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Case Series

Middle mesial canal - A mystery in mandibular first molar: Report of two cases

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ABSTRACT

Endodontic therapy aims at disinfection of the root canal system. Efforts are made by root canal instrumentation and chemical disinfection to remove the infected pulp tissue and debris from the root canal space. However due to variations in canal anatomy, it is impossible to instrument all the parts of canal and that may lead to persistence or progression of infection. Thorough knowledge of tooth morphology is important to improve the success rate of endodontic treatment. Missed canals are considered to be an important factor for endodontic failure and about 4% cases treated by specialists also reported have shown to have missed canals. Hence use of all the available methods to detect the additional aberrant canals and disinfection of them during root canal treatment procedure is essential for favorable endodontic outcome.

1. Introduction

Endodontic therapy aims at disinfection of the root canal system. Efforts are made by root canal instrumentation and chemical disinfection to remove the infected pulp tissue and debris from the root canal space. However due to variations in canal anatomy, it is impossible to instrument all the parts of canal and that may lead to persistence or progression of infection. Complex anatomy is often present in mesial roots of mandibular molars. Presence of middle mesial canal was first reported by Barker et al in 1969 and Vertucci in 1974. Incidence of middle mesial canal was reported to be 0.95-15% according to Fabra et al., 13.3% according to Goel et al.[1] The middle mesial canal was classified as fins, confluent or independent canals by Pomeranz.[2] Failure to recognize such canal aberrations might lead to failure of endodontic therapy.[3] Hence thorough knowledge of root canal anatomy is important for successful endodontic therapy.[4]

This case report enlightens successful endodontic management of two cases in which first mandibular molar had three canals in mesial root.

2. Case Report 1

A forty two year old male patient reported to the department of Conservative Dentistry and Endodontics at Rajas Dental College and Hospital with a chief complaint of pain in lower right back tooth region for past one week. He gave a history of pain that was of sudden onset, throbbing type and aggravated during eating, relieved on medication. Medical history was non contributory.

On clinical examination the mandibular right first molar had dental caries in distoocclusal aspect and exhibited tenderness to percussion. There was no associated swelling or sinus tract seen. Radiographic examination (Figure 1 A) revealed radiolucency involving enamel, dentin and pulpal space. Based on clinical and radiographic examination, diagnosis was made to be symptomatic irreversible pulpitis with apical periodontitis. Therefore, Endodontic treatment

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was planned for the tooth 46.

The tooth was anaesthetised with 2% lignocaine containing 1:80000 adrenaline (Lignox 2% A) and rubber dam (Hygenic, Coltene, Whaledent) isolation was done. Access cavity preparation was done and pulp chamber was irrigated with 3% sodium hypochlorite(Prime Dental Products PVT LTD) and on careful examination of pulp chamber floor under 2.5X magnification(Sanma Medineers Vision Pvt Ltd, Mumbai) there was three separate canal orifices in mesial root and two canal orifices in distal root of 46 (Figure 1B). Canal patency was checked with #10 size K file (MANI, INC. Japan) and working length was determined with #15 size K file (MANI, INC. Japan) (Figure 1C). All the canals were instrumented with ProTaper gold (Dentsply, Maillefer, Switzerland) system upto size #F1 file (Sx,S1,S2,F1) along with 3% sodium hypochlorite copious irrigation in between the files that were used. The master cone fit was checked and confirmed using digital periapical radiograph (Figure 1D). The canals were obturated with gutta percha cones coated with Zinc Oxide Eugenol sealer (DEEPAK ENTERPRISE, Mumbai) followed by Glass Ionomer (Ketac molar, 3M ESPE, Seefeld, Germany) post endodontic restoration in the same visit.

3. Case Report 2

A thirty seven year old male patient reported to the department of Conservative Dentistry and Endodontics at Rajas Dental College and Hospital with a chief complaint of pain in lower right back tooth region for past one month. He gave a history of pain which had spontaneous onset, throbbing type and kept him awake during night time. Medical history was non contributory.

On clinical examination there was dental caries in lower right first molar and the tooth was sensitive to percussion. There was no sinus tract or swelling associated with the tooth. On radiographic examination there was coronal radiolucency involving enamel, dentin and pulpal space. Based on clinical and radiographic examination diagnosis was made to be symptomatic irreversible pulpitis with apical periodontitis in 46 and Endodontic therapy was planned.

The tooth was anaesthetised with 2% lignocaine with 1:80000 adrenaline (Lignox 2%A) and rubber dam (Hygenic, Coltene, Whaledent) isolation was done. Access cavity preparation was done and on examination of pulpal floor under 2X magnification in dental operating microscope(Sanma medineers vision Pvt Ltd, Mumbai) there was three canals in the mesial root and a single large oval canal in the distal root of 46 (Figure 2a). All the four canals were instrumented using ProTaper gold (Dentsply, Maillefer, Switzerland) system along with copious sodium hypochlorite irrigation after each file being used and obturated in single visit followed by temporary coronal seal (Cavitemp, Ammdent, Punjab).

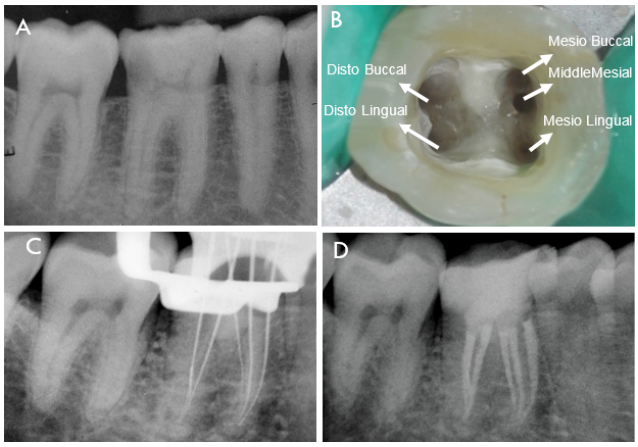

Fig. 1: A: Preoperative Radiograph, **B:** Five Canal Orifices, **C:** Working Length, **D:** Post-operative Radiograph.

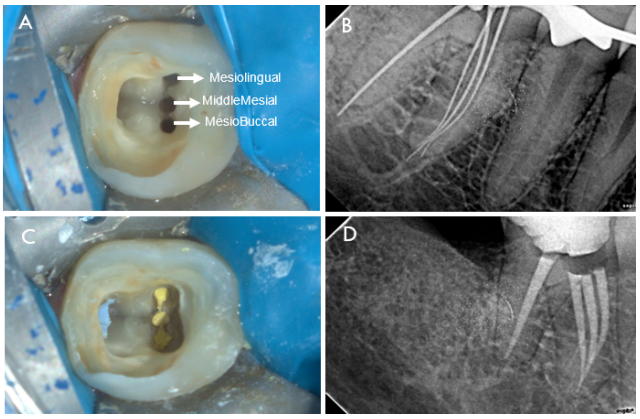

Fig. 2: A: Clinical Image of mesial root with three canals; **B:** Working Length; **C:** Post Obturation Clinical Photograph; **D:** Post-Operative Radiograph.

4. Discussion

In literature there is description of multiple canals in mesial roots of mandibular fist molars hence the clinician treating a mandibular first molar should be cautious to examine the pulp chamber floor to rule out any of the anatomical variation.[5,6] According to Fabra – Compos presence of a third canal in mesial root of mandibular molars have an incidence of about 0.95 -15%.[7] According to Goel et al incidence of mid mesial canal accounted for 13.3% while mid distal canal accounted for 1.3%. Incidence of two canals in distal root was about 60%.[8,9]

Until today all the clinical cases reported have the middle mesial canal either joined with mesiobuccal canal or mesiolingual canal. It is same in the present case report and the midmesial canal joins with mesiobuccal canal in 44.5% and mesiolingual canal in 14.8% in the apical area according to Aminsobhani et al.[10] It is important to have an adequately flared access cavity to visualize the anatomy of the chamber.

Constricted access can lead to missed canal (either Mesio Buccal or Mesio Lingual).[11]

Detection of middle mesial canal was increased upto 40% while troughing the floor of pulpal chamber in mesioapical direction for 2mm using 1mm round bur while the detection was only possible in 6.6% cases without troughing. The incidence also increased with use of magnification and age of the patients than that of invitro studies where the age of the tooth studied is not revealed. According to De Toubes et al., use of dental operating microscope improved locating the mid mesial canal (30%) than that of CBCT which accounted for 27%.[12,13]

5. Conclusion

Thorough knowledge of tooth morphology is important to improve the success rate of endodontic treatment. Missed canals are considered to be an important factor for endodontic failure and about 4% cases treated by specialists also reported have shown to have missed canals. Hence use of all the available methods to detect the additional aberrant canals and disinfection of them during root canal treatment procedure is essential for favorable endodontic outcome.

6. Conflict of Interest

None.

7. Source of Funding

None.

References

1. Barker BCW, Lockett BC, Parsons KC. The demonstration of root canal anatomy. *Aust Dent J*. 1969;14(1):37–41.
2. Pomeranz HH, Eidelman DL, Goldberg MG. Treatment considerations of the middle mesial canal of mandibular first and second molars. *J Endod*. 1981;7(12):565–8. doi:10.1016/S0099-2399(81)80216-6.
3. Martínez-Berná A, Badanelli P. Mandibular first molars with six root canals. *J Endod*. 1985;11(8):348–52.
4. Robinson S, Czerny C, Gahleitner A, Bernhart T, Kainberger FM. Dental CT evaluation of mandibular first premolar root configurations and canal variations. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2002;93(3):328–32.
5. Sundaresh KJ, Srinivasan R, Mallikarjuna R, Rajalbandi S. Endodontic management of middle mesial canal of the mandibular molar. *BMJ Case Rep*. 2013;p. bcr2012008261. doi:10.1136/bcr-2012-008261.
6. Alshehri AA, Alzain SM, Alnaim AJ, Alrumaih JM, Dewedar AN, Alghamdi MM, et al. Root canal morphology and its relationship to endodontic procedures. *Ann Dent Spec*. 2020;8(2):94–6.
7. Fabra-Campos H. Unusual root anatomy of mandibular first molars. *J Endod*. 1985;11(12):568–72. doi:10.1016/S0099-2399(85)80204-1.
8. Bains R, Verma K, Loomba K, Bains V, Loomba A. Mandibular First Molar with Middle Distal Canal: A Case Report. *J Oral Health Comm Dent*. 2013;7(1):69–71.
9. Burns R. Tooth Morphology and Access Cavity Preparation. Cohen's, Burns RC. In: Pathways of the Pulp. 8th edn. Boston, MA, USA: Mosby; 2002.
10. Aminsobhani M, Bolhari B, Shokouhinejad N, Ghorbanzadeh A, Ghabraei S, Rahmani MB, et al. Mandibular first and second molars with three mesial canals: a case series. *Iran Endodont J*. 2010;5(1):36–9.
11. Wasti F, Shearer AC, Wilson NHF. Root canal systems of the mandibular and maxillary first permanent molar teeth of South Asian Pakistanis. *Int Endod J*. 2001;34(4):263–6.
12. De Toubes KS, Côrtes M, Valadares M, Fonseca LC, Nunes E, Silveira FF, et al. Comparative analysis of accessory mesial canal identification in mandibular first molars by using four different diagnostic methods. *J Endod*. 2012;38(4):436–41.
13. Cohen S, Burns R. Orofacial dental pain emergencies: endodontic diagnoses and management. In: Pathways of the Pulp. 8th edn. Boston, MA, USA. Mosby; 2002. p. 13–75.

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