



NON-SURGICAL MANAGEMENT OF MAXILLARY FIRST MOLAR WITH FIVE CANALS EVALUATED USING CONE BEAM COMPUTED TOMOGRAPHY- A CASE REPORT

Dental Science

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ABSTRACT

Non-surgical root canal treatment aims to eliminate the bacterial load from the root canal system and provide a hermetic filling. To achieve this, a proper knowledge of the root canal anatomy of the tooth is necessary. Maxillary molars tend to have a great amount of variation in their internal root canal anatomy. To treat such cases, advanced imaging techniques like cone beam computed tomography (CBCT) are used and have proved to be of great importance. This case report highlights the unusual anatomy of a maxillary first molar with five canals including a secondary mesio-buccal and distobuccal canal, their root canal configuration was assessed and treated non-surgically. CBCT imaging provided a useful tool in diagnosing this unusual root canal system. Thus, it can be concluded that variations in the normal anatomy should always be looked upon for a successful management of a tooth, hence improving the prognosis of the treatment.

KEYWORDS

Root Canal Anomaly, Maxillary Molars, Cone Beam Computed Tomography.

INTRODUCTION

Successful endodontic therapy aims to remove all the noxious stimuli from the root canal system. To obtain this, knowledge of tooth anatomy and various root canal anomalies is of significant importance. Incomplete debridement of this root canal system will lead to endodontic failure and the primary goal of the root canal treatment will not be fulfilled. Thus, thorough knowledge of this internal anatomy, which is complex is necessary in execution of proper planning & subsequent endodontic therapy.

Variation in the teeth and the root canal systems are found in almost all groups of teeth affecting incisors to the third molars in all the quadrants. Various factors play a vital role in the variation of the morphology viz., age, gender and/or ethnic background of the sample studied.¹ The variation in the root canal morphology of Permanent Maxillary first Molar is also not uncommon. The most common form of Maxillary first molar has 3 roots and 3 canals. Data from some anatomical studies have shown that majority of maxillary first molar studied has 3 roots (approx. 96%) followed by 2 roots. 1 root and 4 roots have been rarely reported. The variation in root canals is also not uncommon. One of the major morphoanatomic variation found in maxillary first molar is 4 canals comprising of second Mesiobuccal (MB2) canal. Studies have shown that majority of distobuccal root shows a single canal in majority of cases. Very few studies have been shown wherein both the distal and the mesial root have 2 canals each without a bifurcation. This case report highlights such a case of atypical anatomic variation in permanent maxillary molar found during routine endodontic treatment.

CASE REPORT

A 25-year-old male patient reported to the department of Conservative Dentistry & Endodontics. He presented with the chief complaint of pain in upper left back tooth region. The pain was spontaneous in nature and aggravated on chewing food. Clinical examination of the tooth revealed large mesioproximal carious lesion associated with tooth #26. The tooth was tender on percussion and show no response with heat or cold vitality test. On radiographic Examination, there was pathologic radiolucency in the mesioproximal area of the tooth #26 involving the enamel, dentin and pulp. A final diagnosis of chronic irreversible pulpitis with symptomatic apical periodontitis i.r.t tooth #26 was made. The treatment plan decided was non-surgical root canal treatment i.r.t. 26.

After local anaesthesia injection, the tooth was marked and isolated with rubber dam. Conventional endodontic access cavity was made and all the root canal orifices were found and negotiated. When the pulp chamber floor was modified and canals scouted, one extra distobuccal (DB2) followed by an extra Mesiobuccal (MB2) canal was found. To rule out any more root canals, CBCT was advised. CBCT of the concerned tooth was done with the following parameters: 90kV, 6.3mA and voxel size of 200µm. Exposure time was 19.9 seconds. CBCT analysis showed that tooth #26 had 3 separate roots. The mesial and the distal roots showed 2 root canals with Vertucci type II configuration (Figure 1). They joined at the apex to form a single apical

foramen. All the canal was negotiated with a size #10 K file (Mani, Inc., Tochigi, Japan). The working length was determined using an electronic apex locator (Denta Port; J. Morita Mfg. Corp, Kyoto, Japan) and confirmed radiographically (Figure 2). After establishing apical patency, glide path was created with hand K file upto size 20. Biomechanical preparation was done using Neo-Endo Flex rotary files for buccal canals upto size 30/0.04 and palatal canal was prepared upto size 30/0.06. Irrigation was done with 3% NaOCl and 17% EDTA (Prime Dental Product Pvt Ltd, Mumbai, India). Saline was used in between the two irrigants after ultrasonic activation (Endo activator, Dentsply). Obturation was done using single cone obturation technique with the corresponding gutta percha points (Figure 3) coated with calcium- hydroxide based sealer (Sealapex, Kavo Kerr). Access cavity was then sealed with Posterior composite resin (Figure 4)



Figure 1: CBCT images of left maxillary molar (#26). A- CBCT of the tooth on occlusal third showing 5 distinct canals. B- At the middle third, the Distobuccal 2(DB2) canal merges in the main DB canal. C -At the apical third only 3 canals are visible.

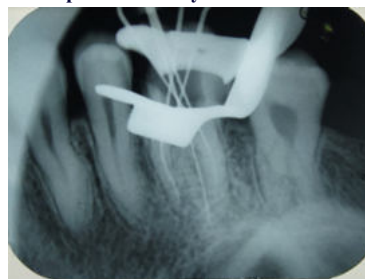


Figure 2: IOPA confirming working length.



Figure 3: IOPA showing master cone selection.

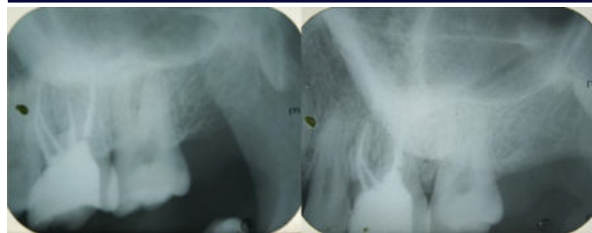


Figure 4: IOPA of the tooth (#26) in 2 different angles after filling the access cavities with posterior composites resin.

DISCUSSION:

The primary objective of endodontic treatment is total debridement of the entire root canal system followed by subsequent obturation of the cleaned spaces. The pain in the tooth is usually caused due to deep caries in the tooth causing infectious products to enter the root canals. Hence, knowledge of root canal anatomy is of utmost importance to render the patients of their pain. Considering the complex anatomy, negotiating all the root canal orifices should be done. Missed canals are more likely to cause failure of the endodontic treatment². Maxillary molar is considered to various clinical anomalies as related to the root canals. Ranging from 3 canals and 3 roots in a normal maxillary first molar¹ to variations in number of root canals^{3,6}, we can notice dynamic morphology of the tooth. Therefore, negotiation of the canals plays an important role during access opening. It is usually known that usually 3 canals are present in maxillary molar. But various studies have shown that approx. 96% of the first molars have a second Mesio Buccal canal⁷. However a study by Sempira et al⁸ evaluated that second Mesio Buccal canal in maxillary first molar is negotiated in about 33% of the cases. This case report highlights endodontic management of a maxillary molar with an extra Mesio Buccal and a distobuccal canal summing up to 5 canals in the tooth. Variations in the number of canals can be attributed to variations in race, caste, and even sex. Yemi Kim et al⁹ studied the morphology of first and second maxillary molars in Korean population. About 63% of the tooth studied showed extra canal in Mesio Buccal root and about 1.2% in distobuccal molar. A study done of the Indian population Prasanna Neelakantan et al¹⁰ showed that 38.6% of the tooth showed additional canal in the maxillary molar. Very rare studies have been seen with a MB2 as well as DB2 in a single maxillary first molar.

Over the recent years, use of CBCT in endodontics have gained significant importance. This is mainly attributed to the diagnosis of periapical inflammation, visualization of canals, root fractures etc^{11,12}. Although, conventional radiography provides clinicians accessible, cost effective modalities for endodontic therapy, CBCT helps us improvise the same with its 3-dimensional imaging¹². Thus, CBCT was used in this case to detect any additional missed canal.

CONCLUSION:

This case report features non-surgical management of a maxillary first molar with an unusual canal morphology of 5 canals in a tooth. Maxillary molar presents with a complex anatomy and hence negotiating all the canals is important. Besides, thorough knowledge of the anatomy and its anomaly, use of ultrasonic, CBCT and magnification aid in achieving the primary goal of endodontic therapy.

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