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### ABSTRACT

The ideal goal of endodontic treatment, the complexity of the root canal systems, management difficulties because of presence of isthmuses and communications between the canals, use of standardized techniques and the possibility of overlooking the presence of extra canals, exploration with the aid of magnification and detection of an accessory canals and management are matters that form the subject of discussion. With the advent of magnification, either by loupes or microscope, the astute clinician must be aware of recent literature that states that the mandibular second molar has a 0.95%-15% chance of a fifth canal. The third mesial canal (Middle Mesial Canal) in mandibular second molars was located in the middle of the distance between the mesiobuccal and mesiolingual canals. This is a case report shows the unusual anatomy of the mandibular second molar with middle mesial canal. In conclusion, every attempt should be made to find and treat all root canals of a tooth.

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### INTRODUCTION:

As right quoted by MT Barrett, “of all the phases of anatomic study in human system, one of the most complex is the pulp cavity morphology.” The external and internal morphology of the tooth varies from person to person. For each tooth in permanent dentition, there is a wide range of variation reported in literature with the respect to frequency of occurrence of the number and shape of the canal in each root, the number of roots and incidence of molar root fusion.<sup>1</sup> A number of factors contribute to the variation found in these studies, such as the ethnic background, age of the patient, gender and also methods of used to assess these teeth.<sup>2,3</sup> As a cause of treatment failures, lack of working knowledge of three dimensional pulp anatomy ranks second only to errors in diagnosis and treatment planning. Over the years, there have been numerous studies that describe the morphology of teeth, including mandibular first molars. Skidmore and Bjorndal, Pineda and Kuttler, and Vertucci have all reported on the morphology of the mandibular first molar.<sup>4-6</sup>

According to Vertucci, the mandibular second molar is similar to the first except the roots are

shorter, the canals are more curved and the range of variations broader.<sup>6</sup> The root canal anatomy of mandibular second molars has been described by a number of investigators. The main areas of dispute are the number of roots possessed by mandibular second molars, and the type and shape of the canals. Meanwhile, an in vitro investigation of mandibular second molar root canal morphology has reported that 73% of mesial roots have one canal at the apex and 27% have two canals at the apex and in the distal root, 95% have one canal at the apex.<sup>7</sup> In addition, Beatty and Krell documented a mandibular second molar with five canals, three canals in the mesial root and two in the distal root.<sup>8</sup> C shape canal and single canal as well as single rooted mandibular second molar is also documented. However, these canal variations have commonly been found in two rooted mandibular second molars.

Every attempt should be made to find and treat all root canals to ensure successful endodontic treatment. The clinician must have a thorough understanding of normal anatomy and of common variations. The clinician must also be prepared to identify those teeth that exhibit unusual anatomical configurations.<sup>9</sup>

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This case report describes rare cases of mandibular second molar with four canals— three in mesial root (MB, MM, ML – Mesio Buccal, Middle Mesial, Mesio lingual) and one canal in distal root.

**Case Report:**

36 year old male patient presented to the dental clinic with a history of severe pain for 2 days. The pain kept him awake at night and was radiating up the side of his face. The clinical examination revealed prosthesis of teeth #45 to #47 (Image no.1).

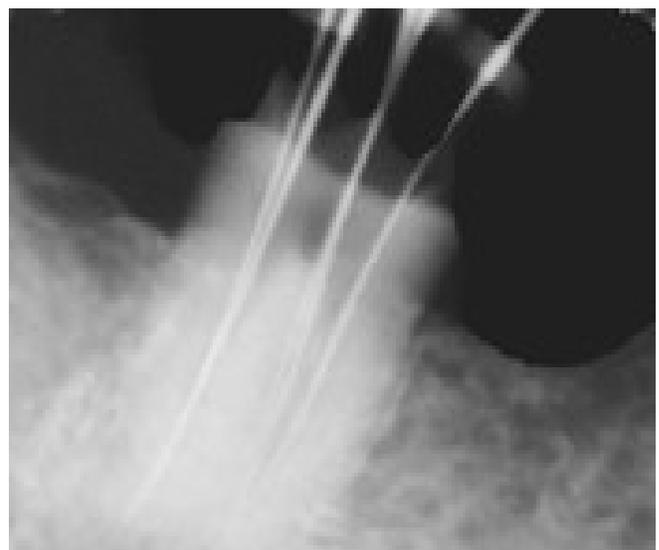


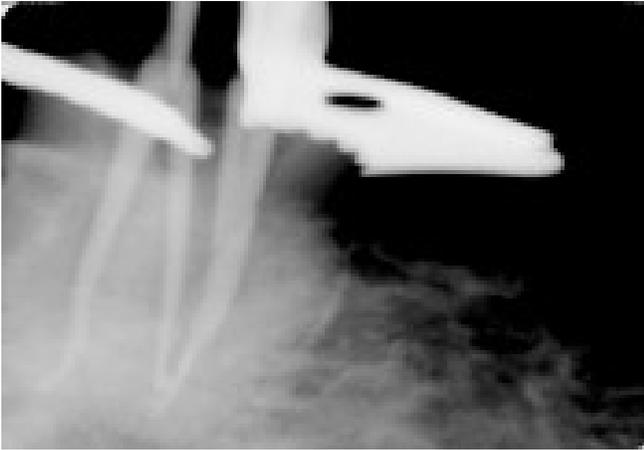
The tooth # 47 was very sensitive to percussion and was nonresponsive to Endo Ice (Hygienic Corp., Akron, Ohio). Prosthesis was removed. A radiograph (Image no. 2)



showed a secondary carious lesion approximating the pulp. A diagnosis of necrotic pulp with acute

apical periodontitis was made. Emergency treatment involved instrumentation of three canals, and placement of calcium hydroxide was performed. The tooth was sealed with a cotton pellet and temporary material. Two weeks later, the patient returned for completion of endodontic therapy. After removal of the temporary restoration, the mesial and distal canals were reexamined. The careful examination of the floor of the pulp chamber with surgical loupes (EyeMag® with×2.5 magnification, Dental Microscopes and Dental Loupes by Carl Zeiss Meditec) and DG-16 Endodontic explorer used to locate the extracanal orifice showed that there was a possible extra canal in the mesial root. Ultrasonic tips (Dentsply Maillefer, Ballaigues, Switzerland) were used to remove the dentin. Again, careful examination of the floor of the pulp chamber showed an additional root canal orifice between mesio buccal and mesio lingual canals. Thus, there were mesio lingual, middle mesial, and mesio buccal canals. Accordingly, with regard to Pomeranz's classification, the middle mesial canal was classified as confluent. The middle mesial canal originated as a separate orifice but joined in the apical third of the canal (Image no. 3).





The canals were obturated (Image no. 4) with laterally condensed gutta percha and AH plus sealer (Dentsply Maillefer, Ballaigues, Switzerland), and the access was closed with a cotton pellet and temporary restoration. The patient experienced no postoperative sequelae and was referred for appropriate coronal restoration (Image no. 5, 6).



The patient will be followed clinically to monitor periradicular responses.

## Discussion

Before root canal treatment is performed, the clinician should ideally have adequate knowledge of the pulp chamber and internal anatomy of the teeth. All root canals should be accessed, cleaned and shaped to achieve a hermetic obturation of the entire root canal space. There is an abundant amount of reports that relate the anatomic variations of mandibular molars.<sup>10</sup> This should induce the clinician to accurately observe the pulp chamber floor to locate possible canal orifices. This will increase the long term prognosis of endodontic therapy. Searching for additional canal orifices should be standard practice for clinicians. 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 MB and ML orifices. This developmental groove should be carefully checked with the sharp tip of an endodontic explorer. If depression or orifices are located, the groove can be troughed with ultrasonic tips at its mesial aspect until a small file can negotiate this intermediate canal.<sup>12</sup>

New technologies, such as the dental operating microscope and dental loupes, offer magnification and illumination of the operating field and substantially improve the visualization of root canal orifices.<sup>13,14</sup> We did not use magnification or these new technologies during treatment sessions. It is possible that more cases may have been discovered with magnification and extra illumination. 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% .<sup>11</sup> In almost all of the clinical cases reported until today, this canal joined the mesiobuccal or mesiolingual canal in the apical third.<sup>11,12</sup> However a few

mandibular first molars that had three independent canals in their mesial root have been reported.<sup>3</sup>

### Conclusion

Instrumentation is one of the key factors in the success of endodontic therapy; therefore, the clinician should be aware of the incidence of these extra canals in the mandibular second molar. The clinician can then perform a thorough examination

of the pulp chamber to insure complete debridement of all canals. Every attempt should be made to find and treat all root canals to ensure successful endodontic treatment. The importance of an accurate clinical evaluation of root canal number and morphology in mandibular molars cannot be overemphasized.

### REFERENCES:

1. Ingle, Bakland, Baumgartner. Morphology of teeth and their root canal system endodontics)(6 th edition ), chapter 6, 151-220.
2. Fava LR. Root canal treatment in an unusual maxillary first molar: a case report . Int Endod J 2001;34:649-53.
3. Cleghorn B, Christie W, Dong C. Root and canal morphology of the human permanent maxillary first molar: A Literature Review. J ENDOD 2006;32:813-21.
4. Skidmore AE, Bjorndal AM. Root canal morphology of the human mandibular first molar. Oral Surg 1971;32:778-84.
5. Pineda F, Kuttler Y. Mesiodistal and buccolingual roentgenographic investigation of 7,275 root canals. Oral Surg 1972;33:101-10.
6. Vertucci F. Root canal anatomy of the human permanent teeth. Oral Surg 1984;58:589-99.
7. Peiris R, Takahashi M, Sasaki K, Kanazawa E. Root and canal morphology of permanent mandibular molars in a Sri Lankan population. Odontology 2007;95:16-23.
8. Beatty RG, Krell K. Mandibular molars with five canals: report of two cases. J Am Dent Assoc 1987;114:802-804.
9. Nallapati S. Three canal mandibular first and second premolars: a treatment approach. A case report. J Endod 2005;31;474-476.
10. Cleghorn BM, Goodacre CJ, Christie WH: Morphology of teeth and their root canal system. In: Ingle JI, Backland LK, Baumgarthner JC: ENDODONTICS, 6th Edition. BC Decker: Inc, 2008: pp. 151-210
11. Fabra-Campos H. Unusual root anatomy of mandibular first molars. J Endod 1985;11:568-72.
12. Vertucci FJ. Root canal morphology and its relationship to endodontic procedures. Endod Topics 2005;10:3-29.
13. Barletta FB, Dotto SR, Reis Mde S, Ferreira R, Travassos RM. Mandibular molar with five root canals. Aust Endod J 2008;34:129-32.
14. De Carvalho MC, Zuolo ML. Orifice locating with a microscope. J Endod 2000;26:532-4.