



ENDODONTIC MANAGEMENT OF THE CONFLUENT TYPE OF MIDDLE MESIAL CANAL IN THE FIRST MANDIBULAR MOLAR : CASE REPORT

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ABSTRACT The endodontic practitioner need to have a broad knowledge on variations of anatomical and morphological characteristics of the teeth for their success. Mandibular molars demonstrate considerable variations with respect to number of roots and root canals. This case report describes the endodontic treatment of the rare anatomical complexity of mandibular first molars with an additional root canals(the confluent type). This paper evaluates and discuss the importance of their identification and treatment.

KEYWORDS : middle mesial canal , ultrasonic , confluent type

Introduction

The effectiveness of any endodontic treatment depends on an number on number of variables, namely in depth awareness of the internal anatomy of the root and its canals, in depth knowledge of instrumentation techniques, and detailed cleaning, shaping, and filling of the canals. The anatomical variations of the internal and external teeth anatomy can be highly complex. Awareness of these differences is of prime apprehension for endodontic treatment success. Related causes of endodontic treatment failure are found to be missed canals, incomplete instrumentation, inadequate cleaning and shaping of the root canal system, and subsequently defective obturation of root canal system.^[1]

Mandibular first molars are two-rooted, with various canal configurations in both mesial and distal roots. According to Vertucci's classification, the mesial root presents with two separate canals at the apex in 59% of teeth, two canals joining with a single apical foramen in 28% of teeth, a single canal in 12% of teeth, and three canals in 1% of teeth.^[2,3] In few other studies, the frequency of a middle mesial canal in the mesial root of mandibular molars varies between 1% and 7% of teeth.^[3] Also the three mesial canals can be separate or can join into two and exit with two apical foramina.^[3,4]

According to Pomeranz *et al.*⁵ and Ballullaya *et al.*⁶ MM Canals are classified into three anatomic variants. (a) Originates as a separate orifice and joins the MB and ML canal near the apex (confluent type). (b) When an instrument could pass freely between the MM canal and MB or ML canal (fin type). (c) The MM canal can occur as an independent canal.

Additional mesial canal is usually located between the two main canals and its orifice is often hidden by a dentinal projection of the pulp chamber wall which can be visualized with an help of operating microscope and ultra-sonic tips or long shank round burs. This case report accentuates on the clinical detection and successful management of different types of MM canals without the aid of magnification.

Case report

An 28-year-old female patient was referred to the Department of Endodontics with the chief complaint of intermittent pain in the lower left back teeth region since 2 months without influential medical history.

The pain was minimal at first, progressively the pain increased in intensity, frequency, and duration on the lookout for the dental assistance. The pain was spontaneous in nature and used to exaggerate by thermal and physical stimuli.

Clinical examination revealed deep occlusal caries and tenderness on vertical and horizontal percussion with the first molar. The electric pulp testing (Waldent) revealed a delayed response, while cold test (Endo ice,Hygenic) revealed a lingering response. Radiographic examination revealed a deep carious lesion which was involving the pulp [Fig 1]. Based on the clinical and radiographic interpretation, a final diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis was made of the mandibular first molar (#36), and root canal therapy was initiated.

Tooth was anesthetized, rubber dam isolation was done, and access was obtained using a large round bur (#8) and safe end bur (Dentsply Maillefer, Switzerland). Pulp chamber was inspected carefully for the root canal orifices. Canal orifices were located using endodontic explorer (DG-16).Four root canal orifices were detected, two mesial and two distal canals. The pulp chamber was thoroughly disinfected using 3% of sodium hypochlorite (Pyrex, Prime Dental Products, Mumbai, India) and flushed using normal saline. A tiny bleeding point appeared between the MB and ML canal (close to MB), and was confirmed when a small number instrument (6, 8# No K File, Mani Inc., Japan) advanced into the third orifice in the mesial root with a watch winding motion [Fig 2].

Working length was estimated using an apex locator (Root ZX mini,J morita), and a radiograph was taken to confirm the working lengths. A radiograph taken from mesial angulation revealed a MM canal which was coinciding with the MB canal at the apical third of the root canal (Confluent type) and also type 2 distal canals[Fig 3].

All five canals were instrumented using Hyflex CM (Coltene) and irrigated with 3% sodium hypochlorite (Pyrex, Prime dental products, Mumbai, India) and 17% ethylenediaminetetraacetic acid (EDTA) solution (RC Help, Prime Dental Products).The root canals were dried using paper points (Dentsply Maillefer, Switzerland) and obturation was done using gutta-percha cones and Sealapex Sealer (Sybron endo kerr). The access cavity was permanently restored.

Post obturation radiograph revealed three distinct orifices with two separate apical terminus of mesial canals and two distal canals with single apical terminus[Fig 4]. Hence, according to "Pomeranz *et al.*'s⁶ classification" this was a case of confluent MM canal.

DISCUSSION

Clinicians usually perceive that a particular tooth will have a predetermined number of roots and root canals most of the times. Studies conducted by Vande Voorde *et al.*,^[7] Martinez-Berna and Badanelli,^[8] emphasized the importance of an accurate clinical evaluation of a possible fourth or fifth root canal to ensure the success of endodontic treatment.

A thorough knowledge about internal anatomy is helpful in detection of root canal orifices. Fabra-Campos^[9] describes that the presence of a third canal (middle mesial) in the mesial root of the mandibular molars has been reported to have an incidence of 0.95–15%. A round bur or an ultrasonic tip can be used for removal of any protuberance from the mesial axial wall which would prevent direct access to the developmental groove between mesiobuccal and mesiolingual orifices. With the sharp tip of an endodontic explorer, the developmental groove could be carefully checked. The groove can be troughed with ultrasonic tips at its mesial aspect until a small file can negotiate this intermediate canal. Careful troughing up to 2 mm of the mesial pulpal groove toward the mesio-apical direction away from the furcation is the significant factor in detection and negotiation of the MM canals.

The clinical detection rate of root canal orifices without any magnification is lower compared to microscopes.^[10] Excellent magnification and illumination are offered by the dental operating microscope or loupes that substantially improves the visualization of canal orifices.^[11]

The present case was not equipped with magnification device which presented a greater challenge in managing the cases. Though, all the cases were treated without any aid of magnification, following the coronal internal anatomy accurately during conventional techniques can be a great tool in successfully treating the cases with different anatomical variations.

Even though, conventional radiographs provides the valuable information, the inherent disadvantages such as superimposition, distortion, foreshortening, elongation, interpretation variability, and lack of three dimensional representation persists. It may be more advantageous and provide more accurate information if advanced radiographic techniques such as cone beam computed tomography are utilized for the detection of MM canals than compared to conventional radiographs.^[12,13]

Prevention of missed anatomy starts with good preoperative radiographs. At least two different horizontal angles along with careful interpretation, which will aid in the detection of extra canals.^[14]

The preparation of this accessory canal system should be done cautiously and conservatively. The geometry of the mesial root shows it to be hourglass shaped and so a preparation in the mid section of the root is automatically closer to the danger zone [the furcation side of the mesial root] increasing the possibility of a perforation.^[15] also while preparing the confluent type of canal, the main canal need to be identified from the connecting to prevent iatrogenic errors such as zipping, transportation or hour glass preparations.

CONCLUSION

The presence of a third canal in the mesial root of mandibular molars has been reported to have an incidence rate of 1 to 15%. This additional canal may be independent with a separate foramen or join apically with either the mesiobuccal or mesiolingual canal. With the thorough anatomical knowledge and careful clinical or radiographical evaluation these cases can be successfully managed.



Fig 1 : Preoperative radiograph.

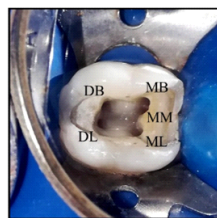


Fig 2 : Five canal orifices.

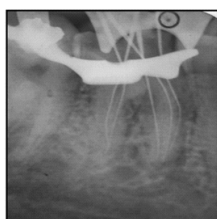


Fig 3 : Working length.



Fig 4 : Obturated canals.

Abbreviations : MM canal (middle mesial canal), MB (mesiobuccal), ML (mesiolingual), fig (figure)

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