Unusual Anatomy of Maxillary First Molar with two palatal roots – Confirmed with Computed Tomography: a case report.

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Abstract: Adequate knowledge of the root and root canal morphological variations is essential for successful endodontic treatment. Maxillary molars show considerable variability and complexity in their external and internal radicular morphology that requires special attention from dental practitioners to provide best clinical outcome. This case report presents an unusual maxillary left first molar with two palatal roots with distinct canals and foramen at the apical level which was confirmed by computed tomography. Endodontic treatment was done in adjunct with operating microscope and final restoration was accomplished with metal-ceramic crown. Treating extra canals in maxillary first molars may be challenging because of very rare occurrence of two palatal roots. Inability to locate and properly treat all the hidden canals may cause failures. Complete clinical and radiographic examination, advanced diagnostic means and a thorough knowledge of the morphology of these teeth is necessary for successful clinical results.

Keywords: angled radiograph, computed tomography, maxillary first molar, operating microscope, palatal roots.

INTRODUCTION

Treatment of the entire root canal system is essential for the success of the root canal treatment (1). Thus, it is necessary for the clinician to have good knowledge of dental anatomy and its variations, which is a constant challenge for successful endodontic therapy (2). Anatomical characteristics of permanent maxillary molars are generally described as group of teeth with three roots, one palatal and two buccal. Various studies have reported variation in anatomical configuration ranging from one to eight root canals (3). The frequency of two palatal roots is extremely rare, however, very few cases of this kind have been reported in the literature. Libfeld and Rostein (4) examined 1200 molars and found a 0.4% incidence of maxillary molars with four roots. Cristie et al. (5) reported 16 cases of maxillary molars with two palatal roots found during 40 years of daily clinical practice. Another important study conducted by Peikoff et al. (6) indicated that the frequency of this variation of two palatal roots was nearly 1.4%. Stone & Stroner (7) reported variations of the palatal root of maxillary molars, such as a single root with two separate orifices, two separate canals and two separate foramina; two separate roots, each with one orifice, one canal and one foramen; single
root with one orifice, a bifurcated canal and two separate foramina. The present case report discusses the successful endodontic management of a maxillary first molar presenting with two palatal roots and four root canals which were confirmed with the help of cone beam computerized tomography (CBCT).

CASE REPORT

A 24-year-old male presented to the Department of Conservative and Endodontics for endodontic treatment of the maxillary left first molar. On examination the maxillary left first molar had a deep carious lesion with tenderness on percussion. Electric pulp test and heat test gave negative response. Digital radiography revealed widening of lamina dura indicated Asymptomatic irreversible pulpitis with symptomatic apical periodontitis. Patient was advised to undergo root canal therapy. The patient’s medical history was non contributory.

Radiographic examination revealed the presence of four roots (one mesiobuccal and one distobuccal and two palatal) (Figure 1), which was confirmed using computerized tomography at apical levels (Figure 2). The tooth was anesthetized using 2% Lignocaine with 1:80 000 adrenaline (Lignox, Indoco Remedies Ltd., India) and isolated using rubber dam.

Endodontic access cavity was established and pulp chamber was flushed with 5.25% sodium hypochlorite to remove debris and bacteria. A sharp DG 16 explorer (Hu-Friedy, Chicago, IL) was used to locate canal orifices. Examination of the pulp chamber floor under operating microscope revealed four distinct canal orifices (Figure 3). Canal patency was checked with #10 K-file (Dentsply-Maierfer).

The working lengths were determined with an electronic apex locator (Root ZX, J. Morita Corp., Kyoto, Japan) and confirmed radiographically (Figure 4). Cleaning and shaping was performed using a crown-down technique with Protaper nickel–titanium rotary instruments till F2 (Maillefer, Dentsply, Ballaigues, Switzerland) along with copious irrigation and 17% EDTA (Glyde, Maillefer, Dentsply, Ballaigues, Switzerland). The temporary restoration was given with IRM cement (Dentsply De Trey GmbH, Konstanz, Germany) and patient recalled after 3 days.
At the next appointment, root canals were irrigated with normal saline, dried with paper points (Maillefer, Dentsply, Ballaigues, Switzerland) and obturated with Protaper F2 gutta-percha (Maillefer, Dentsply, Ballaigues, Switzerland) and resin sealer (AH plus, Mallefer, Dentsply, Konstanz, Germany) (Figure 5). Subsequently tooth was restored by posterior composite (P60; 3M Dental Products, St Paul, MN). After 2 weeks, metal-ceramic crown was cemented with luting cement (GC FujiCEM, GC Corporatio Tokyo, Japan). Patient was asymptomatic during the follow-up period of 3 months.

**DISCUSSION**

Anatomical aberrations are not uncommon in maxillary first molars varying in number of roots and root canal. Christi et al. (5) speculated that maxillary molars with two palatal roots may be encountered once every 3 years in a busy endodontic practice. They (5) suggested a classification for maxillary molars with two palatal roots based on the degree of separation of their roots and their divergence: Type I maxillary molars have two widely divergent palatal roots that are often long and tortuous, the buccal roots often being “cow-horn” shaped and less divergent. Radiographically, this type shows four separate root apices. Type II maxillary molars have four separate roots, although the roots are often shorter, run parallel, have a buccal and lingual root morphology, with blunt root apices. Radiographically, buccolingual superimposition may give an impression that only one mesial and distal root is present. Type III maxillary molars with a constricted root morphology, the mesiobuccal, mesiopalatal and distopalatal canal being engaged in a web of root dentin. The distobuccal root in such cases appears to stand alone, and may even diverge distobuccally. The maxillary molar in the present case may be classified as type I, as it demonstrated completely independent two palatal roots. Aetiology behind abnormal formation is unclear. In supernumerary roots its formation could be related to external factors during odontogenesis or penetrance of atavistic gene. Curzon suggests that additional rooted molar trait has high degree of genetic penetrance (8).

Various methods such as angulated radiographs (at least 3 radiographs at varying horizontal angulations), computed tomography and different magnification means (loupes and dental operating microscopes) have been discussed in the past by many authors (9, 10) to determine the presence of extra root or root canal. Among these, Computed Tomography has played a pivot role in understanding the root canal morphology. It allows the clinician to look at different level of tooth root and root canal system with high precision accuracy in three dimensions.

**CONCLUSION**

The present case report discusses the successful endodontic management of an unusual case of a maxillary first molar with two palatal roots and four distinct canals using surgical operating microscope and Computed Tomography as an adjunct tool to ascertain root canal morphology. Knowledge of unknown variation like the case discussed is essential as non treatment of one additional root or root canal can lead to failure of endodontic treatment.
REFERENCES


