

# Management of Anatomical Aberrations in Maxillary First Molars

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## ABSTRACT

**Introduction:** The clinician should have a thorough knowledge about the root canal anatomy and its variations, as the deviations from the normal are very common. A better understanding of the root canal system guides the clinician in accurate diagnosis and treatment of such aberration, in order to achieve a successful endodontic outcome. The maxillary first molar has been shown to have a wide variation in respect to the number of canals.

**Case report:** The current case series presents a successful endodontic management of three maxillary first molars with abnormal root canal morphology.

**Conclusion:** The clinician should have thorough knowledge of complexity of the root canal system and its variations. Adequate time per appointment with improved illumination will help in identification and treatment of these extra canals

**Keywords:** Aberration, Endodontic treatment, Maxillary molar, Root canal morphology.

## INTRODUCTION

Knowledge of external and internal anatomy of a tooth and its variations is a key for the success of endodontic therapy. These anatomical variations in root canal play a vital role in the success of endodontic therapy. Among all the teeth, maxillary first molars are having high incidence of variations in the root canal morphology and most oftenly they are having high failure rate. In most of the situations it is mainly due to non-identification of the second mesiobuccal canal.<sup>1</sup>

Usually, the permanent maxillary first molar has three roots and in majority of the cases mesiobuccal roots will be having two canals, while distobuccal and palatal roots having a single canal. Documented literature shows highest incidence of extra root canals in the mesiobuccal root. Most of these studies reported the presence of a second canal, but the presence of a third canal is very rare in the mesiobuccal root.<sup>2</sup> The incidence of a maxillary first molar with two palatal canals is very low (about 1%)<sup>1</sup> and the reported frequency of two canals in the distobuccal root is 1.9 to 4.3%.<sup>3</sup> According to the published literature the four rooted anatomy in its various forms is very rare in the maxillary first molar.<sup>4</sup>

The present case series described the successful nonsurgical management of a maxillary molars with three mesiobuccal root canals and a case with two palatal canals and a maxillary molar with an additional distal root.

## CASE 1 (Management of 3 mesiobuccal canals in maxillary first molar)

A 24-year-old male patient was referred to the Department of Conservative dentistry and Endodontics at GITAM dental college and hospital, complaining of pain in upper left posterior region which was continuous and aggravating while taking hot foods, since three days. The patient's medical history was noncontributory. Clinically the left maxillary first molar(#26)

had a deep carious lesion and thermal and electric pulp testing suggested irreversible pulpal damage. A diagnosis of acute apical periodontitis was made and endodontic treatment was suggested to the patient. After administering local anesthesia of 2% lidocaine with 1:100000 epinephrine and rubber dam isolation, a conventional endodontic access cavity was prepared. On exploration 3 main canals mesiobuccal (MB), distobuccal (DB), and palatal (P) were noticed. Careful exploration with DG 16 endodontic explorer (Hu-Friedy, Chicago, IL), a small hemorrhagic spot was noted approximately 2mm from the MB orifice towards the palatal canal. Another hemorrhagic point was noted at 2mm from the second MB canal towards the palatal canal. A small amount of dentin that was covering the third mesiobuccal canal orifice was removed. The triangular access cavity was modified to a trapezoidal shaped to improve the accessibility to these additional canals.

For all the five root canals, the working length was determined by using the electronic apex locator (Root ZX, Morita, Tokyo, Japan) and was confirmed by a digital radiograph. The third mesiobuccal canal joined the second mesiobuccal canal at the apical third and continued as single canal (Vertucci type XII). Intraoral periapical radiograph at 20degree mesial angulation revealed that MB1 had a separate opening and MB2 and MB3 canals merged in the apical third. The canals were initially hand instrumented upto #20 with k files (Mani Inc, Tochigi, Japan) with copious irrigation using 3% sodium hypochlorite (Prime Dental Products, Thane). Cleaning and shaping of the canals was done by using ProTaper rotary nickel-titanium files (DenTosply Malleifer) with a crown-down technique. Intracanal medicament(calcium hydroxide) was placed, and the access cavity was sealed with interim restorative material (IRM). In the second appointment, the tooth was asymptomatic and the obturation was done using AH plus resin sealer and ProTaper guttapercha points (DenTosply Malleifer). A postobturation radiograph was obtained (Figure 1).

## CASE 2 (Management of 2 palatal canals in maxillary first molar)

A 34-year-old male patient with pain in upper left quadrant was referred to the department of Endodontics. Clinical, radiographic examinations and pulp testing revealed that the tooth #26 was

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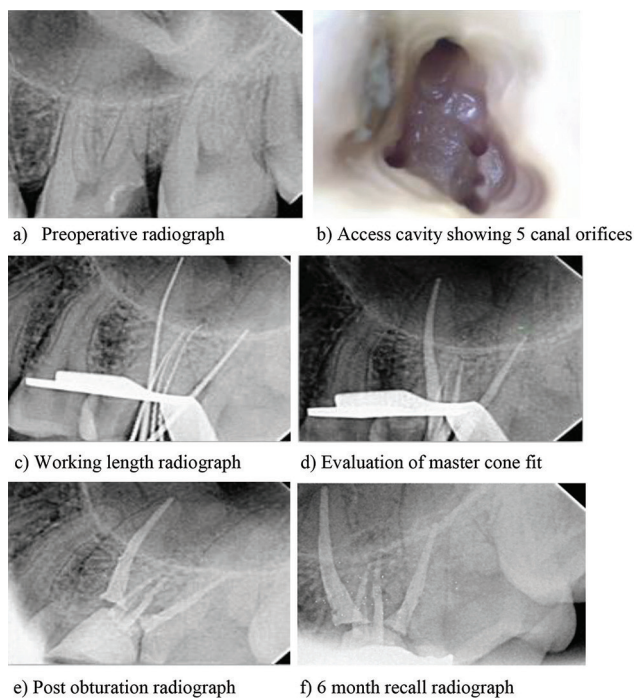
symptomatic with apical periodontitis and endodontic treatment was advocated. Patient medical history was non contributory. After local anesthetic administration and isolation access cavity was prepared. On probing with a DG16 endodontic explorer, additional hemorrhagic point was noted adjacent to the palatal orifice. Working length radiograph confirmed the presence of an additional palatal canal. The canals were initially instrumented with #10 K files with 3% sodium hypochlorite irrigation. Canals were cleaned and shaped using ProTaper rotary system (DenTsply Malliefer). After verifying the fit of master cone, final irrigation with 17% EDTA followed by 3% sodium hypochlorite was done. Root canals were obturated with gutta-percha and AH plus resin sealer using lateral condensation technique and the tooth was restored with a microhybrid composite resin (Figure 2).

**CASE 3 (Management of 2 distobuccal roots in maxillary first molar)**

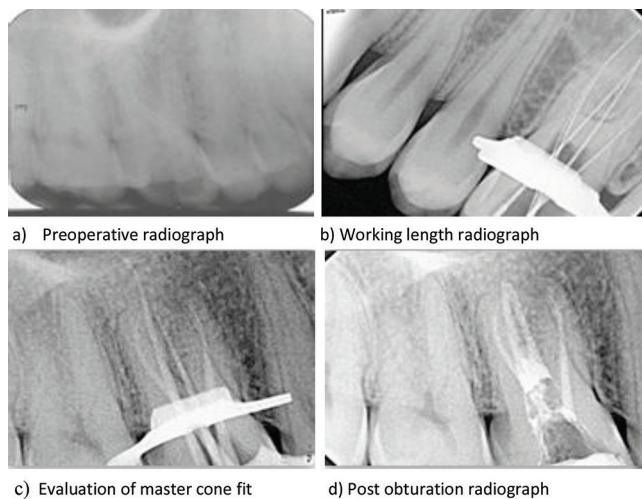
A 20-year-old female patient was diagnosed with irreversible pulpitis in relation to tooth #26. The preoperative radiograph revealed the presence of an additional distal root. After administering local anesthesia, rubber dam isolation was done and a conventional endodontic access opening was made. After removing the coronal pulp and probing with a DG16 endodontic explorer, an additional orifice was noted adjacent to the distobuccal orifice. Canals were cleaned and shaped using ProTaper rotary system (DenTsply Malliefer). Root canals were obturated with AH plus sealer and gutta percha using lateral condensation technique (Figure 3).

**DISCUSSION**

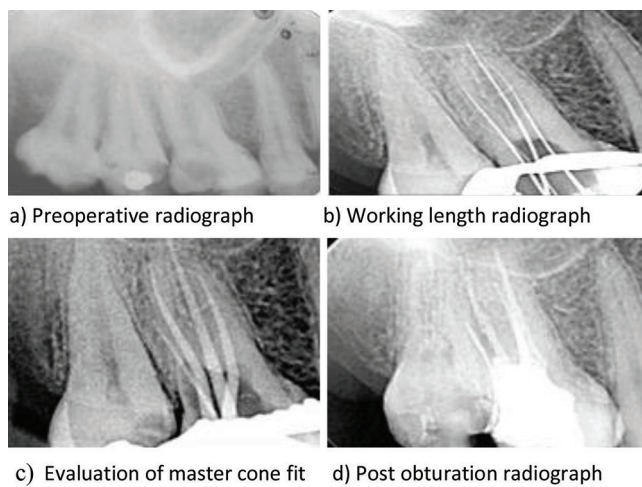
Maxillary permanent first molar presents with wide variations in its anatomy with respect to the number of roots and number of canals in each root. Endodontic failures of the permanent maxillary first molars are mostly due to the inability in identifying and treating the additional canals.<sup>1</sup> The internal anatomy of mesiobuccal root of the maxillary first molar is broader mesiopalatally where as the distobuccal root is round in cross-section. This anatomic difference could possibly explain for the higher incidence of multiple canals in the mesiobuccal root.<sup>5</sup> The reported frequency of presence of second mesiobuccal canal in maxillary molar ranges from 53% to 93%, but the occurrence of third canal is scanty in the literature.<sup>6</sup> A case study of 140 extracted maxillary teeth has reported presence of three mesiobuccal canals in only one tooth.<sup>2</sup> Ferguson and Favieri et al. reported maxillary molars with three mesiobuccal canals viewing with surgical operating microscope.<sup>4,5</sup> Kottoor et al. presented a case of two maxillary first molars with three mesiobuccal canals identified with cone beam computed tomography (CBCT).<sup>6</sup> Using the preoperative radiographs with different angulations and examination of the pulpal floor with a sharp explorer, troughing of grooves with ultrasonic tips, visualizing the hemorrhagic points, staining the pulp chamber floor with a dye, and hypochlorite champagne bubble test are few important aids in locating additional canal orifices. In the present case series, examination of the pulpal floor and exploration of haemorrhagic points with the DG16 explorer hinted the presence of extra



**Figure-1:** Management of 3 mesiobuccal canals in maxillary first molar



**Figure-2:** Management of 2 palatal canals in maxillary first molar



**Figure-3:** Management of 2 disto buccal roots in maxillary first molar

orifices and canals.

Radiographic examination is the most vital constituent in the management of endodontic problems. Images taken at different angulations reveal the basic information about the anatomy of the tooth, variations in root canal system and the type of canal configuration inspite of its limitations. Newer diagnostic methods such as CBCT greatly facilitates the visualization of the root canal morphology. Matherne et al. investigated the use of CBCT and concluded that CBCT images provide more information and enable the clinician to identify of greater number of root canals than digital images.<sup>7</sup> Although conventional CT scans provide a high level of details precautions should be taken to minimize the radiation dose.

Operator experience has a significant role in locating and negotiating difficult canals in the MB root of maxillary molars.<sup>8</sup> Operator should schedule more time in the first appointment to search for additional root canals. Clinically, if the files are off centered during the exploring of root canals or while taking working length radiographs, clinician should suspect the presence of additional canals in the root.<sup>9</sup> In the present case series, identification of additional canals was achieved by modifying the access cavity from the triangular outline form to a rhomboidal shape which also allowed us to gain straight line access. The incidence of two palatal roots or two palatal canals is very low, 3.9 and 1% respectively in maxillary first molar.<sup>1</sup> Stone and Stroner reported the presence of a single root canal with two separate orifices, two separate canals, and two separate roots in palatal root of maxillary molars.<sup>10</sup>

In these cases presented, patients younger age and modified access cavity preparation might have contributed for easy identification of the additional canals without the use of a surgical operating microscope. Thorough knowledge of complexity of the root canal system and its variations, increased operator experience, and increased time per appointment with adequate illumination can /will help in identification and treatment of these extra canals.

## CONCLUSION

The clinician should have thorough knowledge of complexity of the root canal system and its variations. Adequate time per appointment with improved illumination will help in identification and treatment of these extra canals.

## REFERENCES

1. Cleghorn BM, Christie WH, Dong CC. Root and canal morphology of the human permanent maxillary first molar; a literature review. *J Endod.* 2006;32:813-21.
2. Neelakantan P, Subbarao C, Ahuja R, 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;36:1622-7.
3. Vertucci FJ Root canal morphology and its relationship to endodontic procedures. *Endodontic topics.* 2005;10:3-29.
4. Ferguson DB, Kjar KS, Hartwell GR. Three canals in the mesiobuccal root of a maxillary first molar: a case report. *J Endod.* 2005;31:400-402.
5. Favieri A, de Barros FGB, Campos LC. Root canal therapy of a maxillary first molar with five root canals: case report. *Br Dent J.* 2006;17:75-8.
6. Kottoor J, Velmurugan N, Sudha R, Hemamalathi S. Maxillary first molar with seven root canals diagnosed with

cone-beam computed tomography scanning: a case report. *J Endod.* 2010;36:915-21.

7. Matherne RP, Angelopoulos C, Kulild JC, Tira D. Use of cone-beam computed tomography to identify root canal systems in vitro. *J Endod.* 2008;34:87-89.
8. Johal S. Unusual maxillary first molar with 2 palatal canals within a single root: a case report. *J Can Dent Assoc.* 2001; 67:211-4.
9. Gopikrishna V, Reuben J, Kandaswamy D. Endodontic management of a maxillary first molar with two palatal roots and a single fused buccal root diagnosed with spiral computed tomography-a case report. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod.* 2008;105:74-8
10. Stone LH, Stroner WF. Maxillary molars demonstrating more than one palatal root canal. *Oral Surg Oral Med Oral Pathol.* 1981;51:649-52

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