

## Treatment Of Maxillary First Molar With 6 Canals Diagnosed With Cone Beam Computed Tomography Scanning – A Case Report

### Abstract

**Aim:**the purpose of this study is to emphasize the use of Cone Beam Computed Tomography for root canal treatment .

**Summary:**A Case Report is presented here of a maxillary first molar with 6 canals. Six distinct openings of the canal orifices are visible. Cleaning and shaping was performed using a combination of mechanical and rotary NiTi instrumentation. Obturation was performed using conventional 2% gutta percha by lateral compaction.

### Key Learning Points:

- Clinicians should be aware of the anatomical variations in maxillary molars
- Cone beam computed tomography should be a part and parcel of diagnosis prior to initiating root canal treatment

### Key Words

Cone beam computed tomography, maxillary first molar,six canals

<sup>1</sup> Pravin Kumar (MDS,FICD)

<sup>2</sup> Dax Abraham (MDS)

<sup>1</sup> Principal, Professor and Head,  
Dept of Conservative Dentistry & Endodontics,  
Seema Dental College, Rishikesh, Uttarakhand,

<sup>2</sup> Reader

Dept of Conservative Dentistry & Endodontics,  
Institute of Dental Studies and Technologies,  
Kadrabad, Modinagar, Uttar Pradesh India

### Address For Correspondence:

Dr. Dax Abraham  
E-144 East of kailash  
New Delhi-110065  
Ph: +911126484531,+9199104333111

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### Introduction

Extensive review has been carried out in recent years regarding the unusual anatomy of permanent maxillary first molar. Knowledge of the most common anatomic characteristics and their possible variations is fundamental, because the nontreatment of even one canal can lead to endodontic treatment failure.<sup>1</sup> The usual root canal anatomy of maxillary first molars has been described as three roots with three canals, with the commonest variation being the presence of a second mesiobuccal canal showing an incidence between 18% and 96.1%.<sup>2</sup> Case reports with five and six root canals or canals with a C-shaped configuration have also been reported earlier.<sup>3,4,5</sup> Maggiore et al reported the maxillary first molar having six canals with two mesiobuccal, three palatal, and one distobuccal.<sup>6</sup> The occurrence of 2 canals in DB roots has been less frequent and has been reported in 3.6% of maxillary molars.<sup>7</sup> Martinez-Berna and Ruiz-Badanell reported 3 cases in which the maxillary first molars had presented<sup>6</sup> root canals (3 in mesiobuccal, 2 in distobuccal, and 1 in palatine root).<sup>8</sup> Adanir reported six canals with one mesiobuccal, two mesiopalatal, two distobuccal, and one palatal.<sup>9</sup> Alavi et al and Thomas et al reported

the incidence of two canals in the distobuccal root as 1.90% and 4.30%, respectively.<sup>10,11</sup> Filho et al reported a maxillary first molar with three roots and seven root canals. Of the 140 extracted maxillary first molars, only one tooth showed seven root canals in which three mesiobuccal canals, three distobuccal canals, and one palatal canal were identified. Variations in number of palatal root canals have been reported by Christie et al who reported 16 cases of maxillary molars with two palatal roots found during 40 years of daily clinical practice.<sup>12</sup> Currently, technological advances have witnessed the introduction of cone beam computed tomography (CBCT) system to facilitate the assessment of internal anatomic variations of root canals. This system has been very useful in particular endodontic problems as a result of identification of anatomic features and variations of the root canal system, because endodontic diagnosis and treatment planning have been difficult to handle with 2-dimensional radiographs.<sup>13,14</sup>

The Present case report discusses the successful endodontic management of a maxillary first molar presenting with three roots and six root canals. This unusual morphology was confirmed with the help of

cone beam computerized tomography (CBCT) scans.

### Case Report:

A 19 year old female patient reported to the Department of Conservative Dentistry, Institute of Dental Studies and with pain in the upper right maxillary first molar for the past two days. The pain intensified during any thermal stimuli and upon mastication. The patient's medical history was noncontributory.

Detailed clinical examination revealed a carious (mesio-occlusal) maxillary right upper first molar which was tender to percussion. Periodontal assessment revealed the tooth was within the normal physiological limits. Heat test using gutta percha stick revealed a lingering pain after the removal of the stimulus. The heat test was first performed on the contra lateral tooth and then on the adjacent tooth.

A preoperative radiograph in relation to the involved tooth revealed deep caries in the mesio-occlusal portion of the tooth involving the pulp space with periodontal ligament space widening in relation to mesiobuccal root (**Fig 1**)



Fig 1 : Pre Operative X Ray Depicting Mesioocclusal Caries Involving The Pulp

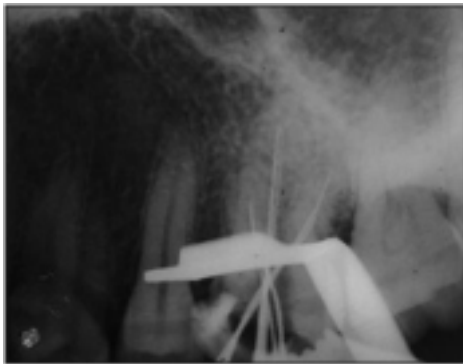


Fig 2 : Working Length Showing The Files In All The 6 Canals.

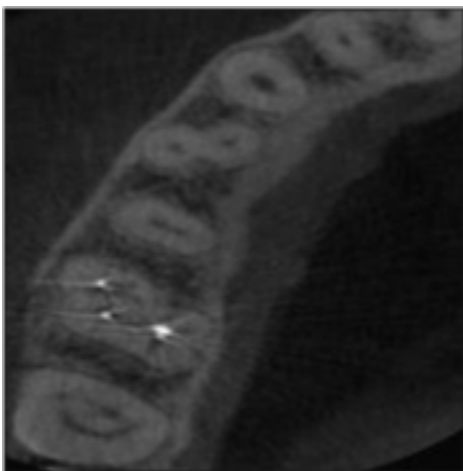


Fig 3 : Cbct Image Showing 6 Separate Canals

A detailed review of the clinical and radiographic findings led to the diagnosis of acute irreversible pulpitis with acute apical periodontitis. Endodontic treatment was suggested and the procedure was explained to the patient.

The tooth was anesthetized with 1.8 mL (30 mg) 2% lignocaine containing 1:200,000 epinephrine (Xylocaine; AstraZeneca Pharma Ind Ltd, Bangalore, India.) followed

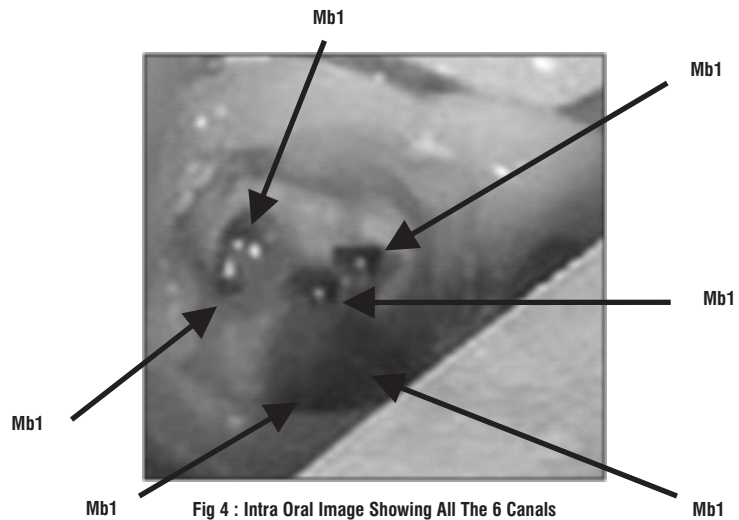


Fig 4 : Intra Oral Image Showing All The 6 Canals

by rubber dam isolation. An endodontic access cavity was established. Clinical examination with a DG-16 endodontic explorer (Hu-Friedy, Chicago, IL) revealed two canal openings in each of the, mesiobuccal, and palatal root and one opening in the distobuccal root. During the further examination using surgical loupes a second canal was suspected in the distobuccal orifice.

The working length was determined with the help of an apex locator (Tri Auto ZX, J Morita, Tokyo, Japan) and later confirmed using a radiograph. Multiple working length radiographs were taken at different angulations (Fig 2)

To confirm the unusual morphology it was decided to obtain a CBCT image of the tooth. An interim dressing of Cavit (3M, ESPE) was placed and after an informed consent of the patient the CBCT image of the maxilla was performed. The images clearly revealed 6 canals, two in each of the mesiobuccal, distobuccal and palatal roots.

As it can be clearly seen from the image (Fig 3) there were 6 separate canals confirmed with the CBCT imaging. An intraoral photograph was also taken (Fig 4)

Pulp extirpation was completed in all the canals and an interim dressing of Cavit (3M ESPE) was placed in the canals.

In the subsequent appointment the tooth was asymptomatic. Cleaning and shaping of the

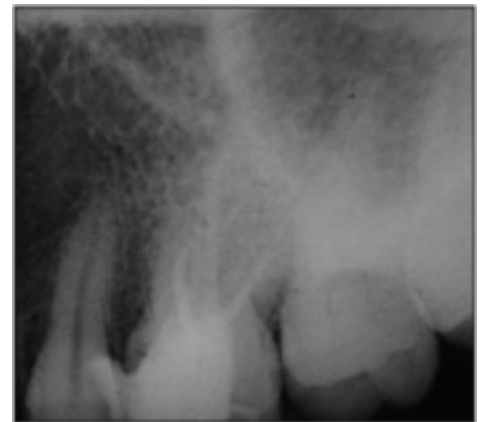


Fig 5 : Obturation X Ray

canals were performed under rubber dam isolation using Protaper Nickel titanium rotary instruments with a crown down technique till file no. F2. Irrigation of the canals were done between each instrumentation using 2.5% NaOCl and 17% EDTA. Normal saline was used as the final irrigant.

The canals were subsequently dried with absorbent paper points and obturated using the F2 ProTaper cone and ZnOE sealer (Fig 5). The tooth was then restored with a posterior composite Synergy D6 (Coltene Whaledent). The patient was advised a full coverage restoration.

### Discussion

A variety of study methods such as radiographs, magnification, clinical evaluations, dye injection, tooth sectioning, and scanning electron microscopy have been discussed and reported by several authors for the prevalence of additional root canals.<sup>14</sup> Newer diagnostic methods such as

computerized axial tomography (CT) scanning greatly facilitate access to the internal root canal morphology by allowing the operator to look at multiple slices of tooth roots and their root canal systems.<sup>15</sup> With CT scans, it is possible to reconstruct overlapping structures at arbitrary intervals, and, thus, the ability to resolve small subjects is increased. Additional advantage is the drastic reduction in scan time and effective dosages, but they still are not as accurate and do not limit the dosage as low as reasonably achievable.<sup>16</sup>

The use of newer diagnostic imaging modality (CBCT) is fast gaining importance in diagnosis of unusual root canal morphology as the amount of information gained from conventional radiographs and digitally captured periapical radiographs is limited by the fact that the three-dimensional anatomy of the area being radiographed is compressed into a two-dimensional image.<sup>17,18,19</sup> CBCT has been used in endodontics for the effective evaluation of the root canal morphology along with the diagnosis of endodontic pathosis, assessing root and alveolar fractures, analysis of resorptive lesions, identification of pathosis of non-endodontic origin, and presurgical assessment before root-end surgery.<sup>17,18,19</sup>

The present case report emphasises on the use of CBCT for the identification of multiple root canals and subsequent success of the root canal treatment.

Matherne et al in a study concluded that CBCT images always resulted in the identification of greater number of root canal systems than digital images.<sup>20</sup> Baratto Filho et al evaluated the internal morphology of maxillary first molars by ex vivo and clinical assessments and concluded that CBCT scanning along with the use of operating microscope can be used as a good method for initial identification of maxillary first molar internal morphology.<sup>14</sup> In a study by Jojo Kottoor et al, CBCT axial images confirmed the presence of three roots and seven root canals, namely mesiobuccal 1 (MB1), mesiobuccal 2 (MB2), mesiobuccal 3 (MB3), distobuccal 1 (DB1), distobuccal 2 (DB2), mesiopalatal (MP) and distopalatal (DP).<sup>21</sup>

## Conclusion

This case report clearly ascertains the use of advanced imaging techniques like CBCT for successful endodontic treatment.

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