

A Case Report on Endodontic Management of Abberant Root Canal Morphology with 7 Root Canals in Maxillary 1st Molar

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Abstract

This case report describes an unusual morphology of seven root canals in maxillary first molar tooth. The maxillary right first molar of a young male patient was treated endodontically, the second visit, the seven canals (MB1, MB2 and MB3, 2 Palatal and DB1 and DB2) was easily identified at high magnification under an operating microscope. The canals were then instrumented and obturated. It should be acknowledged that all molar teeth have more than the traditionally expected three canals. The location of root canals should be identified at high magnification under the microscope. Careful radiographic re-examination of the fillings should be done in order to identify possibly missed canals.

Keywords: Root Canals, Extra canals, Root Morphology.

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INTRODUCTION

A thorough knowledge is essential to determine the presence of the root canal morphology, its variations, the presence of additional roots, and unusual root canal morphology, as it determines the successful outcome of endodontic treatment [1]. To ascertain the long-term prognosis of root canal treatment, it is necessary to access, clean, and obturate all of the canals. However, the anatomic complexities and variations are constant challenges for successful endodontic therapy [2]. Literature has reported that extensive studies have been carried out for the morphology of the maxillary first molar. Usually the maxillary first molar exhibits three roots and three canals. The occurrence of a fourth canal ranges from 50.4% to 95% [3-7] and a fifth canal 2.25% [8], and a few authors have also reported cases with 6 canals [9-10]. The occurrence of 2 canals in distobuccal root has been reported in 3.6% of maxillary molars, which is less frequent [4, 10, 11]. Palatal root canal variations were well established by Christie *et al.* [8-12], who reported the endodontic treatment of maxillary molars with 2 palatal roots and classified these teeth as types I, II, and III, according to root degree of divergence. Others reported cases of maxillary first molar with two canals in each of the three roots [9-12]. The clinical

findings were confirmed with the help of operating microscope and endodontic management was successfully carried out.

CASE REPORT

A 24-year-old male patient presented with the chief complaint in department of endodontics with pain in the right upper back tooth. The pain was continuous and aggravated on heat stimulation. The patient also complained of pain at night. The patient's medical history was noncontributory.

Clinical examination revealed the right maxillary first molar with a deep carious lesion which was tender on percussion. Electric pulp testing gave a premature response, indicative of inflammatory pulpal changes. The radiographic examination revealed a radiolucent lesion on the distal aspect of the crown extending to the pulp (Figure 1(a)). After the clinical and radiographic examination, the left maxillary first molar was diagnosed with irreversible pulpitis and endodontic treatment was suggested to the patient. The tooth was anaesthetised with 1.8 mL of 2% lidocaine containing 1 : 80,000 epinephrine (Lignox 2%, Indoco Remedies Ltd., Mumbai, India) followed by rubber dam isolation. Endodontic access cavity was prepared.

Clinical evaluation of the internal anatomy revealed 3 principal root canal systems: mesiobuccal (MB), distobuccal (DB), and palatal. After probing with a DG 16 endodontic explorer, small hemorrhagic points were noted 2 mm palatal to the MB and DB canals. As the dentin that was occluding the orifice of the palatal canal was removed, a second palatal canal was also identified. This was further evaluated and verified by a Surgical Operating Microscope. There seemed to be 2 distinct orifices in distobuccal and palatal whereas there were three distinct orifices in mesiobuccal (Figure 1(b)). A sterile cotton pellet and an interim restoration of Cavit (3 M Espe, Seefeld, Germany) were placed in the pulp chamber to seal the access cavity. The mesiobuccal 1 and 2 canals merged but mesiobuccal 3 was separate canal from orifice merging at apex, 2 distobuccal canals

emerged as two separate canals from orifice to apex and the 2 palatal canals merged in the middle third of the root to follow as a single canal (Vertucci's type II). At the next visit, the working lengths of each canal were estimated by an electronic apex locator (Propex II, Dentsply) and confirmed with a radiograph. The cleaning and shaping were performed using ProTaper Gold nickel-titanium rotary instruments (Dentsply Maillefer, Switzerland). Irrigation between each instrument was done using 2.5% sodium hypochlorite solution and 17% EDTA. The canals were dried and obturation was performed using cold lateral compaction of gutta-percha (Dentsply Maillefer) and a resin-based sealapex sealer. (Figure 1(c)). The tooth was then restored with a composite resin core.



Fig-1(a): Preoperative radiograph showing carious lesion on distal aspect of maxillary 1st molar

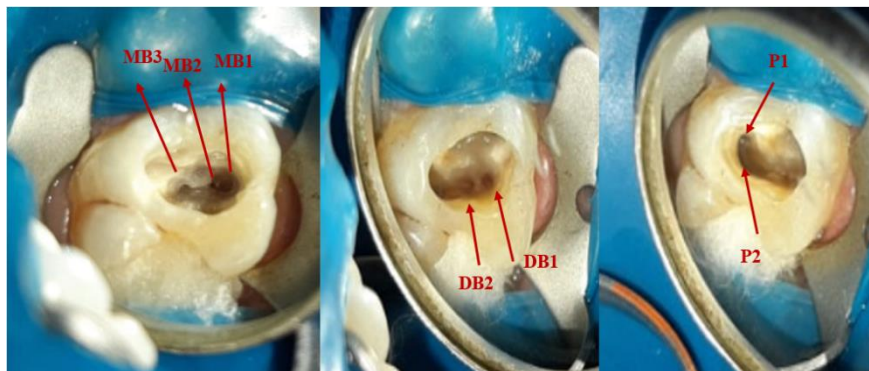


Fig-1(b): Clinical photographs showing 3 mesial canals, 2 distal canals and 2 palatal canals in maxillary 1st molar



Fig-1(c): Post-operative radiograph showing 3 mesial canals merging, 2 separate distal canals and 2 palatal canals merging in maxillary 1st molar

DISCUSSION

Anatomical aberrations are commonly observed in maxillary first molar ranging from one to seven canals [4]. It is generally accepted that maxillary first molar has three roots and three canals with a fourth canal (MB2) seen in 50.4–91% of cases [3-6]. The simultaneous occurrence of double canal system in all roots of a maxillary molar is an unusual finding [8, 9, 14, 15]. Case report highlights the unusual anatomy of maxillary first molar with 3 canals in mesial, 2 canals in distal and palatal. Proper access opening and modifying the shape of the access to approach all orifices is a key to success in identifying and negotiating unusual anatomy of root canals. In the present case reports, the conventional triangular access was modified to trapezoidal to improve access to the additional canals [14]. Diagnostic measures such as multiple preoperative radiographs, examination of the pulp floor with a sharp explorer, troughing of grooves with ultrasonic tips, staining the chamber floor with 1% methylene blue dye, performing the hypochlorite champagne bubble test, and visualising canal bleeding points are important aids in locating root orifices [17]. In the presented cases, examination of the pulpal floor to follow the dentinal map and exploration of haemorrhagic points with the DG16 was the first indication to hint at presence of extra orifices and canals. An important aid for locating root canals is the Surgical Operating Microscope (SOM). It brings minute details into clear view by enhancing lighting and visibility. Studies have demonstrated that magnification and illumination by the SOM increased the identification of MB2 canals tremendously [3,18-20]. The use of magnification aids in verifying the presence of morphologic variations.

Radiographic examination is an essential component for management of endodontic problems. But they produce only a 2D image of a 3D object resulting in superimposition of images [21]. CBCT is a valuable method for initial identification and effective evaluation of internal morphology of teeth [22-25]. Although conventional CT scans produce a high level of detail, it is essential that the radiation dosage is kept as low as reasonably possible. The simultaneous occurrence of double canal systems in all roots of maxillary first molar is an unusual finding, as is the occurrence of 3 mesiobuccal and 2 distobuccal and 2 palatal canals in the same tooth. Thus, it is important to be conscious to variations from the expected and to use all the armamentaria available to locate and treat the entire root canal system.

CONCLUSION

Although the incidence of root variations is rare, their importance should not be underestimated. Careful examination of radiographs and the internal anatomy of teeth are essential. The present cases confirm the necessity for meticulous examination of the pulpal floor at high magnification under sufficient

illumination of the operating microscope and emphasize the importance of newer imaging techniques like CBCT in preoperative assessment.

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