

Case Report

Rare Variation in Root Canals of Mandibular, Canine and Premolar Teeth

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ABSTRACT

One of the main causes of failure of root canal treatment is failure to diagnose variations in root canal anatomy. Hence, diagnosing the correct root canal morphology is critical for successful endodontic treatment. The purpose of this article is to discuss variations seen in root canal morphology of mandibular canine and first premolars. In the present case two separate canals along with separate roots in mandibular canine and premolar were identified and successfully managed.

INTRODUCTION

The success of root canal therapy depends upon a thorough knowledge of the root and anticipation for their possible morphologic variations is essential. The wide range of studies conducted on root canal morphology, from the early work of Hess and Zurcher¹ to various recent authors², demonstrating anatomic complexities of the root canal systems, have all emphasized on the fact that a root with tapering canal and a single foramen is an exception rather than a rule. Root canal variation can be identified with intra oral peri apical (IOPA) radiograph, magnifying optical loupes, surgical operating microscopes, endodontic endoscopes and Cone Beam Computed Tomography (CBCT).³ This article describes endodontic management with morphological variations in anatomy of mandibular canine and premolar.

CASE REPORT: An 18 year old female patient complained of pain in lower left front tooth region since 4-5 months. Intra oral examination revealed presence of dental caries in relation to 33, 34. IOPA radiograph (Figure1) showed presence of two roots in left mandibular canine and premolar. IOPA radiographic examination also revealed pulp involvement with two roots in right



Figure 1: IOPA showing presence of two roots in left mandibular canine and premolar.



Figure 2: Working length determination.

mandibular canine and premolar. Radiographs analysis with dental operating microscope confirmed the presence of two canals. Vitality test was positive. Diagnosis was chronic irreversible pulpitis.

Tooth isolation was done with rubber dam. 2%



Figure: 3 IOPA showing presence of two roots in left mandibular canine and premolar

Lignocaine hydrochloride (Astra Zeneca Pharma, Astrazenca – Bangalore) was used to anaesthetize the tooth. Endodontic access was prepared with round bur and Endo Z bur (Mani Company, Japan). Pulp chamber was inspected with microscope at 3x and 5x (3D Medisys Operating Microscope) and sharp DG 16 explorer was used to locate the root canal orifice. Presence of two canals was noticed, one buccal and one lingual canal in right mandibular canine and first premolar teeth. Working length was determined with IOPA radiograph (Figure 2). Cleaning and shaping of root canal was performed with hand protaper file (Densply, Maillefer, Switzerland) and 17 % EDTA was used at each change of file and irrigation was done with 5.25% sodium hypochlorite solution. Canals were dried with paper point and packed with cavit (3M ESPE, St. Paul, MN, USA). After 4 days canals were obturated with single cone gutta-percha (Densply, Maillefer, Switzerland) with AH plus sealer (Dentsply DeTrey) in right mandibular canine and first premolar. Two well obturated canals showed in final radiograph (Figure 3) and both teeth were restored with composite restoration and followed by metal ceramic crown.

DISCUSSION

The root canal system is complex and canal may branch, divide and rejoin taking various pathways to the apex. Weine et al⁴ were the first to categorize root canal configurations within a single root into three types depending on the pattern of division of the main root canal along its course from the pulp chamber to the root apex. Vertucci⁵ found numerous complex canal systems and

identified eight pulp canal configurations. The complex nature of root canal morphology should be thoroughly understood because additional root canals if not detected, can be a major reason for failure of root canal treatment. In the present case, two roots were seen clearly in pre-operative IOPA radiograph and confirmed with different angulated radiograph and microscope, so investigation such as CBCT was not required because of considerable radiation dosages exposure. Magnification aids such as loupes surgical operating microscopes definitely offer a better percentage of identification of extra canal.³ According to Vertucci's⁵ classification, root canal system of mandibular first premolars was found to be predominantly (67.39%) type I (single canal extends from pulp chamber to apex). Type II canal system (two separate canals leave pulp chamber and join short of apex to form one canal) was found in 7.97% teeth, type III canal system (one canal leaves pulp chamber and divides into two canals in the root, and finally merge into one and exit) was found in 3.62% teeth, type IV canal system (two separate canals extend from pulp chamber to apex) was found in 2.89 % mandibular first premolars, type V canal system (one canal leaves pulp chamber, divides short of apex into two) was found in 17.39% teeth, type VI canal system (two canals leave pulp chamber merge in the root and divide again short of apex to exit as two distinct canals) was found in 0.72% teeth. Types VII (one canal leaves pulp chamber, divides and then rejoin in root and finally divides into two canals short of the apex) and VIII (three separate canals extend from pulp chamber to the apex) were not identified in any of the teeth. The difference in the incidence of I, II, III, IV, V, canal system could be attributed to racial differences.

Pécora et al⁶ studied the internal anatomy, of 830 mandibular canines, and the results showed that 98.3% had only one root and of these 97.2% had one canal and one opening orifice, 4.9% two canals and one orifice, 1.2% two canals and two orifices. Two canals and two roots were present in only 1.7% of the cases. Quellet⁷ described the occurrence of two roots and two canals in mandibular canines in only 5% of all analyzed teeth. Zaatar et al⁸ conducted a study on mandibular premolar, included 4019 teeth and he reported that 4.7% of the mandibular second bicuspid have two roots. Scott and Turner⁹ described the accessory root of mandibular first

premolar as tome's root. They observed ethnic difference in the root morphology and reported the highest incidence (>25%) of accessory roots and the lowest incidence of tome's root (0-10%) occurred.

CONCLUSION

Diagnosing the correct root canal morphology is critical to the success of endodontic treatment. Hence, clinicians should keep in mind that they may encounter variation of root canal morphology in daily practice. The mandibular first premolar and canine with dual canals dividing at various levels of the root can generate complex mechanical problems. The canals may divide almost anywhere down the root. Because of the absence of direct access, cleaning, shaping, and filling of these teeth can be extremely difficult. In the present case two separate canals along with separate roots in mandibular canine and premolar were identified and successfully managed. This justifies the importance of understanding the radicular anatomic variations that may be encountered in day to day practice.

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