

## CASE REPORT ON MIDDLE MESIAL CANAL: A HIDDEN-ENTITY

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### Abstract

This is a case report of a mandibular first molar having 3-mesial canals and one elliptical distal canal and its endodontic management. The patient presented a persistent sinus with purulent pus discharge even after the bio-mechanical preparation. On clinical examination a third mesial canal, middle mesial canal, was visualized located centrally between Mesiobuccal and Mesiolingual canals. Following case report emphasizes on, why one should have a clear understanding of the root canal morphology and, the importance of careful clinical as well as radiological examination of the tooth in interest.

**Key Words:** Mandibular, Medial Mesial Canal

### INTRODUCTION

A thorough understanding of the normal as well as the abnormal morphology of the root-canal is crucial in determining the outcome of the endodontic treatment.<sup>1</sup> One of the reasons for failure of the endodontic treatment has been attributed to missed root canal<sup>2, 12</sup> or presence of extra roots. Such aberrations are more common in premolars and molars.

Usually mandibular 1<sup>st</sup> molar has two roots and 2-canals in the mesial root (i.e. mesiobuccal and mesiolingual) and one/two canals in distal root. But the literature quotes many anatomic disparities and aberrations associated exactly with lower 1<sup>st</sup> molar ranging from presence of multiple canals to C-shaped canals. Martinez Berna and Badanelli<sup>6</sup> reported the presence of 6 canals in 1985, followed by Reeh<sup>3</sup> (1998) who reported the presence of 7-canals and, Ankit Arora<sup>8</sup> (2015) reported the presence of 8 canals in mandibular molar.

Presence of a 3<sup>rd</sup> canal in the mesial root of the lower 1<sup>st</sup> molar, i.e. the middle mesial canal, was first reported by Vertucci, William and Barker et al in 1974.<sup>11</sup> Range of MMC (Middle Mesial Canal) has been reported to be from 0.26% to 53.8%. Located centrally between the two main canals, mesiobuccal and mesiolingual, the middle mesial canal is also called the "Intermediary mesial canal" or the "medial mesial canal".<sup>7</sup> Detection of the canal sometimes can pose a challenge as the canal orifice is located deep in the isthmus or the developmental groove. The average length of this groove has been reported to be 1.07–2.81 mm, and the average depth to be 1.05 mm and 0.17–7.66 mm.<sup>13</sup>

In 1981, Pomeranz was the first to classify the middle mesial canal in to three categories; confluent type (MMC joining with either of the two canals-MB or ML), independent type (separate orifice and terminates as a separate foramen) and the fin type (during debridement the instrument could pass freely between the MB or ML canal and the middle mesial canal).<sup>4</sup>

Clinician should start the case with at least three-well angulated periapical radiographs (mesial angulation, distal angulation, straight) to rule out the possibility of an

extra root or the extra canal.<sup>8</sup> Also, the presence of persistent sinus (clinical signs and symptoms; as in the presented case report) should be given importance and careful examination should be done to rule out the presence of any missed canal.

This case report explains the diagnosis and management of a mandibular molar with confluent type of MMC.

### CASE REPORT

A 25-year-old male patient with his chief complaint of swelling and intermittent type of pain in the lower left back tooth for the last 2-3 weeks came to the Department of Conservative Dentistry & Endodontics (TMDCRC). He presented with no relevant past medical or dental history.

On examining clinically, a deep carious lesion and a sinus opening in relation to 36 (the tooth was temporized using temporary restorative material by the referring clinician) was found. Diagnosis of Chronic Irreversible Pulpitis with Periapical Abscess in relation to 36 was made which necessitated an endodontic therapy. Figure 1



Figure 1. Pre-Operative Radiograph

2% Lignocaine with 1:80,000 adrenaline (Lignox, Indoco Remedies Ltd, India) was used to administer left IANB (Inferior Alveolar Nerve Block). The tooth of interest was isolated using rubber dam, and access opening was done. A no. 10 K-file (Dentsply M-Access, Switzerland) was used to check the patency of all the canals (MB, ML and Distal canals).

ProTaper nickel-titanium rotary instruments (Maillefer, Dentsply, Ballaigues, Switzerland) was used to prepare all the canals in crown down technique. Copious irrigation was carried out using sodium hypochlorite solution (5.25%) and EDTA (17%, Prep Canal, Ammdent). The access preparation was temporized using Cavitemp (Ammdent, India) and the patient was recalled few days later. On the consecutive visit, sinus opening with purulent pus discharge was observed clinically in relation to 36. Sinus tracing was done to establish the source with the help of no. 25 2% gutta-percha point. Figure 2.



Figure 2. Sinus tracing with 25 no. 2% Gutta-Percha irt 36

An endodontic probe (DG-16, Dentsply, Maillefer, Switzerland) was used to examine fissure joining the two main mesial canals, revealing an additional orifice in between the mesiobuccal and the mesiolingual canals. Figure 3.

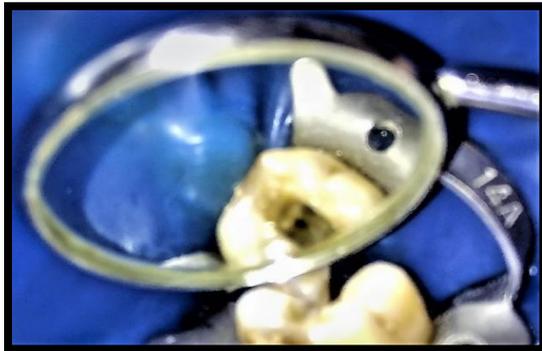


Figure 3. Three separate orifices located mesially irt 36

A no. 10 K-file (Dentsply M-Access, Switzerland) was used to check the patency of the 3<sup>rd</sup> mesial canals. Multiple radiographs were taken at different angulations to confirm the confluent type canal and also to establish the working length (Figure 4(a), (b)). The middle mesial canal was also prepared keeping 1 mm short of the mesiobuccal canal's working length. Calcium hydroxide was placed as an intra-canal medicament and the patient was recalled after one week (Figure 5).



Figure 4.(a) Patency checked of the three canals, (b) Working length determination



Figure 5. Calcium hydroxide placed inside the canals

Obturation was performed after one week with Bioceramic based root canal sealer (BioRoot RCS, Septodont) and ProTaper gutta-percha F1 for mesial canals. And for distal canal, ProTaper gutta-percha F3 with 2% gutta-percha points which were laterally condensed (Maillefer, Dentsply) Figure.5 A and B and sealed with IRM cement.

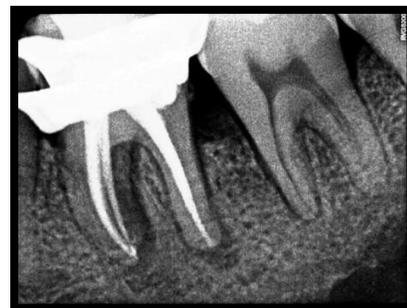


Figure 5A - Calcium hydroxide placed inside the canals

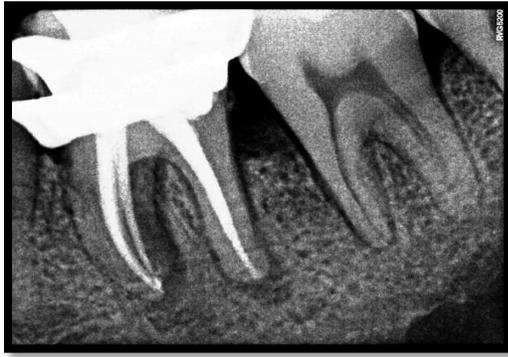


Figure 5 B- Obturation of the tooth showing the confluent type of MMC

Post-obturation radiograph was taken to check the obturation which shows mesial canals ending apically in to 2-separate canals (with three separate orifices clinically). This case can be classified as confluent middle mesial canal according to the Pomeranz's classification.

## DISCUSSION

According to Fabra et al. 2.6% of mandibular molars had three mesial canals, out of which the 3<sup>rd</sup> canal joined the MB canal in the apical third in 65% cases, the 30% converged with the ML canal and, only 1-case was an independent canal throughout.<sup>5</sup>

There is variation in the morphology of the root canal system according to age as well. Mostly one large canal is present in the mesial roots of the mandibular 1<sup>st</sup> and 2<sup>nd</sup> molars until the age of 11 and 15 years. By the age of 30-40 years, there is secondary dentine deposition leading to changes in the root canal system, and higher probability of finding MMC.<sup>14</sup> Therefore, it is essential to be aware of these age-related inconsistencies in the canal.

Proper preoperative radiographs from at least two different horizontal angles will aid in the recognising an extra or missed out canal. A proper preparation of the access cavity is of fundamental importance in locating canal orifices, pulp chamber floor should be examined with a sharp instrument (an endodontic explorer), ultrasonic tips or a small round bur for troughing the grooves,<sup>15</sup> staining the floor with 1-2% methylene blue dye, performing the age-old sodium hypochlorite "champagne bubble" test, FOTI (Fibre-optic Transillumination), or a "catch" on the canal wall during scouting are essential aids in identifying the orifices.<sup>7</sup>

Radiographically clinician should look for these few markers; an lateral apical rarefaction on the root in cases of necrotic pulp, fast break guideline, eccentric location of an endodontic file during working length determination, a sinus tract that traces laterally away from the main canal (as in the presented case).

Mostly the MMC (middle mesial canal) is concealed by a projection in the mesial aspect of pulp chamber, and this dentinal growth is usually located between the MB and ML canals.<sup>7</sup> In Indian population, Sherwani et al reported that 67% of the cases had the MMC in the center of the

MB and ML canals, 20% closer to ML canal orifice and 12% closer to the MB canal orifice.<sup>15</sup> After establishing an adequate access cavity, clinicians should always spend time in examining the mesial sub-pulpal groove to detect and negotiate any such hidden additional canal.

Mortman and Ahn suggested that the third mesial canal is not an accessory or extra canal at all.<sup>10</sup> However, these accessory canals when negotiated, cleaned, and shaped can constitute a pathway into the otherwise inaccessible isthmus providing access for removal of bacterial biofilms and the necrotic remaining pulpal tissue. This will help in increased successful outcomes of non surgical root canal therapy.

## CONCLUSION

Locating extra canals does not entirely depend upon the use of newer diagnostic or visual aids but an in-depth understanding of the root canal system and its morphology. Any aberrant morphology should be recognised and treated with utmost importance to avoid failure of the endodontic therapy.

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