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CASE REPORT

Endodontic Management of Mesiobuccal-2 Canal in Four-Rooted and Five-Canalled Mandibular Third Molar

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ABSTRACT

Aim: A case of unusual root morphology is presented to demonstrate anatomic variations in mandibular third molar.

Background: The most common configuration of mandibular third molar is two roots and three canals; however they may have many different combinations. Endodontic treatment was performed in mandibular third molar having aberrant anatomy.

Case description: Four root canal orifices were located with the aid of dental operating microscope (DOM) and three separate roots were diagnosed with radiographs. Spiral computed tomography (SCT) showed the presence of an extra canal and extra root, indicating a rare anatomic configuration. Looking for additional canals and roots are important part of successful endodontics, as the knowledge of their existence enable clinicians to treat a case successfully that otherwise might end in failure.

Conclusion: The use of DOM and SCT in this case greatly contributed toward making a confirmatory diagnosis and successful endodontic treatment of four-rooted and five-canalled mandibular third molar.

Clinical significance: Variation in root canal anatomy is very common. Knowledge of these variations is very essential for successful root canal outcome, inability to do so can lead to missed canals and failures. Hence, thorough knowledge of root canal anatomy and advances in diagnostic aids are essential.

Keywords: Four-rooted mandibular third molar, MB-2 canal, Radix entomolaris, Radix paramolaris, Spiral computed tomography scan.

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BACKGROUND

Mandibular molars typically have two roots placed mesio-distally, but they sometimes have an additional root, a radix entomolaris (RE), usually on the distolingual aspect.[1] An additional root at the mesiobuccal side is called radix paramolaris (RP). The mandibular third molar, being the last tooth in the arch, has been associated with greater variation in root pattern and canal systems.[2] The morphology of the mesial root canals in mandibular molars presents a complex pattern.[3] The incidence of a third canal (middle mesial) in the mesial root of mandibular molars has been reported as 1 to 15%.[4]

Two canals in MB root (commonly found in maxillary first molar) and five canals in four rooted mandibular third molar have never been reported, indicating a rare anatomic configuration. To our best knowledge, this is only one case report of mandibular third molar with four roots and five canals (MB-2) diagnosed and confirmed with spiral computed tomography (SCT).

CASE DESCRIPTION

A 42-year-old Indian male patient was referred for endodontic treatment of mandibular right third molar. History revealed intermittent pain in the same tooth during mastication for the last 2 months. Clinically, the right mandibular third molar had a deep carious lesion. The tooth did not respond to thermal sensitivity tests and electric pulp test. The angled intraoral periapical (IOPA) radiograph revealed grossly decayed tooth, the possibility of extra root (radix entomolaris) and periradicular radiolucency at mesial root (Fig. 1). The patient's medical history was unremarkable. After extensive clinical and radiographic examination, the diagnosis of pulp necrosis with chronic periradicular periodontitis was made for the same.

The tooth was anesthetized by 2% lidocaine with 1:80,000 epinephrine. The distal surface of the tooth was restored with composite resin. A rubber dam was applied and coronal access was made. One distal and two mesial canal orifices were located using an endodontic explorer. Upon visual inspection with a DOM (Global Surgical Corporation, St Louis, MO), a dark line was observed between the distal canal orifice and the distolingual corner of the pulp

Fig. 1: Preoperative radiograph with RE

Fig. 2: Working length radiographs with five canals in mandibular third molar

chamber floor. At this corner, overlying dentin was removed and a second distal canal orifice was detected. Thus, four canal orifices were seen on the pulp chamber floor. The conventional triangular access was modified to a trapezoidal shape to improve access to the additional root canal orifices RE. The root canals were explored with a K-file #15. The radiographical working length measurement was performed with 20° mesial and 20° distal angulations to identify RE (Fig. 2) and confirmed with an electronic apex locator. On inspection of the radiographs, the three files were present in mesial root.

Since the images on the IOPA were two-dimensional, a specialized computed tomography (CT) scan was planned in order to determine and confirm the presence of extra roots and additional root canals. An informed consent was obtained from the patient. Spiral computed tomography revealed the presence of an extra root located distolingually, RE and mesiobuccally, RP. Computed tomography (CT) scan was done with SCT scanner (Asteion Super 4, Toshiba, Tokyo, Japan). Also all the protective measures were taken to protect the patient from radiation. CT scan slices revealed five separate orifices at coronal third (presence of MM canal orifice which was not detected with DOM), four separate roots at middle third (RP, ML, DB, RE) with five canals (Fig. 3) and four separate exits at the apical third and 3D reconstruction revealed four roots in the tooth (Fig. 4). The RE and RP had the Vertucci type I and II canal configurations respectively. The dentin overhang between MB and ML canal orifices was removed using non-cutting tip diamond bur and five canal orifices (MB-1, MB-2, ML, DB and RE) were located with the aid of DOM (Fig. 5).

The root canals were shaped with ProTaper rotary instruments. During preparation, EDTA was used as lubricant and the root canals were disinfected with sodium hypochlorite solution (5.2%). Master cone radiograph was taken. The canals were coated with AH plus sealer and obturated with ProTaper gutta-percha (Fig. 6). The pulp chamber was sealed with Ketac Fil glass ionomer cement and the tooth was restored with composite. Patient was asymptomatic during the subsequent follow-up period and advised full coverage crown.

DISCUSSION

A thorough knowledge of root canal morphology and configuration of mandibular molar teeth is important for the success of endodontic therapy. Most endodontic text books describe that these teeth have two roots, one mesial and one distal with two, three or four root canals,[5] but some articles reported three or four roots with a corresponding number of root canals.[6,7] Silberman et al reported a case of five canals (four mesial canals) in mandibular third molar,[8] but they did not describe that these were either MB-2 or ML-2. Plotino G observed three mesial canals in three separate mesial roots (a total of four canals) in mandibular third molar.[9] Researchers have shown that the anatomy of mandibular molars especially third molars requires much attention since it is highly unpredictable.

Conventional intraoral periapical radiographs are an important diagnostic tool in endodontics for assessing the canal morphology. The angled radiographs, 20° from mesial and 20° from distal, reveal the basic information on the tooth's external and internal anatomy that is required for endodontic treatment. Spiral computed tomography scan reveals 3D images, and therefore much finer details can be obtained. Hence, it can be used when traditional methods prevent adequate endodontic diagnosis. Hence, it is mandatory to use all the available diagnostic aids to locate and treat the entire root canal system. More recently, with

Fig. 3: CT scan slice reveals four separate roots (RP, ML, DB and RE) and five separate (MB-1, MB-2, ML, DB, RE) canals at middle third

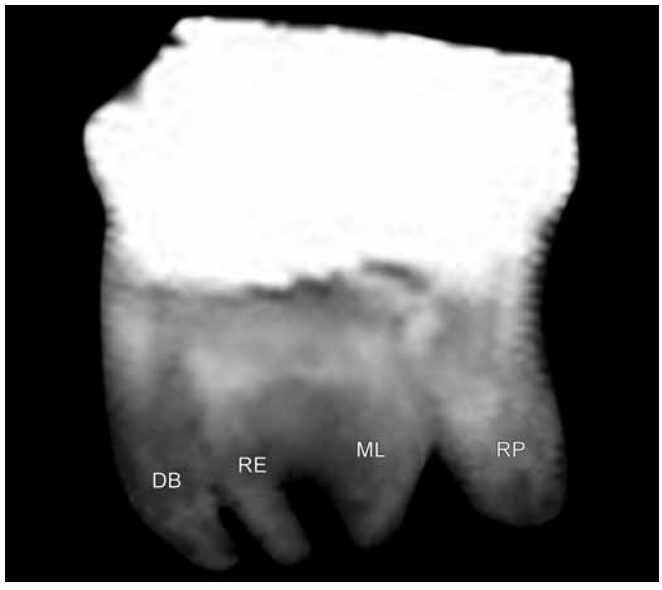

Fig. 4: 3D reconstruction of the tooth (#32) reveals 4 separate roots (RP, ML, DB and RE)

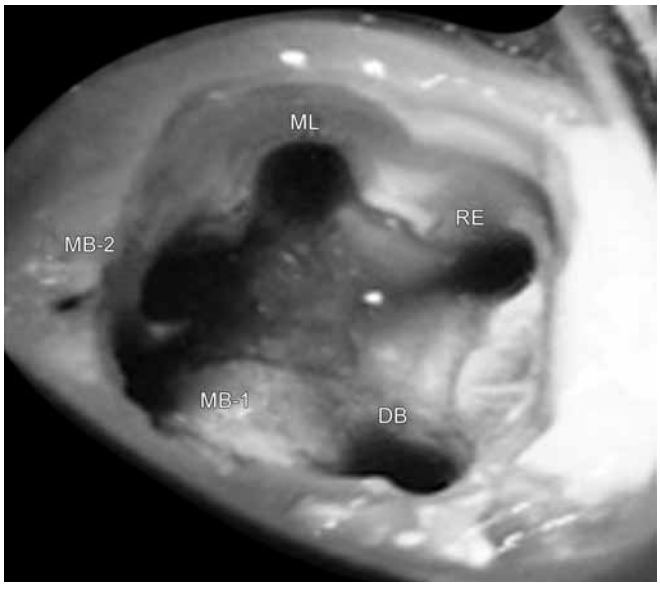

Fig. 5: Occlusal view of the pulp chamber floor reveals five root canal orifices (MB-1, MB-2, ML, DB and RE)

Fig. 6: Postoperative radiograph

the advent of DOM, SCT and cone beam CT in endodontics; more accurate information can be obtained about root and canals forms of individual teeth. Robinson et al reported that CT images identified greater number of morphological variations than panoramic radiograph.[10]

CONCLUSION

Although the incidence of root and canal variations is rare, dental practitioners must make every effort to find and treat all roots and canals for successful clinical results. This article highlights the diagnostic importance SCT in endodontic treatment of MB-2 canal in four-rooted mandibular third molar.

CLINICAL SIGNIFICANCE

Variation in root canal anatomy is very common. Knowledge of these variations is very essential for successful root canal outcome, inability to do so can lead to missed canals and failures. Hence, thorough knowledge of root canal anatomy and advances in diagnostic aids are essential.

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