Maxillary First Molar with Two Mesiobuccal Roots: Report of a Rare Case

Ajit Hindlekar[1], Srinidhi Surya Raghavendra[2], Nishant Vyavahare[3], Niranjan Desai[4]

1- Post graduate student, Department of Conservative Dentistry & Endodontics, Sinhgad Dental College & Hospital, Pune. 2- Professor & Head, Department of Conservative Dentistry & Endodontics, Sinhgad Dental College & Hospital, Pune. 3- Lecturer, Department of Conservative Dentistry & Endodontics, Sinhgad Dental College & Hospital, Pune. 4- Reader, Department of Conservative Dentistry & Endodontics, Sinhgad Dental College & Hospital, Pune.

Correspondence to:
Dr. Srinidhi Surya Raghavendra, Professor & Head, Department of Conservative Dentistry & Endodontics, Sinhgad Dental College & Hospital, 44/1, Vadgaon (Bk), Pune, Maharashtra, India.

ABSTRACT

A thorough knowledge of root canal morphology is a prerequisite for endodontic therapy. The main goal of endodontic treatment is healing of periapical tissues which are achieved by elimination of bacteria and their byproducts from the canal and prevention from reinfection. Anatomic forms and variations in teeth are well known, chief among them being extra roots/canals. The use of preoperative radiographs at different angles and advanced diagnostic aids like CBCT helps to detect and evaluate root canal morphology and anatomy. The maxillary first molar has been extensively studied with numerous case reports on variations through the years. There are reports of multiple canals, multiple roots and developmental abnormalities. This case report details the endodontic management of a maxillary first molar with four roots, Mesiobuccal1, Mesiobuccal2, Distobuccal and Palatal.

KEYWORDS: Aberrant Canals, Maxillary First Molar, Mesiobuccal Root, Operating Microscope

INTRODUCTION

The main objective of root canal treatment is to relieve pain, disinfect the root canal and prevent reinfection.[1] Knowledge of root morphology and canal anatomy is essential for obtaining three dimensionally obturated root canal systems. Challenges faced during root canal treatment may be attributed to an inadequate understanding of the canal morphology of teeth, with undetected extra roots or root canals being the major reason for failure of root canal treatment.[2] Accurate radiographic technique with preoperative radiographs at different angles and proper interpretation are needed for sound diagnosis and treatment.

Incidence of second mesiobuccal (MB2) canals in permanent maxillary first molars range from 18-96.1%.[3,4] Generally, it has three roots and four canals. The incidence of five canals is reported to be 2.25–2.4%[5] and the incidence of six canals is reported to be 0.319 – 0.88%.[6] The incidence of a second distobuccal (DB1) canal in the maxillary first molars is reported to be between 1.7[7] and 1.25%.[8] Baratto Filho et al [9] reported one maxillary first molar having three roots and seven canals out of 140 teeth. Raghavendra SS et al[10] and Kottoor et al[11] reported the endodontic management of maxillary first molars with seven and eight canals respectively.

This paper describes a case of endodontic management of maxillary right first molar with four roots and five root canals. The aberrant root morphology was confirmed with the help of Cone Beam Computed Tomography (CBCT). There are two mesiobuccal roots (MB1 and MB2) with their own separate canals, one distobuccal and one palatal. The distobuccal and palatal roots had normal anatomy. To the best of our knowledge, this variation with two mesiobuccal roots has not been previously reported in the literature.

CASE REPORT

A 27-year-old male patient reported to the Department of Conservative Dentistry and Endodontics with a complaint of continuous pain in an upper right posterior tooth since five days. The patient gave a history of intermittent pain on mastication in that tooth since past two months. On clinical examination, the maxillary right first molar had a mesio proximal carious lesion and was tender on percussion. Vitality testing of the involved tooth with heated gutta-percha gave a prolonged response while electric pulp testing (Parkell, USA) gave an early response. The pre operative radiograph (Fig No.1) showed mesio proximal caries involving the pulp space. The periodontal ligament space with respect to the mesiobuccal root was widened. From the history, clinical findings and radiographic interpretation, a diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis in maxillary right first molar was made. Non surgical endodontic therapy was recommended and patient's consent was obtained.

After local anesthesia, caries excavation was done and the mesial surface of the tooth was built up with composite

How to cite this article:
Hindlekar A, Raghavendra SS, Vyavahare N, Desai N. Maxillary First Molar with Two Mesiobuccal Roots: Report of a Rare Case. Int J Dent Med Res 2015;1(6):94-97.

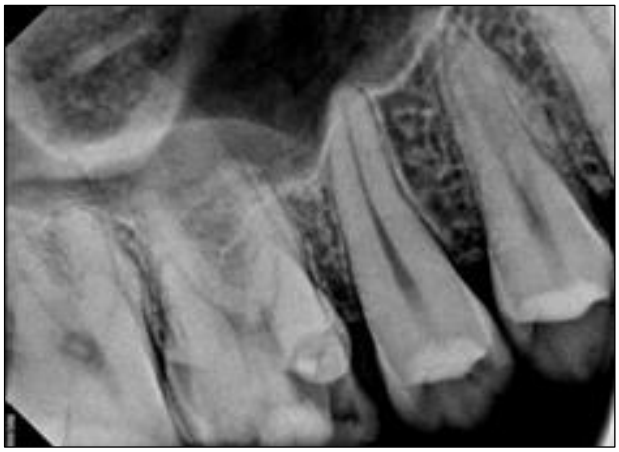

Fig 1:Pre-Operative Radiograph

resin (Matrix, Medicept Dental Prod, UK) to enable optimal isolation. Rubber dam was placed and a conventional endodontic access opening was established. After access opening, initially MB1, MB2, DB and Palatal canals were located. Further examination with dental operating microscope (DOM) (Moller Wedel, Germany) revealed an additional orifice, MB3. To improve straight line access to MB3 canal, the access cavity was modified into a trapezoidal shape (Fig No. 2a,b,c). The patency of the canals were confirmed with.

Fig 2a: Access opening with MB root

Fig 2b: Access opening with DB root

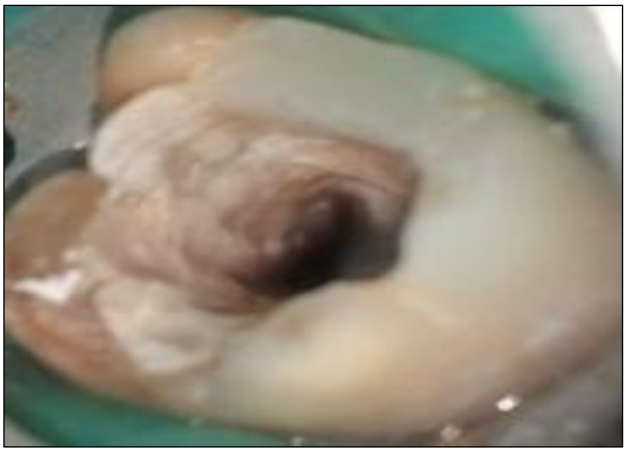

Fig 2c: Access opening with P root

ISO #10 K-files (Mani, Japan) and intraoral periapical radiographs of the mesiobuccal, distobuccal and palatal roots were taken to confirm the working lengths. Careful examination of the radiographs indicated the possibility of aberrant morphology in the mesiobuccal root

In view of this unusual root canal configuration, it was decided to subject the tooth to CBCT imaging. The tooth was temporized with Cavit G (3M ESPE Dental Products, St Paul, MN). The patient was informed of the need for additional diagnostic procedures and consent was obtained. CBCT imaging was done with tube voltage of 100kV, tube current of 8mA and the canal morphology was recorded in transverse, axial and sagittal sections with a thickness of 0.5mm. Scan slices revealed five canals (three mesiobuccal, one palatal, one distobuccal) in the right maxillary first molar. CBCT images confirmed two mesiobuccal roots, one distobuccal and one palatal root (Fig No. 3a).

Fig 3a: CBCT image of MB root

At the next appointment, the working lengths were determined with the help of an apex locator (Root ZX Mini, J Morita, Tokyo, Japan) and intraoral periapical radiographs (Fig No.3b). Cleaning and shaping were performed using nickel–titanium rotary instruments (M2, Dentsply VDW, Germany) using the crown-down technique. During the biomechanical preparation of the

canals, 2.5% Sodium hypochlorite was used as the irrigant. Final rinsing of the canals was done with 2% Chlorhexidine Gluconate (Asep RC, Stedman Anabond, Chennai, India). The canals were washed with saline, dried and obturated with gutta percha and AH Plus sealer (Dentsply Maillefer, Ballaigues, Switzerland) using the lateral compaction technique (Fig No. 4a).

A radiograph was taken to establish the quality of the obturation (Fig No. 4b).

The tooth was restored with a posterior composite filling (Matrix, Medicept Dental Products, UK) and a full coverage porcelain crown was placed. The patient was asymptomatic at the two-month follow-up.

Fig 3b: WL of MB root

Fig 4a: Post obturation

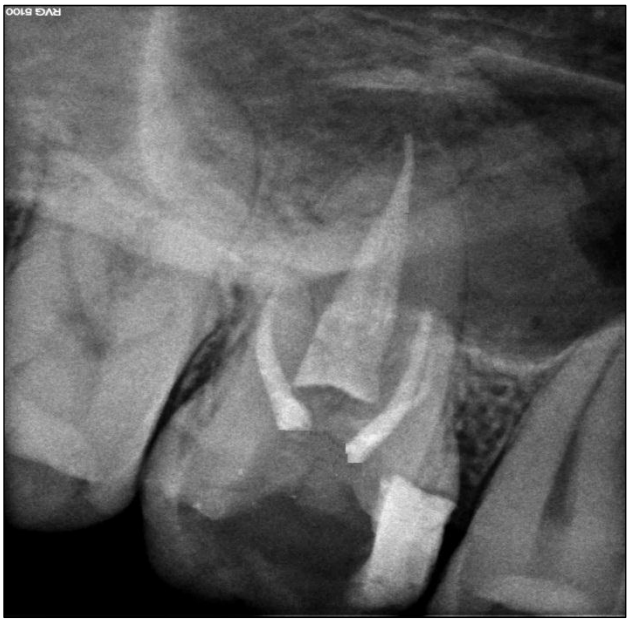

Fig 4b: Post obturation

DISCUSSION

One of the concerns in endodontic treatment is the adequate cleaning, shaping and disinfection of the root canal. The internal anatomy of human teeth is complex and variable. The canal system is complex and composed of accessory canals and multiple apical openings, whose cross-sections can be circular or oval. Endodontic treatment requires thorough knowledge of the root morphology and anatomy. Pre operative radiographs with different angulations are of great help in determination of aberrant root and canal morphology. However, diagnosis of extra canals and roots may be difficult because of their relatively small size and their superposition over other root canals.

The number of roots in maxillary molars can vary. Diamond[12] and Slowey[2] reported treatment of maxillary first molars with four roots, two of which were palatal. Libfeld and Rotstein[13] examined 1200 molars and found a 0.4% incidence of maxillary molars with four roots. Barbizam et al[14] reported a maxillary first molar with two buccal and two palatal roots and a second maxillary molar with two root canal orifices at the palatal root and two at buccal roots. Christie et al[15] reported 14 maxillary second molars and 2 maxillary second molars with two palatal roots in his years of clinical practice. In our case, the first mesio-buccal root had a Vertucci Type 2 configuration (two canals joining together and exiting as one) while the second mesio-buccal root had a Vertucci Type 1 configuration (single canal, single foramen).

Use of operating microscope improves the location and instrumentation of aberrant canals. In our case, the use of a dental operating microscope helped in the location and identification of additional canal orifices. This enabled the modification of the access opening to accommodate the extra canals. To overcome the limitation of 2-dimensional radiographs, the use of CBCT or Spiral CT

scan is useful in diagnosis of such aberrations.[16-19] Use of this aid facilitates easy detection of variations and number of root canals as compared to previously available techniques.[17,19]

CONCLUSION

Anatomic variation in the number of roots and root canals can occur in any tooth. Although uncommon, dentists should be aware of them when considering endodontic treatment. Examination of radiographs taken from different angles with careful evaluation of the internal anatomy of teeth and use of improved magnification are essential for successful treatment.

REFERENCES

1. Grossman LI, Oliet S, Rio CE. 'Principles of endodontic treatment' in Endodontic Practice, L. I. Grossman, Ed., Lea & Febiger, Philadelphia, Pa, USA, 11th edition, pp. 132–144.
2. Slowey RR. Radiographic aids in the detection of extra root canals. Oral Surg Oral Med Oral Pathol 1974;37(5):762–772.
3. Kulild JC, Peters DD. Incidence and configuration of canal systems in the mesiobuccal root of maxillary first and second molars. J Endod 1990;16:311-317.
4. Burhley LJ, Barrows MJ, BeGole EA, Wenckus CS. Effect of magnification on locating MB2 canal in maxillary molars. J Endod 2002;28:324-327.
5. Acosta Vigoroux SA, Trugeda Bosaans SA. Anatomy of the pulp chamber floor of the permanent maxillary first molar. J Endod 1978;4:214-219.
6. Martinez-Berna A, Ruiz-Badanelli P. Maxillary first molars with six canals. J Endod 1983;9:375-381.
7. Cleghorn BM, Christie WH, Dong CC. Root and root canal morphology of the human permanent maxillary first molar: A literature review. J Endod 2006;32:813-821.
8. Kim Y, Lee SJ, Woo J. Morphology of first and second molars analyzed by cone beam computed tomography in a Korean population: variations in number of roots and canals and the incidence of fusion. J Endod 2012;38:1063-1068.
9. Baratto-Filho F, Zaitter S, Haragushiku GA, de Campos EA, Abuabara A, Correr GM. Analysis of internal anatomy of maxillary first molars using different methods. J Endod 2009;35:337-342.
10. Raghavendra SS, Hindlekar AN, Desai NN, Vyavahare NK, Napte BD. Endodontic management of maxillary first molar with seven root canals diagnosed using Cone Beam Computed Tomography scanning. Indian J Dent 2014;5:152-6.
11. Kottoor J, Velmurugan M, Surendran S. Endodontic management of maxillary first molar with eight root canal systems evaluated using cone beam computed tomography scanning: A case report. J Endod 2011;37:715-719.
12. Diamond M. Dental anatomy including anatomy of head and neck. 3rd ed. New York: McMillan 1952;28:419-425.
13. Libfeld H, Rotstein I. Incidence of four rooted maxillary second molars: literature review and radiographic survey of 1200 teeth. J Endod 1989;15:129-131.
14. Barbizam JVB, Ribeiro RG, Tanomaru- Filho M. Unusual anatomy of permanent maxillary molars. J Endod 2004;30:668-671.
15. Christie WH, Peikoff MD, Fogel HM. Maxillary molars with two palatal roots: a retrospective clinical study. J Endod 1991;17(2):80–84.
16. Aggarwal V, Singla M, Logani A, Shah N. Endodontic management of a maxillary first molar with two palatal canals with the aid of spiral computed tomography: a case report. J Endod 2009;35(1):137–139.
17. Matherne RP, Angelopoulos C, Kulild JC, Tira D. Use of cone-beam computed tomography to identify root canal systems in vitro. J Endod 2008; 34(1):87–89.
18. Patel S, Dawood A, Whaites E, Pitt Ford T. New dimensions in endodontic imaging: Part 1. Conventional and alternative radiographic systems. Int Endod J 2009;42:447-62.
19. Patel S. New dimensions in endodontic imaging: Part 2. Cone beam computed Tomography. Int Endod J 2009; 42 :463-75.

Source of Support: Nil
Conflict of Interest: Nil