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Endodontic Management of Radix Entomolaris: Case Report

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ABSTRACT

Endodontic treatment plays an important role in achieving and maintaining good oral health by eliminating infection and preserving natural dentition. Success of endodontic treatment depends on accurate diagnosis and identification of all the canals. Therefore a thorough knowledge of root canal anatomy is necessary . Awareness and understanding of the presence of unusual root canal morphology contributes to the success of the root canal treatment. Usually mandibular molar have two roots and three canals. Variation in number of roots may occur, if extra root is present lingually it is called as radix entomolaris and if located buccally called as radix paramolaris. This article present successful treatment of mandibular molar with three roots, one located lingually i.e. radix entomolaris.

INTRODUCTION

Radix entomolaris (RE) is one of the anatomical variant found in a permanent mandibular molar and was first described by Carabelli. [1] It is characterized by the presence of an additional or extra third root, which is typically found disto-lingually. Radix entomolaris can be found in the first, second, and third mandibular molars, occurring the least frequently in the second molar. [2,3,4]

The prevalence of RE is reported to differ significantly with races and ranges from 0-33.1%. The prevalence of RE is said to be highest among the population of Mongolian origin such as Chinese, Taiwanese, and Koreans which considered to be an eumorphic root morphology among them. Radix entomolaris is not very common in African, Eurasian, Caucasian and Indian population and it is said to be a dysmorphic root morphology in them. [4,5] Despite RE consideration as an Asiatic trait with a high prevalence and a eumorphic root morphology in certain races such as Chinese, Taiwanese, and Koreans, the incidence of RE among the Indian population is found to be very low and only 0.2%. However, few studies have reported higher prevalence of RE, with a range from 2.19-13.3%, among the Indian population. [3,4,6,7]

The relationship between the finding of RE and various other factors such as gender, right vs left side distribution and bilateral occurrence is said to be contradictory. Regarding gender predilection, although few studies found male predilection for RE, no significant difference was found in the prevalence of RE according to gender.[5] Similarly, no significant difference was found in the side occurrence, despite some studies reporting it to be more on the right side while other studies finding it more on the left side. [5] The bilateral occurrence of RE is reported to vary from 37.14 to 67%. However, since some studies have reported only unilateral occurrence of RE, further studies are required to clarify this aspect. [3,5,8,9] Despite the prevalence of RE clearly showing a racial predilection, the diagnosis and management of RE are of utmost importance as mandibular molar is most frequently involved and need endodontic treatment. The purpose of this article is to present a case report on clinical approach for identification and endodontic management of RE in mandibular molar.

CASE REPORT

A 26 -year-old male patient reported with a chief complaint of continuous and radiating pain in relation to right mandibular first molar for several days. Clinical examination revealed deep occlusal caries in mandibular right first molar (tooth 46). The tooth was very sensitive to percussion and apical palpation. On radiographic examination of tooth 46 additional distal root outline was noticed on the radiograph. [Figure-1] Following pulp testing, chronic irreversible pulpitis was diagnosed. Non surgical endodontic treatment was planned. Access opening under rubber dam isolation was done. The presence of all the canal orifices were confirmed using an endodontic explorer [DG16, Hu-Friedy, Chicago]. In the subsequent visits, canals were

explored and negotiated using #08 and #10 size K-files [Dentsply Maillefer, Ballaigues, Switzerland]. The working length of the canals was determined and confirmed radiographically. [Figure 2] Canals were cleaned and shaped using rotary Ni-Ti files [ProTaper, Dentsply-Maillefer] and crown-down technique. Canals were irrigated using 5% sodium hypochlorite solution and flushed with 17% EDTA solution to remove smear layer. Canal disinfection was carried out using calcium hydroxide [Calcicur, VOCO, Germany]. In this case locating separate disto-lingual canal orifice and radiographic outline of the roots indicated the presence of an RE. In the follow up visits, when the patient was found asymptomatic, canals were obturated. [Figure-3] The access opening was restored with silver amalgam and the patient was scheduled for post-endodontic treatment.

Figure-1: Preoperative radiograph showing double distal root outline suggesting the presence of an RE in mandibular right first molar

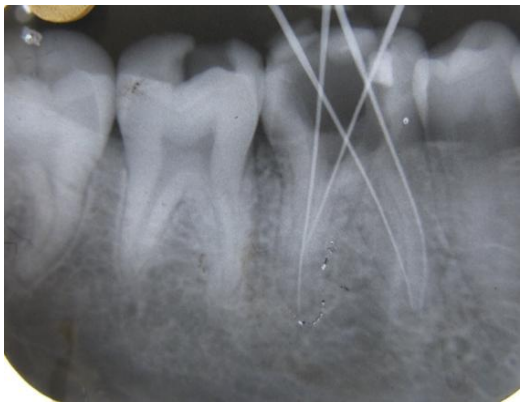

Figure-2: Radiographic verification of working length.

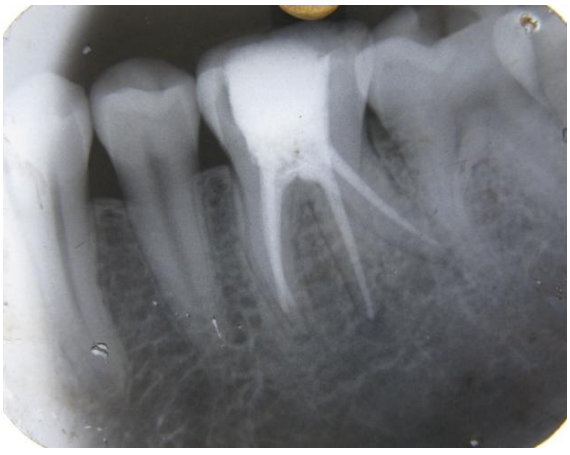

Figure- 3: Radiograph of Obturation

DISCUSSION

Endodontic success in such morphological variation tooth depends on its diagnosis, anatomy or morphology, canal configuration and clinical approach used. An accurate diagnosis of RE can avoid endodontic failure. Detection of RE can be based on clinical examination, radiographic and imaging techniques and other accessories [5,6]. Various factors such as an extra cusp, cervical convexity, prominent distolingual lobe, complex external contour of the furcation can indicate the presence of RE. Thorough inspection and awareness about existence and racial prevalence of RE aid in accurate diagnosis. Radiographically, double periodontal ligament images or outline of the distal root contour or the root canal can hint its presence. However, this requires a thorough inspection and skillful diagnosis of the preoperative radiograph. It is mentioned that the radiographs were successful in over 90% of the cases while identifying additional roots but superimposition of the distal roots can be limiting factor. An angled radiograph (25-30°) can be more useful in this regard and it is said that a mesial angled radiograph is better than a distal angled radiograph for RE detection [5,10,11,12,13]. Cone beam computed tomography (CBCT) are useful for 3-D visualizing or studying the true morphology of an RE. However, cost and access to them are said to be the limiting factors.[3,5]

Modification of the conventional triangular access trapezoidal outline form assisted in locating the orifice of RE. Since canal entrances are equidistant from a line drawn in a mesio distal (MD) direction through the pulp chamber floor and lie on a line perpendicular to this MD line across the center of the floor of the pulp chamber, following the laws of symmetry helps in both detecting and locating an RE. Further, following a dark line on the floor of the pulp chamber may act as a visual aid to indicate the position of an RE canal orifice.[5,10,14,15] The values based on the mean inter-orifice distance between an RE canal and remaining canals, as found in a study by Tu et al., may also serve as a useful guideline to locate and treat an RE.[3,16] In case of any calcification or overlying dentin or pulp roof remnants obscuring the orifice of an RE, use of an angled probe, ultrasonics cutting tips along with good illumination and visual aids such as loupes or surgical operating microscopes is said to facilitate the locating of an RE. [5,10,17]

Morphologically of RE can vary from a short conical extension to a mature root with root canal. It is generally smaller than the distobuccal and mesial roots and can be classified into separate and non-separate categories depending on the amount of its fusion with the other roots. Classification given by carlsen and Alexanderson described four different type of RE depending on the location of its cervical part.[9,23] Type A- distally located cervical part with two normal distal root components, Type B- same as Type A but only one normal distal component; Type C- mesially located cervical part; Type AC – central location between mesial and distal root component.[23] De Moor et al classified RE- based on curvature in bucco-lingual orientation into three types. Type I- refers to a straight root/root canal. Type II- refers to an initially curved entrance which continues as a straight root/root canal. Type III - refers to 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. [11,12] Canal configuration wise, despite these morphological variations, RE is reported to be typically rounder in shape with Vertucci type I configuration which can be considered to be the simplest canal anatomy of all types.[2,4,5,20] In confirmation of this, all the detected RE in the present case series radiographically exhibited only Vertucci type I canal configuration. It is said that externally, furcation contour wise, the distal furcation (furcation between disto-buccal root and RE) is significantly lower, with an average of 1 mm, than the furcation between the mesial and the distal roots and radiographically the distal furcation is not detectable.[21]

Radix entomolaris, due to variations and complexities in its anatomy coupled with its variable furcation levels, can pose multiple and significant endodontic problems in the form of furcal or strip perforation, vertical root fracture, weakening of root, ledge formation, straightening of the root canal, loss of working length, root canal transportation and instrument separation. These problems are more likely to happen during coronal pre-flaring, canal cleaning and shaping or post-space preparation, particularly in a type III RE which exhibits more curvature than other types. [5,10] To minimize above complications a proper clinical approach should be adopted. An initial relocation of the orifice without excessive removal of dentin helps to achieve straight-line access and avoid perforations. Manual preflaring is recommended to prevent instrument separation. It is said that RE exhibits the greatest degrees of curvature with its canal having relatively longer length and smaller radius of curvature as compare to other mandibular molar. As the risk of instrument fracture significantly increases with the decrease in the radius of curvature and canal preflaring. Manual use of stainless steel files is suggested to overcome instrument fracture. procedural errors can be reduced by initial root canal exploration with small files (size 10 or less), creation of a glide path along with the proper determination of the canal curvature and working length such as ledging and transportation. Finally, use of nickel-titanium rotary files having a taper of not more than 0.04 taper and crown down technique is said to allow a more centered, rounder and conservative canal preparation in RE.[5,10,22]

CONCLUSION

RE in mandibular first molar is not a frequent finding in the Indian population. However, dental clinician should be aware about the morphological complexities and variation. Failure to identify and treat an RE can significantly affect the outcome of an endodontic treatment. Angulated radiographs can play important role in the identification in RE. Though knowledge about prevalence, diagnosis, morphology, canal configuration of an RE would be a very important prerequisite to achieve endodontic success in a mandibular molar with a RE.

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