



Endodontic Management of Maxillary First Molar with Unusual Root Canal Anatomy

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ABSTRACT: Sufficient knowledge on the root and root canal anatomy is essential for practicing root canal treatment. The mesiobuccal root of maxillary molar teeth present an endodontic challenge due to their wide variability and complexity of their internal morphological landmarks. A review on the literature indicates that prevalence of 3rd mesiobuccal root canal in the mesiobuccal root of maxillary molar teeth may reach 9%, and the root canal configuration usually is type XV (3-2). These reported data reveal the importance of absolute awareness for this anatomical aberration that requires special attention from dental practitioners while commencing root canal treatment in maxillary molar teeth. Hence, this article aims to report & describe the management of a maxillary first molar tooth with 3 mesiobuccal root canals, but with an unusual morphology.

Keywords: Maxillary first molar, Mesiobuccal root, MB3.

I. INTRODUCTION

The increased prevalence of missed roots and root canals is the major cause for root canal treatment failures (Cantatore et al., 2006).

Adequate knowledge, good anticipation and clinical thoroughness are essential requirements for practicing successful endodontics (Vertucci, 2005).

The maxillary first molars have been extensively studied as they frequently represent a challenge due to their complex internal anatomy, especially in the mesiobuccal root which generally presents an alternate main canal (MB2) which is generally neglected by clinicians and gives way to an incorrect cleaning of the root canal system^[1,2]. Recent studies of the internal morphology of upper molars using microcomputed tomography have shown the presence of fine anatomical structures such as intracanal communications, isthmuses, ramifications, and in low incidence the presence of a third main canal (MB3)³.

Reviewing the reported cases in literature indicates that supplemental Sert and Bayirli configuration root canal type XV (3-2) is the most common configuration in the mesiobuccal root enclosing three root canals (Martínez-Berná and RuizBadanelli, 1983; Beatty 1984; Ferguson et al., 2005; Favieri et al., 2006; Garg et al., 2010; Kottoor et al., 2010; Prabu et al., 2010; Kottoor et al., 2011) (Table 1)⁴.

Table 1: Review of the reported cases for maxillary first molars with three mesiobuccal root canals

Author/s	Year	Root canal configuration
Martínez-Berná and Ruiz-Badanelli	1983	(3 cases) Configuration (3-2)
Beatty	1984	Configuration (3-3)
Ferguson et al.	2005	Configuration (3-2)



Favieriet al.	2006	Configuration (3-2)
Kottooret al.	2010	Configuration (3-2)
Garg et al.	2010	Configuration (3-2)
Prabu et al.	2010	Configuration (3-2)
Kottooret al.	2011	Configuration (3-2)
Ayranciet al.	2011	Configuration (3-1)
The present case	2023	Configuration (3-2)

This article aims to describe an unusual root canal configuration in the mesiobuccal root of a maxillary first molar tooth.

II. CASE REPORT

A 28-year-old male patient reported to our Department of Conservative Dentistry and Endodontics, with history of mild discomfort on chewing on the left upper tooth for 1 week. The patient did not give any history of spontaneous or night pain and there was no history of any swelling or fever associated with the pain. Intraoral examination revealed Mesio-occlusal caries in tooth #26. This tooth was slightly tender on percussion and did not show any response on thermal testing. IOPA revealed Mesio-occlusal caries with pulp involvement in tooth #26. The mesial and distal roots were associated with localised well-circumscribed radiolucency. Therefore, a diagnosis of pulpal necrosis with chronic periapical periodontitis was confirmed.

Investigations: Periapical radiograph, Vitality testing

Treatment: After a thorough discussion about the treatment and its outcome, root canal was initiated with patient's consent. Profound local anaesthesia was achieved with one cartridge infiltration (Xylestesin-A 2% epinephrine lidocaine 1.7 mL), rubber dam was applied and disinfected with chlorhexidine. All the caries were removed with a round bur using a slow-speed handpiece, after which the pulp chamber was accessed and mesiobuccal (MB) distobuccal (DB) and palatal (P) orifices were explored.

Some troughing was performed in mesiopatatal direction from Mb1 orifice with the help of an ultrasonic tip (CT #1 and #3), MB2 orifice was located and explored.

After that floor map was followed by continuing troughing in same direction then MB3

was located at end point of developmental line and therefore the access opening was further modified and the MB3 canal was successfully instrumented.

A combination of electronic apex locator (Root ZX, J. Morita Corp, Tustin, California, USA) and periapical radiographs were used to determine the working length, which was 19.5mm for Mb1 Mb2 and Mb3 18.5mm and P 22mm, Db 20.5mm. After doing instrumentation till 20/4 %, The canals were then filled with non-setting calcium hydroxide (Calcipulp, SpecialitesSeptodont, Saint-Maur, France) and the tooth temporized (Cavit, ESPE, Seefeld, Germany). After a week, the patient returned to our department for completion of treatment, without any discomfort. At the 2nd appointment, the patient was asymptomatic. The tooth was anesthetized followed by rubber dam isolation. Cleaning and shaping were done using protaper gold rotary instruments along with lubricant (Glyde File Prep, Dentsply Maillefer, Tulsa, OK, USA) using the crown-down technique. Distobuccal canal were enlarged to size 25/0.06, whereas the palatal canal was enlarged to size 30/0.06. Mb1 to size 20/0.06, Mb1 & Mb2 to 20/0.04.

Irrigation was performed using 3% sodium hypochlorite solution and 17% EDTA solution. The canals were finally flushed with saline. Master cones were selected by placing gutta-percha cones (Dentsply Maillefer) corresponding with the size and taper of the last file used to the working length and was confirmed radiographically. The canals were dried with absorbent points (Dentsply Maillefer), and obturation was performed using cold lateral compaction of gutta-percha and AH Plus resin sealer (Dentsply Maillefer). The tooth was then restored with posterior composite resin core (P60, 3M ESPE). Final radiograph was taken to establish the quality of the obturation.



Pre operative RVG



Pre operative CBCT



Clinical image showing
5 canals orifice



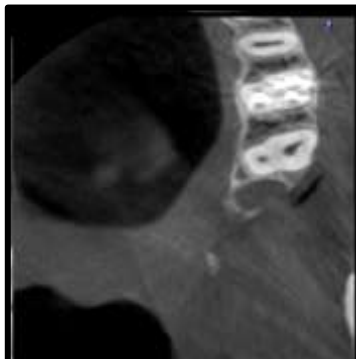
Working
lengthDeterminatio



Master
coneSelection
Radiograph



Post Obturation
Radiograph



Post Obturation CBCT



Post Obturation Restoration Clinical

III. DISCUSSION

A successful RCT demands proper preoperative assessment, identification and location of accessory canal(s). Various methods have been described in the past that can help the clinician in locating of root canal orifices effectively. Multiple pre-operative IOPA radiographs, use of tactile sensation while examining the floor of the pulp chamber with a sharp explorer, troughing with ultrasonic tips, visualizing bleeding points of the canal orifices, staining of the floor of pulp chamber with 1% methylene blue, performing Champagne bubble test and last but not the least use of magnification with microscopes or surgical loupes are the most commonly known techniques. In the present case, a series of preoperative IOPA radiographs and CBCT revealed the presence of accessory root canals which signifies the

importance of radiographic assessment in the detecting of unusual root canal morphology.⁵

Degerness⁶ et al analysed 153 mesiobuccal roots, using a stereo microscope methodology, and found an incidence of MB3 of 1.1%. With the use of a cone beam computer tomography analysis Lee et al⁷, using 458 roots, and Kim et al⁸, with 814 roots, identified a prevalence of MB3 of 1.3% and 0.1%, respectively. The higher incidence rates were obtained using micro-computed tomography technology, with which Verma et al⁹ and Kim et al¹⁰ documented an incidence of 10% and 12%, respectively. The study from Verma had a small sample of 20 roots, so the results may not have a very strong statistical value. However, the study from Kim had a sample of 154 roots and must be considered as a frame of reference (Table 2)

Table 2 Incidence of the MB3 root canal in the mesiobuccal root of the maxillary first molar.

AUTHOR	COUNTRY	Method	n	Incidence of MB3
Degerness (2010) ¹⁰	USA	Stereo microscope	153	1.1%
Verma (2011) ¹²	New Zealand	Micro-computed tomography	20	10%
Lee (2011) ⁶	South Korea	Cone beam computer tomography	458	1.3%
Kim (2012) ¹¹	South Korea	Cone beam computer tomography	814	0.1%
Kim (2012) ¹³	South Korea	Micro-computed tomography	154	12%

IV. CONCLUSION

The mesiobuccal root canal anatomy of maxillary first molar teeth presents an endodontic challenge due to their considerable morphological variability & complexity. Special attention should be given during their endodontic management to prevent the undesirable consequences when they are left untreated with missed root canals. clinician should have a thorough knowledge of all the diversities and should perform careful examination of the floor of the pulp chamber with a dental

operating microscope, and use advanced diagnostic aids such as CBCT for the success in endodontic treatment

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