

Endodontic Management of Bilateral Maxillary First Molars with Aberrant Canal Configuration: A Rare Case Report

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Abstract

Knowledge regarding the anatomic morphology of maxillary molars is absolutely essential for the success of endodontic treatment. The morphology of the permanent maxillary first molar has been reviewed extensively; however, the two canals in palatal root of maxillary first molar of both side has rarely been reported in studies. The aim of this case report is to describe a unique case of both maxillary first molars with two canals within a single palatal root as confirmed by magnifying loupes and intraoral periapical-radiographic images. Such variations can facilitate a better understanding of the complex root canal anatomy during root canal treatment of maxillary molar to prevent iatrogenic errors in endodontic therapy.

Keywords: Maxillary First Molar, Bilateral anatomic variation, Magnifying loupes.

Introduction

Internal root morphology of a tooth is often complex and greatly influences endodontic treatment¹. In fact, successful endodontic treatment depends on proper cleaning, shaping, and filling of the root canal system. One of the main causes of failure in endodontic therapy is overlooking aberrant root canals and roots². A thorough knowledge of root canal morphology and good anticipation of their possible morphological variations may help to prevent iatrogenic errors in endodontic therapy. It is generally accepted that maxillary first molar usually exhibits three roots and three or four canals³.

Maxillary molars have one of the most complex root canal anatomies. The literature shows the wide range of variations with respect to frequency of occurrence of number of roots, number of canals in each root and incidence of fusion of roots⁴. Literature has found two root canals in the palatal root of a maxillary molar are 2% to 5.1%⁵. Other variations for maxillary first molars include one, four and five roots and unusual morphology of root canal systems within individual roots⁶. Cases with a C-shaped canal configuration, seven and eight root canals have also been reported earlier⁷. Smadi and Khraisat reported that the maxillary first molar has some of the highest failure rates in endodontic treatment. The failure often is due to the presence of extra canal in the mesiobuccal root that clinician fails to detect, debride and obturate⁸.

Various cases of maxillary first molar have been found with more number of roots and root canals, but only very few cases have been documented with two canals in palatal root both side. This case report describes endodontic therapy of a permanent maxillary first molar with two separate canals in palatal root, diagnosed and confirmed with the help of radiovisiography and magnifying loupes.

Case Report

A 35-year-old female patient reported to the Department with chief complaint of pain in maxillary posterior region both side for past several days. She gave a history of intermittent pain which was increased in intensity since three days and not relieved by medication. Medical history was noncontributory.

On clinical examination both the maxillary first molars (#16 & #26) found to be disto-proximal carious. None of the teeth showed any presence of pain on palpation or tenderness on percussion. The preoperative radiograph

both the teeth (#16 & #26) showed disto-proximal radiolucency in the coronal portion approaching the pulp space with no widening of the periodontal ligament space and normal periapical tissue. Electric pulp testing was indicative of irreversible pulp damage in both first molar teeth. The clinical findings, radiographic findings and vitality tests led to a diagnosis of chronic irreversible pulpitis necessitating endodontic therapy.



Figure 1: Working length determination, master cone and obturation of left maxillary first molar (#26).

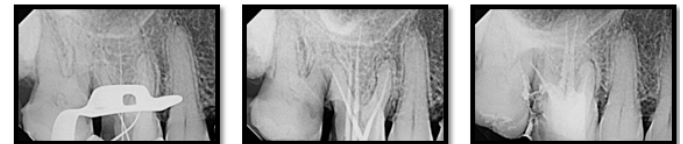


Figure 2: Working length determination, master cone and obturation of right maxillary first molar (#16).

The treatment plan was discussed with the patient and consent was taken. The patient was administered local anesthesia of 2% lidocaine (Themis Medicare Limited, Uttarakhand, India) containing 1:80,000 epinephrine and an access opening was performed using rubber dam isolation. The clinical evaluation of the internal anatomy revealed 3 principal root canal systems: mesiobuccal, distobuccal, and palatal. Under 2.5X magnification using surgical loupes (2.5x loupes, Carl Zeiss, Germany) careful probing with DG 16 endodontic explorer (GDC India) there was a “catch” present near the orifice of the main palatal canal. The conventional triangular access was modified to a trapezoidal shape to improve access with the help of slow-speed safe-end bur (MANI, Japan). After scouting the canals with no.10 and no.15 K-files (Mani Japan), coronal flaring with Neo Endo Sx (Orikam Gurugram, Haryana, India) was done. Working

lengths were determined by means of an apex locator (Root ZX, J. Morita Mfg Corp, Kyoto, Japan) and confirmed with a radiovisiography (Sopro Imaging, France). The canals were initially instrumented to a size no.15 K-file (Mani Japan), under copious irrigation with 3% sodium hypochlorite (Neelkanth, Jodhpur, India). Biomechanical preparation was performed using the crown-down technique with Neo Endo Rotary NiTi files (Orikam Gurugram, Haryana, India).

Irrigation was performed after instrumentation with 3% sodium hypochlorite solution and 17% ethylene diamine tetraacetic acid (Prime dental product, Thane, India). Canals were subsequently flushed with sterile saline (Axa Parenterals Ltd India). The canals were dried using paper points (Dentsply, Maillefer) and a calcium hydroxide (R C CAL; Prime dental product, Thane, India) dressing was given. At the next visit after three days, the teeth were asymptomatic and obturated using cold, laterally condensed gutta-percha (Dentsply, Maillefer) and sealapex sealer (Sybron Endo, West Collins orange CA, USA).

Discussion

A successful endodontic treatment requires a thorough understanding of root canal anatomy and morphology. Anatomical aberration in maxillary first molars is corroborated in the literature therefore a thorough understanding of the variations occurring in the root canal system is an absolute necessity in achieving endodontic success. Burns RC (2002) described the maxillary first molar as “possibly the most treated, least understood, posterior tooth”.⁹ Human molars have many anatomic variations and abnormalities with respect to number of roots and root canals, particularly root canal morphology of maxillary first molars. The classical presentation of the root canal anatomy of the maxillary

first molar is that of three roots with three canals with an incidence as high as 97.6% to 100%¹⁰.

The commonest variation is the presence of a second mesiobuccal canal with an incidence ranging from 18% to 96.1%¹¹. Cleghorn BM et al. (2006) performed a comprehensive review of the root and root canal morphologies of the human permanent maxillary first molar¹². The prevalence of maxillary first molars with two palatal canals is rare. Thews et al., Stone and Stroner, Cecic et al., Bond et al., Baratto-Filho et al., de Almeida-Gomes et al., Aggarwal et al., Karthikeyan and Mahalaxmi and Kottor et al. have reported cases with 2 palatal canals^{13,14,15}.

Preoperative intraoral periapical radiographs are essential before initiating endodontic treatment to identify variations from the normal. In certain cases, use of multiple preoperative radiographs or an additional radiograph from a 20° mesial or distal projection may be helpful in detecting unusual root canal morphology¹⁶. Kottor et al. (2011) and Neelkanthan et al. (2010) have suggested the use of CBCT for the purpose of determining the root canal morphology in cases with aberrations^{16,17}.

In the present case, the presence of two canals in palatal root was confirmed with intraoral radiograph and with the help of 3.2x magnification loupes. The canals were easily located by making a conventional trapezoid access outline following the pulp chamber floor anatomy and application of basic concepts. No further attempt was made to search for any other canal, which could cause iatrogenic errors.

For success of the endodontic treatment we should have thorough knowledge of root canal morphology. Many morphologic variations present in maxillary first molars. Such variation can be found by intraoral periapical

radiographs and its proper interpretation, magnification and preoperative CBCT imaging. However, in present case CBCT image could not be obtained due to the patient's financial constraints hence, we ascertained the morphology with the IOPA radiographs and magnification loupes.

Conclusion

The present case report discusses the endodontic management of an unusual case of a maxillary first molar with two root canals in palatal root. Anatomic variations can occur in any tooth, and maxillary first molar is no exception. Although the incidence of presence of two root canals in palatal root is very less, it is important to take these variations into consideration during root canal treatment of maxillary molar to prevent iatrogenic errors and to ensure success.

References

1. Vertucci FJ. Root canal anatomy of the human permanent teeth. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 1984; 58: 589–99.
2. Deepalakshmi M, Miglani R, Indira R, Ramachandran S. Spiral CT diagnosis and endodontic management of an anatomically variant palatal root with two canals in a maxillary first molar. *Indian J Dent Res*. 2010; 21(3):443-445.
3. Peters OA. Current challenges and concepts in the preparation of root canal systems: a review. *J Endod*. 2004; 30(8):559-67.
4. Pecora JD, Woelfel JB, Sousa Neto MD, Issa EP. Morphologic study of the maxillary molars. Part II: Internal anatomy. *Braz Dent J*. 1992; 3(1):53-7.
5. Stone HL, Stroner FW. Maxillary molars demonstrating more than one palatal root canal. *Oral Surg Oral Med Oral Pathol*. 1981; 51(6):649-652.
6. Kottoor J, Velmurugan N, Sudha R, et al. Maxillary first molar with seven root canals diagnosed with cone-beam computed tomography scanning: a case report. *J Endod*. 2010; 36:915–21.
7. Gopikrishna V, Bhargavi N, Kandaswamy D. Endodontic management of a maxillary first molar with a single root and a single canal diagnosed with the aid of spiral CT: a case report. *J Endod*. 2006; 32:687–91.
8. Smadi L, Khraisat A. Detection of a second mesiobuccal canal in the mesiobuccal roots of maxillary first molar teeth. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2007; 103:77–81.
9. Burns RC, Herbranson EJ. Tooth morphology and access cavity preparation. In: Cohen S, Burns RC, editors. *Pathways of the pulp*. 8th ed. St. Louis, MO: Elsevier Mosby; 2002. p. 173-229.
10. Sharma S, Mittal M, Passi D, Grover S. Management of a maxillary first molar having atypical anatomy of two roots diagnosed using cone beam computed tomography. *J Conserv Dent*. 2015; 18:342-45.
11. Renita Soares, Ida De Noronha De Ataide, Karla Maria Carvalho, Neil De Souza, Sergio Martires. Management of two rooted maxillary first molar. *Journal of Clinical and Diagnostic Research*. 2018; 12(7): 9-10.
12. 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: 813-21.
13. Pamboo J, Hans MK, Chander S and Sharma K. Endodontic Management of maxillary first molar with two palatal canals aided with Cone Beam

Computed Tomography: A Case Report. *Compend Contin Educ Dent.* 2017; 38(4):1-4.

14. 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.
15. Karthikeyan K, Mahalaxmi S. New nomenclature for extra canals based on four reported cases of maxillary first molars with six canals. *J. Endod.* 2010; 36(6):1073-1078.
16. Kottor J, Velmurugan N, 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(5):715-719.
17. Neelakantan P, Subbarao C, Ahuja R, Subbarao CV, Gutmann JL. Cone-beam computed tomography study of root and canal morphology of maxillary first and second molars in an Indian population. *J. Endod.* 2010; 36:1622-27.