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Mandibular First Molars with Middle Mesial and Middle Distal Canals – A Report of Two Cases

Narmatha Vallakuruchi Jayabal[1], Sheetal Shetty[2], Sandhya Yelamali[3], Anamika Thakur[4]
[1-3]*(Faculty Of Dentistry, Melaka Manipal Medical College, Manipal , Karnataka, India)*
[4]*(Sri Sukhmani Dental College and Hospital, Mohali, Punjab, India)*

Abstract: *Meticulous cleaning, shaping and filling of the root canal system are requisites for a successful root canal treatment.. Unfortunately, canal preparation is adversely influenced by the highly complex, intricate and variable root-canal anatomy. Thorough knowledge of root canal morphology and unusual anatomy of the tooth is crucial for the practitioner. Over the years, there have been numerous studies that describe the morphology of teeth, including mandibular first molars. These reports have shown that mandibular first molars have three or four canals. However, unusual root canal anatomy associated with the mandibular first molars has been reported in several studies and case reports. The following article reports the identification and systematic management of a middle mesial canal and middle distal canal in mandibular first molars in two cases.*
Keywords: *Molar, Root canals, Middle mesial canal, Middle distal canal*

I. Introduction

Meticulous cleaning, shaping and filling of the root canal system are requsites for a successful root canal treatment. Unfortunately, canal preparation is adversely influenced by the highly complex, intricate and variable root-canal anatomy and the relative inability of the operator to visualize this anatomy from radiographs. Hence, root canal preparation is not only important but also demanding for the clinician Thorough knowledge of root canal morphology and unusual anatomy of the tooth is extremely vital for the practitioner. Over the years, there have been numerous studies that describe the morphology of teeth, including mandibular first molars. The classical study by Hess[1] on 512 mandibular first molars reported that 0.3% of the teeth had only one, 17.7% had two, 78% had three, and 4% had four canals. Several other in vitro and in vivo studies by Skidmore and Bjorndal, Pineda and Kuttler, and Vertucci [2-4] have reported on the morphology of the mandibular first molar. These reports have shown that mandibular first molars have three or four canals.

However, unusual root canal anatomy associated with the mandibular first molars has been reported in several studies and case reports. [5-11]Vertucci and William, as well as Barker et al. first described the presence of a 5 th canal called the middle mesial canal (MMC).[12,13] In 1981, Pomeranz et al. reported an incidence of 12% of mandibular first molars with more than 4 canals. [9] Fabra – Campos et al studied 145 teeth in vivo and reported 2.1% cases of middle mesial canal and 0.6% of middle distal canal.[6] l n a radiographic study of extracted teeth Goel et al. reported that mandibular first molars had three mesial canals in 13.3%, four mesial canals in 3.3%, and three distal canals in 1.7% of specimens.[7] With increasing reports of aberrant canal morphology, the clinician needs to be aware of this varied anatomy. The purpose of this article is to report the successful treatment of two additional cases of mandibular first molars with five canals: one having and middle mesial canal and the other with a middle distal canal.

II. Case Report

Case 1: A 32 yr old female patient reported with a complaint of incomplete treatment in the lower left back tooth. Clinical examination revealed a temporary restoration on the left mandibular first molar. The tooth was asymptomatic. Pre operative radiograph revealed two distal canals which were obturated satisfactorily and fractured instrument in mesial canal. (Fig 1)

Fig 1: Pre –op IOPAR

The temporary coronal seal was removed and the mesial canal orifices were located. A third mesial canal was located between the mesiobuccal and the distobuccal canal – Middle mesial canal. (Fig 2)

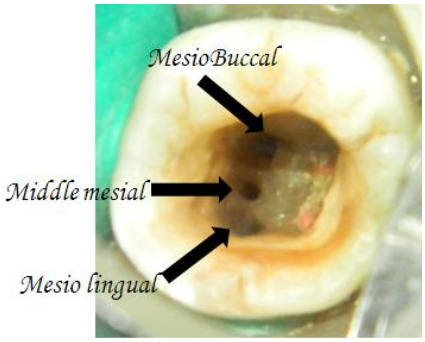


Fig 2: Clinical photograph showing three mesial canals

The working lengths were determined after an attempt to retrieve the instrument in the mesiolingual canal and bypassing the instrument. Thorough cleaning and shaping was done with the hybrid technique using hand and ProTaper rotary instruments with simultaneous irrigation with 1% sodium hypochlorite. A calcium hydroxide intracanal medicament was placed for a period of 1 week which was followed by obturation of the three mesial canals with cold lateral compaction and zinc oxide eugenol sealer. (Fig 3)

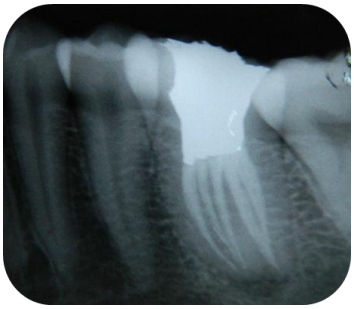


Fig 3: Post operative IOPAR showing 5 obturated canals

Case 2

A 53 year old male patient reported with a complain of continuous pain with respect to the lower right back tooth. On clinical examination, a severely attrited tooth with pulpal exposure was seen in the right mandibular first molar. Radiographic examination revealed a widening of the PDL space indicating an acute apical periodontitis. On access cavity preparation and canal exploration, a third distal canal was found between the distobuccal and the distolingual canal which is considered to be a rare occurrence. (Fig 4)

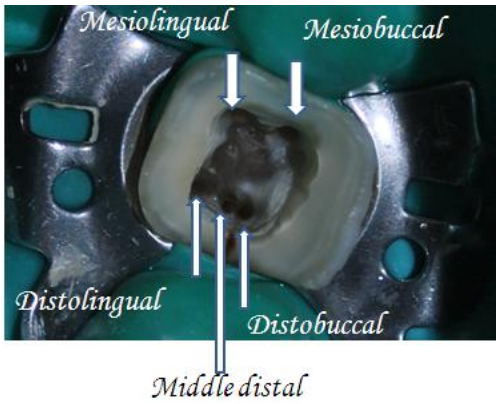


Fig 4: Clinical photograph showing middle distal canal

Subsequently, routine root canal therapy was done as described in the above case. Figure 5 shows the final obturation indicating the merging of the middle distal and the distobuccal canals.

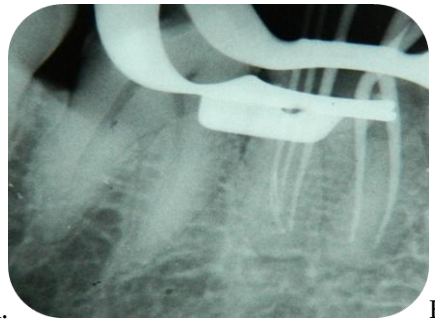
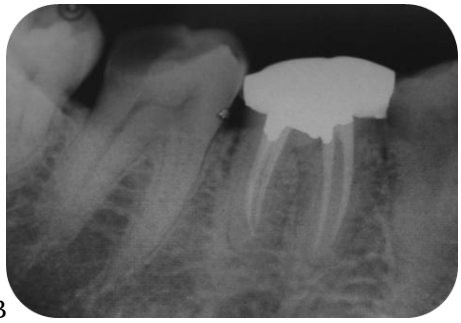
A.  B 

Fig 5: A- Master cone selection , **B:** Obturated canals.

III. Conclusion

There are numerous cases in the literature concerning the unusual anatomy of the mandibular first molar. 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%. However the occurrence of middle distal canal is extremely rare with an incidence rate of 0.6- 1.7%.[6,7] In one of the present case reports, a middle distal canal was identified and managed meticulously. 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 first molar. The clinician can then perform a thorough examination of the pulp chamber to insure complete debridement of all canals. The use of magnification and illumination can drastically increase the chances of identification of these aberrant canals. This increases the chance for long-term successful endodontic therapy.

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