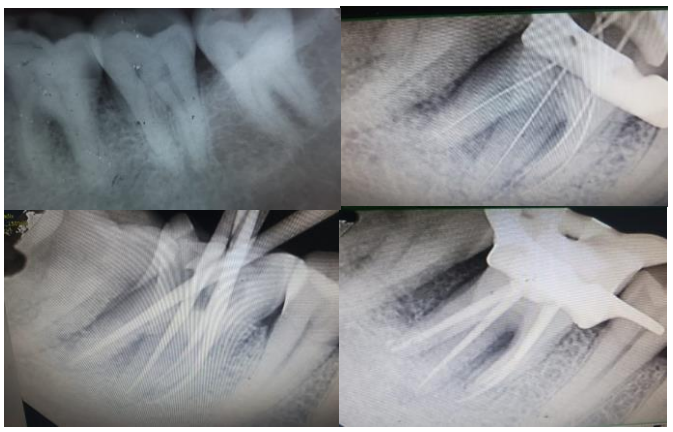
results in the more pronounced phenotypic manifestation.[15,19]

CASE REPORT 1: A 28-year-old male patient reported with complain of pain in the right lower back tooth region. He gave a history of intermittent pain in the last1 month, which had increased in intensity in the past 2 days. On examination, the right mandibular first molar was carious with pulpal involvement and tender on percussion. Thermal and electrical pulp testing of the tooth elicited a negative response. The diagnostic radiograph showed widening of the periodontal ligament space and an additional root between the mesial and distal roots. Two radiographs with different horizontal angulations were made which confirmed that the additional root was located distolingual to the mesial root (Fig. 1A). Medical history was non-contributory. A diagnosis of a nonvital right mandibular first molar with apical periodontitis was made and endodontic treatment was planned. The tooth was anesthetized and then isolated under rubber dam. The access cavity was prepared using an endo access bur. One distal and two mesial canal orifices were located using an endodontic explorer. Upon close inspection a dark line was observed between the distal canal orifice and the distolingual corner of the pulp chamber floor. At this corner overlying dentin was removed and a second distal canal orifice was detected. The canal lengths were determined using radiograph and an apex locator (J. MORITA) (Fig. 1B). Cleaning and shaping were performed using Neo-Endo rotary instrument. Irrigation between each instrument was done using 5.25% sodium hypochlorite and 17% EDTA. After the master cone selection canals were obturated with gutta-percha and sealer. Post endodontic restoration was placed (Figs 1C and 1D).



Figs1AtoD:(A)Diagnosticradiograph,(B)Workinglengthradiograph,(C)Masterconeradiograph,(D)Postobturationradiograph(case1)

CASE REPORT 2: A 39-year-old female patient reported with complain of pain in the left lower back tooth region. She gave a history of intermittent pain in the last 1 month, which had increased in intensity in the past 4 days. On examination, the left mandibular first molar was carious with pulpal involvement and tender on percussion. Thermal and electrical pulp testing of the tooth elicited a negative response. The diagnostic radiograph showed widening of the periodontal ligament space and an additional root between the mesial and distal roots. Two radiographs with different horizontal angulations were taken which confirmed that the additional root was located distolingual to the mesial root (Fig. 2A).No relevant medical history of illness was given. A diagnosis of a nonvital left mandibular first molar with apical periodontitis was made and endodontic treatment was planned. The tooth was anesthetized and then isolated under rubber dam. The access cavity was prepared using an endo access bur. Two distal and two mesial canal orifices were located using an endodontic explorer. The distolingual orifice was found in the distolingual corner of the pulp chamber floor. At this corner overlying dentin was removed. The canal lengths were determined using radiograph and an apex locator (J. MORITA) (Fig. 2B). Cleaning and shaping were performed using Neo-Endo rotary instrument. Irrigation between each instrument was done using 5.25% sodium hypochlorite and 17% EDTA. After the master cone selection canals were obturated with gutta-percha and sealer. Post endodontic restoration was placed (Figs 2C and 2D).



Figs2AtoD:(A)Diagnosticradiograph,(B)Workinglengthradiograph,(C)Masterconeradiograph,(D)Postobturationradiograph(case2)

DISCUSSION

The presence of an RE has clinical implicationsin endodontic treatment. An accurate diagnosis of thesesupernumerary roots can avoid complications or a 'missedcanal' during root canal treatment. 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' RE. To reveal the RE, as econdradio-graph should be taken from a more mesial or distal angle(20º). This way an accurate diagnosis can be made in themajority 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. Anextracusp (tuberculum paramolare) or more prominent occlusal distal or distolingual lobe, in combination with acervical prominenceor convexity, can indicate the presence of an additional root. If an RE is diagnosed before endodontic treatment, one knows what to expect or where to look once the pulp chamber has been opened.

The location of the orifice of the root canal of an RE has implications for the opening cavity. The orifice of the RE is located distotomesio lingually from the main canal or canals in the distal root. An extension of the triangular opening cavity to the (disto) lingual results in amore rectangularor trapezoidal outline form. If the RE canal entrance is not clearly visible after removal of the pulp chamber roof, a more thorough inspection of the pulp chamber floor and wall, especially in the distolingual region, is necessary. Visual aids such asaloupe, intra oral camera or dental microscope in this respect, be useful. A dark line on the pulp chamber floor can indicate the precise location of the RE canal orifice. The distal and lingual pulp chamber wall can be explored with anangled probe to reveal overlying dentin or pulp roof remnants masking the root canal entrance.[15]

CONCLUSION

Unlike in other races, RE in mandibular first molar is not a frequent finding in the Indian population. However, Dental clinician should be aware of the occurrence of RE as an anatomical variant. The detection of RE and its thorough cleaning, shaping and obturation would contribute significantly to ward the success of primary end odontic treatment. Further, mandibular first molars have lower success rate following root canal treatment due to factors like missed canal and awareness about extra root helps in the diagnosis and to better the overall prognosis for endodontic retreatment. For the above reasons, molars also have high rate of extraction and early identification of extra distolingual root will minimize complications related to exodontias like root breakage.This case report also highlights the role of radiographs alone in the early identification and end odontic management of RE.

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