



Management of mid mesial canal in mandibular first molar – A case report

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General Note

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ABSTRACT

The outcome and long term prognosis of the successful root canal therapy relies on the awareness and thorough understanding of variations in morphology that may exist in the root canals. Aim of the present study is to report a case of Management of Two Mandibular First Molar with Middle Mesial Canal. A 34 year old male reported with pain since three months. He was diagnosed with irreversible pulpitis. The Root canal treatment was initiated. The presence of extra canal, which is not so common finding was found during the treatment. Treatment plan was modified accordingly and Root canal was completed. The extra canal has been reviewed and discussed. This mid- mesial canal can be visualized after obtaining access to the pulp chamber and removing hindrance covering the canal orifice with either burs or ultrasonic tips.

Keywords: Middle Mesial Canal, Extra Canal, Mandibular Molars, Mid Mesial Canal

1. INTRODUCTION

The purpose of root canal procedure aims at thorough cleaning and shaping of the canals and subsequently sealing the canal space so as to eliminate the pathology and prevent infection. Normal root canal anatomy is an exception rather than a rule and a wide variety of variation exist in the root canal system (Vertucci, 2005). The outcome and long term prognosis of the successful root canal therapy relies on the awareness and thorough understanding of variations in morphology that may exist in the root canals. Among the major obvious reasons for failure of endodontic treatment is missed extra root with its root canal (Reeh, 1998). Every tooth in the dental arch may have extra root or root canal, with more chance of variation existing in posterior tooth (Vertucci, 1984). Mandibular 1st molar being the most primitive tooth that erupt in the dentition and thus at majority of times required endodontic intervention. The variations in canals are far more common, and tooth with simple root canal system are barely seen now. The variations seen in mandibular molars are - third canal in the middle root on mesial side, called as middle mesial (MM) canal, first mentioned by vertucci, additional DL root c/a radix entomolaris and MB root c/a Paramolaris, C-shaped canals, a 'ribbon-shaped communication' existing in the mesiobuccal (MB) canal & mesiolingual (ML) canal called as isthmus (Pomeranz et al., 1981; Campos et al., 1989). The initial literature for existence of extra and independent canal in lower molar tooth was reported by Barker et al. and Vertucci and Williams. Canal was present in mesial root beneath the developmental groove joining the buccal and lingual canal on mesial side (Barker et al., 1969). Later, Martinez-Berna and Badanelli showed a middle canal along the distal root also (Berna et al., 1985). since then, several researchers have reported this type of configuration of canal in lower molars. Middle canal is also referred by other names such as "Intermediate canal, Mesio-central canal, Third mesial canal, Accessory mesial canal and Middle mesial canal (MMC)" (Nagmode et al., 2017). In a study of 145 extracted human lower first molars, it was observed that 'teeth with five canals had incidence rate of 2.75%' (Fabra-Campos, 1989). A study on permanent mandibular molars found out that, of 2362 molars, 1.5 % teeth were with five root canals (Martínez & Badanelli, 1985). Jacobsen et al. stated that 12% of lower first molars had three canals on mesial side (Jacobson et al., 1994). Baugh D and Wallace J conducted a literature review and found out that prevalence of middle canals in Mesial root ranged from as low as 0.95 % to as high as 15% (Baugh & Wallace, 2004). Similarly, Kirici DO and Koc S in 2019 in a literature review found presence of middle distal canal to be from 0.2 % to 1.7% (Kirici & Koc, 2018). This case documented the 'endodontic management of 46 with mid-mesial canal.'

2. CASE REPORT

A 34 year old male with chief complaint of pain in the lower right back region of jaw since three months reported to dental OPD. Pain was intermittent, spontaneous and got aggravated on intake of cold and also during night and relieved on intake of medication. There was no history of pus discharge and fever. Past medical history was not significant. When examined clinically, 46 revealed a disto-proximal caries. Radiographic and neural sensibility investigations were carried out. On radiographic examination of tooth 46, caries was found to be close to distal pulp horn. Periodontal ligament space around the roots was found intact with initial apical widening (fig. 1).

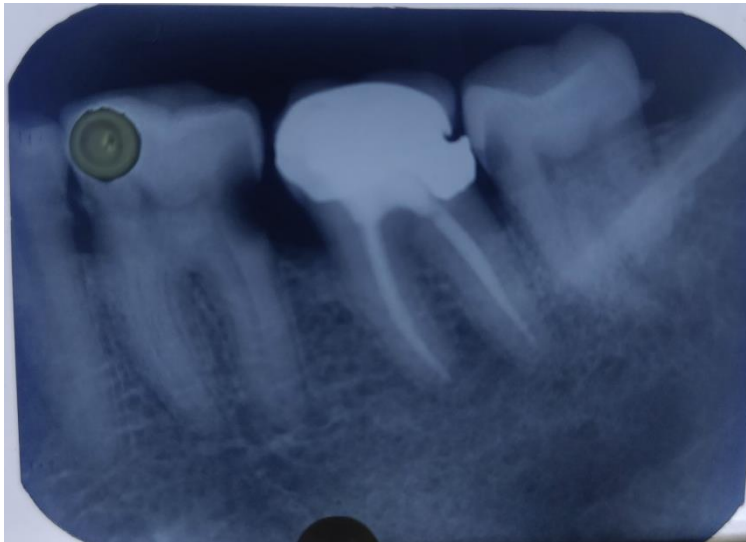


Figure 1 Pre-operative Radiograph

On Neural sensibility test, affected tooth showed an exaggerated lingering response to pulp testing. The clinico-radiographic diagnosis was chronic irreversible pulpitis with 46, indicating the need of endodontic therapy. Treatment was then initiated; right IANB anesthesia was injected with 2% lignocaine with 1: 1, 00,000 adrenaline. Rubber dam was used to isolate single tooth. Caries excavation was done with 46 and pre-endodontic build up was done using composite resin restoration. Access cavity preparation was made trapezoidal in shape following dentinal map. Close inspection of pulpal floor was done with endodontic explorer; a depression was felt in between two mesial canals. Troughing was done with round bur connecting the MB and ML canal to widen it. On widening, pulpal floor showed three mesial orifices and two distal orifices (fig.2).



Figure 2 shows 3 mesial canals and 2 distal canals

The canal patency was obtained using a no. 10 K-file. Numerous angulated radiographs (fig.3) were obtained to assure the independent existence of 5 discrete canals (fig 3).

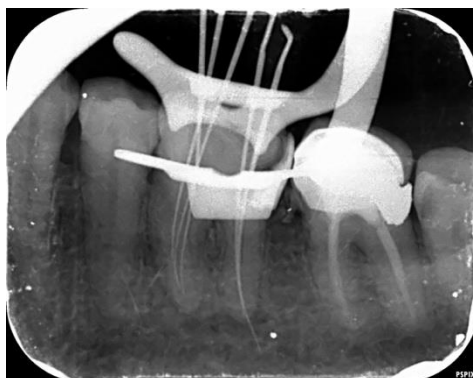


Figure 3 Working Length Determinations

Individual canal preparation was carried out using Protaper NiTi instruments (Maillefer, Dentsply). Profuse irrigation was done with 5.25% NaOCl and EDTA alternatively with normal saline. Final flushing with chlorhexidine was done followed by drying of canals using absorbent points. Master cones were selected (fig.4).

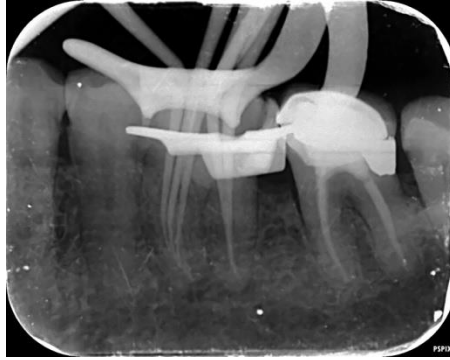


Figure 4 Master cone

Obturation was carried out with master cones (Maillefer, Dentsply, Tulsa, OK) and Sealapex sealer (fig. 5). Post endodontic restoration was done using composite resin restoration (fig. 6) followed by metal crown prosthesis with 46 (fig.7).



Figure 5 Obturation



Figure 6 Post endodontic restorations



Figure 7 follow up with prosthesis after 3 months

3. DISCUSSION

Internal anatomy of tooth may vary from teeth to teeth. This case report considers mandibular 1st molar (Tikku et al., 2017). Certainty of success in endodontics depends upon following steps –preparation of access cavity, cleaning, shaping and obturation of root canals (Mukerjee et al., 2012). Therefore it is imperative to identify, clean and shape and obturate all canals present in a tooth. Missed anatomy can be prevented by radiographic examination of tooth prior to treatment, during access opening of tooth, with aid of dental operating microscope, ultrasonics, CBCT (Cantatore et al., 2006). Radiographic examination should be done before and even post obturation in search of extra canal. The abrupt narrowing or disappearance of canal indicates division of main canal. To detect extra canal in this 2D image angulated radiographs are valuable (Albuquerque et al., 2014). Bedford et al. showed that routine radiographs were not sensitive in evaluating the number of canals, any canal obstructions and existence of lateral and accessory canals (Bedford et al., 2004). The access opening of tooth should be modified following dentinal map. Modification can be done using ultrasonic tips (Plotino et al., 2007). Various aids that can be used for identification of extra canals include white line test, red line test, dye test. MM canals have small orifices and may lie deep into the isthmus; hence, troughing to widen and deepen the isthmus and then exploring with DG16 the developmental groove increases the probability of canal detection (Sert et al., 2004). Studies suggest the DOM enable to discover 7.8% additional canals in mandibular molars. Under good illumination DOM helps dentist to selectively remove dentin precisely (Coehlo and Zuilo et al., 2000). Numerous studies have found that endodontists and oral and maxillofacial radiologists may recognize as low as 76% as many canals on traditional radiographs, but up to 100% of canals on CBCT radiographs. Missed canals have an impact on outcome of endodontic treatment. Bacteria surviving in these canals result in persistence of symptoms. In another study, 1100 endodontically treated teeth; failure in 42% cases was due to missed canals (Hoen and Pink et al., 2002). According to literature, in the mandibular first molars, frequency of missed canal is more in distal (86%) than in mesial root (14%). A micro-CT study showed that middle canal is located under a dentinal projection in the groove connecting the two main canals (Versiani et al., 2016). In view of the fact that extra canals are formed linking two main canals; their diameter is less than the main canals. Therefore, overzealous preparation of middle canals may result in perforation (Azim et al., 2015). Position of the middle canal with reference to the main canal was also studied by Sherwani et al. They observed that 67% of the orifice of middle mesial canal was in middle of the MB and ML orifice, 20% of cases- orifice was located nearer to the ML canal and 12%- had the orifices to be situated closer to the MB canal (Sherwani, 2016). In these cases, canal was to be found in middle of MB and ML canal orifices.

4. CONCLUSION

It is said that, no two tooth are alike, and same applies to the root canal system. Variation is common finding and the root canals without any variation is rare. The above documented case confirms this and states that additional canal exist in the mesial side of mandibular 1st molar. This mid-mesial canal can be visualized after obtaining access to the pulp chamber and removing hindrance covering the canal orifice with either burs or ultrasonic tips.

Informed Consent

Written and oral informed consent was obtained from the patient in this study.

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Conflict of interest

The authors report no conflict of interest.

Data and materials availability

All data associated with this study are present in the paper.

Peer-review

External peer-review was done through double-blind method.

REFERENCES AND NOTES

1. Albuquerque D, Kottoor J, Hammo M. Endodontic and clinical considerations in the management of variable anatomy in mandibular premolars: a literature review. *BioMed research international*. 2014.
2. Azim AA, Deutsch AS, Solomon CS. Prevalence of middle mesial canals in mandibular molars after guided troughing under high magnification: an in vivo investigation. *Journal of endodontics*. 2015 Feb 1;41(2):164-8.
3. Barker BC, Lockett BC, Parsons KC. The demonstration of root canal anatomy. *Aust Dent J*. 1969;14:37-41.
4. Baugh D, Wallace J. Middle mesial canal of the mandibular first molar: A case report and literature review. *J Endod*. 2004;30:185-6.
5. Bedford JM, Martin DM, Youngson CC. Assessment of a contrast medium as an adjunct to endodontic radiography. *Int Endod J*. 2004;37:806–813.
6. Cantatore G, Berutti E, & Castellucci A. Missed anatomy: frequency and clinical impact. *Endodontic Topics*. 2006;15(1):3–31.
7. Coelho de Carvalho MC, Zuolo ML. Orifice locating with a microscope. *J Endod*. 2000; 26:532–534.
8. Fabra-Campos H. Three canals in the mesial root of mandibular first permanent molars: a clinical study. *International Endodontic Journal*. 1989;22(1):39–43.
9. Hoen MM, Pink FE. Contemporary endodontic retreatments: An analysis based on clinical treatment findings. *J Endod*. 2002;28:834–6.
10. Jacobsen EL, Dick K, Bodell R. Mandibular first molars with multiple mesial canals. *Journal of endodontics*. 1994 Dec 1;20(12):610.
11. Kirci DO, Koç S. Middle distal canal of mandibular first molar: A case report and literature review. *Niger J Clin Pract*. 2019;22:285-8.
12. Martinez-Berna A, Badanelli P. Mandibular first molars with six root canals. *J Endod*. 1985;11:348-52.
13. Martínez-Berná A, Badanelli P. Mandibular first molars with six root canals. *Journal of endodontics*. 1985;11(8):348-52.
14. Mukherjee, Prithwish, Aditya Patel, M. Chandak, and Rasika Kashikar. Minimally Invasive Endodontics a Promising Future Concept: A Review Article. *International Journal of Scientific Study*. 2017;5(1):245–51.
15. Nagmode PS, Patel AV, Satpute AB, Gupta PL. Endodontic management of mandibular first molars with mid mesial canal: A case series. *Journal of conservative dentistry: JCD*. 2017 Mar;20(2):137.
16. Plotino GL, Pameijer CH, Grande NM, Somma F. Ultrasonics in endodontics: a review of the literature. *J Endod*. 2007;33:81–95.
17. Pomeranz H, Eidelman D, and Goldberg M. Treatment considerations of the middle mesial canal of mandibular first and second molars. *Journal of Endodontics*. 1981;7(12):565–568.
18. Reeh E.S. Seven canals in a lower first molar. *Journal of Endodontics*. 1998;24(7):497–499.
19. Sert S, Bayirli GS. Evaluation of the root canal configurations of the mandibular and maxillary permanent teeth by gender in the Turkish population. *J Endod*. 2004;30:391-8
20. Sherwani OA, Kumar A, Tewari RK, Mishra SK, Andrabi SM, Alam S. Frequency of middle mesial canals in mandibular first molars in North Indian population – An in vivo study. *Saudi Endod J*. 2016;6:66-70.
21. Tikku AP, Pandey WP, Shukla I. Intricate internal anatomy of teeth and its clinical significance in endodontics: A review. *Endodontology*. 2012;24(2):160-9.
22. Versiani MA, Ordinola-Zapata R, Keleş A, Alcin H, Bramante CM, Pécora JD, et al. Middle mesial canals in mandibular first molars: A micro-CT study in different populations. *Arch Oral Biol*. 2016;61:130-7.
23. Vertucci F.J. Root canal anatomy of the human permanent teeth. *Oral Surgery Oral Medicine and Oral Pathology*. 1984;58(5):589–599.
24. Vertucci F.J. Root canal morphology and its relationship to endodontic procedures. *Endodontic Topics*. 2005;10(1):3–29.