



Middle Mesial Canal in Mandibular 1st Molar: Unravel the Hidden Anatomy

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Abstract

Endodontic treatment of mandibular molars is challenging because of variable root canal morphology. Thorough knowledge of the internal dental morphology is extremely important for effective cleaning and shaping the root canal system. The possibility of additional canals, should be explored with the aid of technologies such as magnification and illumination among others. Clinicians experience has also shown to be a key factor in negotiation and management of these aberrant canal configurations. This case report presents the treatment of a mandibular first molar with five root canals, of which three were located in the mesial root. A third canal was found between the mesiobuccal and mesiolingual root canals

KEYWORDS

Five Canals, Mandibular Second Molar, Middle Mesial Canal

1 | INTRODUCTION

The primary aim of endodontic therapy is complete debridement of the root canal system and three dimensional obturation of the same. Thorough knowledge of the internal dental morphology is important so as to identify aberrant anatomy of teeth pre-operatively. Permanent mandibular molars, which are the earliest posterior teeth to erupt, are the most commonly encountered type of tooth for endodontic treatment. Mandibular molars present usually as 2-rooted teeth with 2 canals in the mesial root and 1 or 2 canals in the distal root.^{1,2}

During tooth maturation, secondary dentin apposition can cause vertical partitions within the root canal cavity, creating multiple canals. Similarly, a third root canal may be created within the root canal cavity of mandibular molars. Such third canals are situated centrally between the buccal and lingual root canals and exhibit relatively smaller diameter.³ The probability of a fifth canal in mandibular first molars, is around 1–15%.⁴ Vertucci and Williams were the first to report the middle mesial

canal in a mandibular molar.⁵ Thereafter many case reports presented aberrant canal morphology in the mesial root. Magnification with loupes or microscope improves the visibility and thus helps in the detection of small hidden canals. The purpose of this article is to report the successful endodontic treatment in a mandibular molar with three mesial canals.

2 | CASE 1:

A 23-year-old female patient presented with a chief complaint of decayed tooth and associated pain in her left mandibular region for 2 weeks. History of presenting illness showed dull, continuous pain on chewing. On intraoral examination, deep carious lesion was present in 36. Tooth exhibited no mobility and was tender on vertical percussion. Her medical history was noncontributory. Periodontal probing was within the normal limit. Preoperative periapical radiograph revealed deep carious lesion involving pulp with widening of apical periodontal ligament space in 36[Fig:1]

The involved tooth gave exaggerated response to electric pulp tester in comparison to the contra-lateral tooth. A diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis was made for the involved tooth and endodontic therapy was planned. The goal of the treatment was to relieve pain through root canal treatment followed by suitable post endodontic restoration. After administration of local anesthesia with 2% lignocaine, dam isolation was done and all carious tissue was removed. An endodontic access preparation was made. After pulp extirpation and copious irrigation of the pulp chamber, two distal and two mesial canal orifices were located. Using the dental loupes and endodontic explorer, a thorough examination of the groove between the mesiobuccal and mesiolingual canal orifices revealed the middle mesial canal orifice, that was subsequently negotiated with a size 6 K file [Fig 2]. The electronic apex locator was used to establish the working length that was confirmed with a radiograph. Radiographs taken at multiple angles showed independent mesiolingual canal and middle mesial canal confluent with mesiobuccal canal. The canals were initially instrumented with stainless steel K files up to size 20.

Irrigation was done with copious amounts of 3% sodium hypochlorite and 17% ethylene diaminetetraacetic acid with saline irrigation intermittently. Rotary instrumentation was carried with Neo-endo flex files till 25.4% for each canal and a master cone radiograph was taken [Fig 4]. After preparation, the canals were flushed with saline, dried with sterile paper points. Calcium hydroxide based intracanal medicament was given and temporized with cavit. At the subsequent visit after a week, the tooth was asymptomatic. The intracanal medicament was flushed out and the canals were irrigated with 17% EDTA for one minute. Saline was used as the final irrigant, canals were dried with paper points and obturated with gutta percha cones and zinc oxide eugenol-based sealer. A post obturation radiograph was taken [Fig 6]. Appropriate post-endodontic restoration was performed in the subsequent visit, to ensure an adequate coronal seal.



Fig 1: Pre-Operative IOPAR



Fig 2: Negotiated 3 mesial canals



Fig 3: Working Length



Fig 4: Master Cone Selection

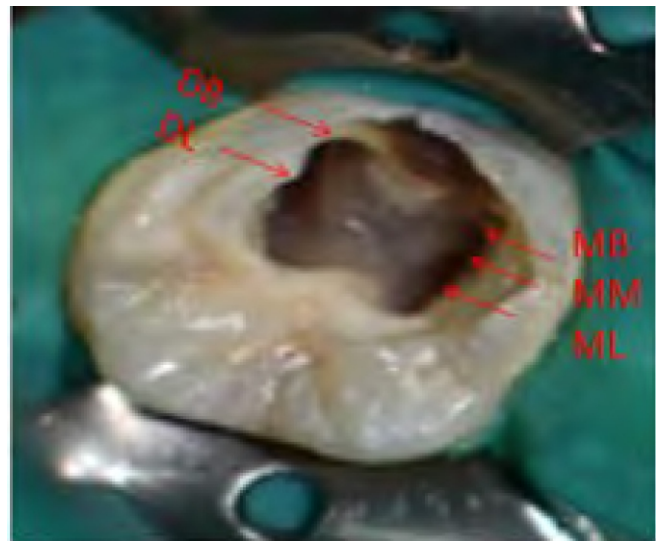


Fig 5: Canal orifices after cleaning and shaping



Fig 6: Post Obturation



Fig 7: 3 Months Follow-up

3 | CASE 2:

A 48-year-old male patient presented with a chief complaint of pain in his lower left back teeth region since past 1 month. On clinical examination, mandibular left first and second molar were tender to horizontal percussion and exhibited grade II mobility with abscess draining through the gingival sulcus. No relevant medical history was noted. Both the teeth were non carious, and showed no response to thermal or electrical pulp sensibility tests. Diagnosis of pulpal necrosis with symptomatic apical periodontitis in 36, 37 was established. Treatment plan was to perform endodontic treatment for 36, 37 followed by periodontal therapy for the same. On first appointment oral prophylaxis was done and local anesthesia was administered for root canal treatment of 36, 37. Access opening was done under rubber dam isolation. After pulp extirpation and copious irrigation of the pulp chamber, two distal and two mesial canal orifices were located in 36 and two mesial canals and one distal canal were located in 37. Using the dental loupes and endodontic explorer, a thorough examination of the groove between the mesiobuccal and mesiolingual canal orifices was done, which revealed the middle mesial canal orifice in 36 that was subsequently negotiated with a size 6 K file [Fig 9]. The electronic apex locator was used to establish the working length that was confirmed with a radiograph [Fig 10]. Radiographs taken at multiple angles showed independent mesiolingual canal and middle mesial canal confluent with mesiobuccal canal in tooth 36.

The canals were initially instrumented with stainless steel K files up to size 20. Irrigation was done with copious amounts of 3% sodium hypochlorite and 17% ethylene diaminetetraacetic acid with saline irrigation intermittently. Rotary instrumentation was carried with ProTaper gold file till F2 for each canal and a master cone radiograph was taken [Fig 12]. After preparation, the canals were flushed with saline, dried with sterile paper points. Calcium hydroxide based intracanal medicament was given and temporized with cavit. At the subsequent visit after 2 months, the tooth was asymptomatic. The intracanal medicament was flushed out and the canals were irrigated with 17% EDTA for one minute. Saline was used as the final irrigant, canals were dried with paper points and obturated with gutta percha cones and AH plus sealer. A post obturation radiograph was taken [Fig 13]. Post endodontic restoration was done with composite resin. The patient was referred back to dept of periodontics for further periodontal therapy wrt 36 and 37.



Fig 8:



Fig 9:



Fig 10:



Fig 11:



Fig 12:

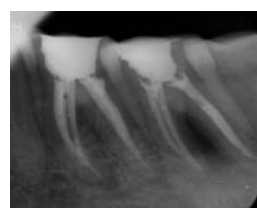


Fig 13:

3 | DISCUSSION

This case report, presents the endodontic management of mandibular first molars with confluent middle mesial canals. Several studies have been reported with aberrant canal morphology in mandibular first molar.^{6,7,8} A good preoperative peri-apical radiograph taken from at least two different horizontal angles helps in accurate interpretation of the complete root canal system.⁹ Clinically, the location of the canal orifices by a proper access cavity preparation, examination of the pulp chamber floor with a sharp explorer, troughing of grooves with ultrasonic tips, staining the chamber floor with 1% methylene blue dye, and performing the sodium hypochlorite “champagne bubble” test, fibro-optic transillumination, visualizing canal bleeding points and the feeling of a “catch” on the canal wall during instrumentation are important aids. Advancements in ultrasonic activation systems have improved the detection, exploration and effective debridement of the additional canals. The radiographic findings suggestive of additional canals include the fast break phenomenon, eccentric location of the endodontic file during working length determination, inconsistent apex locator readings, and the tracing of a sinus tract laterally away from the main canal.¹⁰ Dental loupes are one of the most common magnification systems used in dentistry. It provides better visualization as it enables the clinician to treat cases which are labeled as having poor prognosis or un-treatable. Magnification has been found to increase the detection of extra canals. In this paper, both cases were successfully managed endodontically using dental loupes.

4 | CONCLUSION

The middle mesial canal is an additional canal located between the usual mesiobuccal and mesiolingual canals in the mesial root of mandibular first molars. Even though its incidence is low, the importance of looking for this canal has a high clinical relevance. A modified endodontic access, the use of the operating microscope and periapical radiographs in two different horizontal projections are indicated to enhance the long-term favorable outcome of endodontic treatment. The management of additional root canals may be challenging but it is more imperative to accurately locate and successfully treat root canals to reduce failures. Even though the incidence of middle mesial canal is low, every effort made in looking for this canal has a high clinical relevance. A clinician should be vigilant and use additional aids for canal negotiation, whenever an additional or aberrant canal anatomy is suspected.

Conflict of Interest

The authors declare no conflict of interest.

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