

Unusual Root Canal Morphology of Maxillary First Molar with Seven Canals: A Case Report

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ABSTRACT

Background: Anatomy of root canal system is so uncertain that no one can predict number of roots as well as canals. It is important to have thorough knowledge regarding root canal system and different variation associated with it. The present article discusses a case report of maxillary first molar having seven canals, four mesio-buccal canals, one disto-buccal canal, two palatal canals and its successful non-surgical endodontic management.

Keywords: Maxillary first molar, Root canal anatomy, extra canals.

INTRODUCTION

Success of endodontic therapy depends on thorough knowledge of canal morphology as well as its variations because root canal system is a highly complex system. Therefore, anatomic characteristics of permanent maxillary first molar has been read extensively and reported in literature for endodontic success. Traditionally, it exhibits three roots with three canals, with the commonest variation, second mesio-buccal canal. Incidence of second mesio-buccal canal has been reported between 18% and 96.1%.¹⁻³ Case reports have been documented on one ⁴, two ⁵, four⁶, five ⁷, six ^{8,9} root canals and teeth with C-shaped canal ¹⁰ configuration. Among various comprehensive studies, Baratto Filho et al ¹¹ were the first one to report a maxillary first molar with three roots and seven root canals. The present case report discusses the successful endodontic management of a maxillary first molar presenting with three roots and seven root canals.

CASE REPORT

A 43-year-old woman presented with the complaint of spontaneous toothache in her left posterior maxillary region. The pain increased by hot and sweet stimuli and on mastication. The patient's medical history was non-contributory. On clinical examination it was revealed that maxillary left first molar was carious and tender to percussion. No mobility was present and periodontal probing was within physiological limits. An OPG (Fig-1) revealed disto-occlusal radiolucency approaching pulp space with widening of periodontal ligament. A diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis was made and endodontic treatment was advised. The tooth was anesthetized with 1.8mL of 2% lidocaine (Lignox 2%, Indoco Remedies Ltd., Mumbai, India). An endodontic access cavity was established. Clinical examination revealed two canal openings in mesiobuccal, one in disto-buccal and one in palatal root.

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Fig 1: OPG showing disto-occlusal radiolucency approaching pulp space with widening of periodontal ligament.



Fig 2: Working length determination.



Fig 3: Obturation of root canals.



Fig 4: Porcelain fused to metal crown

Due to presence of small hemorrhagic points, DG-16 endodontic explorer and Magnifying loops were used. With the help of champagne/bubble test with (warmed 2.5% NaOCl) the presence of four mesio-buccal canals, two palatal canals and one disto-buccal canal was revealed.

Coronal enlargement was performed with the help of nickel-titanium ProTaper series orifice shaper (Dentsply Maillefer, Switzerland). The working length was determined with an apex locator (Root ZX; Morita, Tokyo, Japan) and was confirmed using a radiograph. (Fig-2) Cleaning and shaping was done with Pro Taper nickel-titanium rotary instruments (Dentsply Maillefer), a crown down technique. Meanwhile irrigation was performed using normal saline, 2.5% sodium hypochlorite solution and 17% EDTA. As final irrigant 2% chlorhexidine digluconate was used. After cleaning and shaping canals absorbent points (Dentsply Maillefer) were used to dry canal and obturation was performed using gutta-percha (Dentsply Maillefer) and AH Plus resin sealer (Maillefer, Dentsply, Konstanz, German. (Fig-3) The tooth was then restored and porcelain fused to metal crown was given. (Fig-4)

DISCUSSION

Description of maxillary first molar with three roots and 3 to 4 root canals have been made in most of the endodontic literature but great number of variations can occur in formation, number and shape of the roots.¹² Therefore, an idea of fixed number of roots and root canals has been

Table 1: Review of literature showing case reports of maxillary first molars having six and seven canals.

REFERENCE	NO. OF ROOTS (CANALS)	ROOT (NO. OF CANALS)
Martinez-Bern and Ruiz-Badanelli (3 cases) 1983	3(6)	MB(3), DB(2), P(1)
Bond et al. 1988	3(6)	MB(2), DB(2), P(2)
Maggiore et al.2002	3(6)	MB(2), DB(1), P(3)
Adanir.2007	4(6)	MB(2), MP(1), DB(1),P(2)
de Almeida-Gomes et al. 2009	3(6)	MB(2), DB(2), P(2)
Karthikeyan and Mahalaxmi (4 cases) 2010	3(6)	MB(2), DB(2), P(2)
Albuquerque et al. 2010	3(6)	MB(2), DB(2), P(2)
Du Y. et al.2011	3(6)	MB(3), DB(1), P(2)
Kottor et al.2010	3(7)	MB(3), DB(2), P(2)
Kumar R 2014	3(7)	MB(3), DB(2), P(2)
Munavalli et al 2016	3(7)	MB(3), DB(2), P(2)

now obsolete and for endodontic success a thorough knowledge of root canal morphology and configuration is vital. Traditionally, more researches and clinical evaluation is conducted on the MB root of the maxillary first molar. Most of the in vitro studies of the MB root canal anatomy have not reported the presence of a third canal in the MB root but maximum time two canals.¹³

The frequency of MB2 canals in the MB root was reported to be 92.85% (based on ex vivo results), 95.63% (based on clinical results), and 95.45% (based on CBCT results), whereas the corresponding figures for the DB root (DB2) were 1.15% (ex vivo) and 3.75% (clinical) and those for the palatal root (second palatal canal) were 2.05% (ex vivo), 0.62% (clinical), and 4.55% (CBCT).^{14, 15} When Filho et al. ¹¹ evaluated 140 extracted maxillary first molars, for the first time in literature he noticed seven root canals in one of the tooth, which were like three MB, three DB, and one palatal canal.

This case presents four mesio-buccal canals in mesio-buccal root, one disto-buccal canal and two palatal canals. A thorough literature search in PubMed database was done and it revealed that the present case is apparently the first reported case of endodontic therapy of a maxillary first molar with four mesio-buccal canals in mesio-buccal root. Case reports of maxillary first molars having six and seven canals are summarized with number of canals and roots. Table -1.^{16,17} For identifying and negotiating challenging anatomy proper access opening and modifying the shape to locate all orifices is a key to success.

Diagnostic measures such as multiple preoperative radiographs from different shifts, examination of the pulp floor with a DG-16, use of ultrasonic tips for troughing of grooves, 1% methylene blue dye can be used for staining the chamber floor, performing hypochlorite champagne bubble test, even visualising canal bleeding points are important aids in locating root orifices.¹⁸

The use of magnification and illumination aids in verifying the presence of morphologic variations. New diagnostic methods such as computerized axial tomography (CT) scanning, CBCT greatly facilitate and helps in understanding an access to the internal root canal morphology. In the present case, pulpal floor was examined using magnifying loops, dentinal map was followed whereas exploration of haemorrhagic points with the DG16 explorer was the first indication as well as hint to the presence of extra orifices and canals.

CONCLUSION

Although the incidence of root canal variations is rare yet every tooth is challenging. Each case should be thoroughly investigated to rule out any anatomical variations. Therefore, for success of endodontic treatment it is important to have thorough knowledge.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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