

An Unusual Case of Maxillary First Molar: A Case Report

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Abstract:- The success of root canal therapy depends on cleaning of all the infected root canals and three-dimensional hermetic seal of the canals. For this, the knowledge of the root canal anatomy plays a vital role. However, the root canal anatomy is not always predictable. It is complex due to various anatomic variations and recognizing it and cleaning it thoroughly is a challenge to clinicians. This case report presents root canal treatment of unusual anatomy of maxillary first molar with six root canals, two mesio-buccal, two disto-buccal and two palatal canals.

Keywords:- Disto-Palatal, Maxillary First Molar, Mesio-Palatal, Six Canals.

I. INTRODUCTION

The goal of root canal treatment is to clean all the root canals thoroughly and provide a hermetic seal in all dimensions. A thorough knowledge of the root canal anatomy and its possible variations is essential for obtaining such a goal. However, because of wide variations in root canal morphology and its complexity, it is always a challenge during root canal therapy.¹

There have been many studies on the morphology of maxillary first molar. In the literature, the usual radicular anatomy of maxillary first molar is described as three roots and three or four canals; the fourth canal being the second mesio-buccal canal (MB2).¹ In the world wide Cone beam computed tomography (CBCT) assessed MB2 prevalence study, the prevalence of MB2 was 73.8%, ranging from 48% in Venezuela to the maximum of 97.6% in Belgium.² However in the study done in Nepal, the prevalence was found to be 30.4%.³ Additionally, the occurrence of more than one canal in distobuccal and palatal roots have been also reported although the incidence is low. Studies have reported the incidence of two canals in distobuccal root to be 1.9-9.5%.^{1,4-6} Moreover, the incidence of presence of extra palatal canals has also been reported to be 2-5.1%.^{7,8}

This case report describes the root canal treatment of a maxillary first molar with three roots and six root canals: two mesio-buccal, two disto-buccal and two palatal canals.

II. CASE REPORT

A 52-year-old male patient with no significant medical history presented to Conservative Dentistry and Endodontic unit of Bir Hospital, Kathmandu, Nepal with the chief

complaint of pain in the upper left back tooth since few weeks. The pain was intermittent in nature and aggravated by taking cold food and during mastication. Patient also gave history of severe pain at night since few days which was not relieved by analgesics. On oral examination, a deep carious lesion (Class II; Mesio-occlusal) was found in the left maxillary first molar (tooth number 14). Electric pulp test and cold test showed aggravated response that lingered for few minutes. The tooth was tender to percussion. Intra oral peri-apical (IOPA) radiographic examination of the tooth revealed a large carious lesion that was seen encroaching onto the pulp space. No peri-apical lesion was seen in relation to the tooth (Figure 1). Hence, a diagnosis of symptomatic irreversible pulpitis with symptomatic apical periodontitis was made, and the tooth was planned for endodontic therapy.



Fig 1 IOPA Image of Tooth Number 14

Local anaesthetized 1.8 mL of 2% lignocaine containing 1: 200,000 epinephrine (Unijules Life Science Ltd., India) was given to the patient. Caries was excavated using round carbide bur in a highspeed handpiece. Access cavity was prepared, and the internal anatomy showed mesiobuccal 1 (MB1), mesiobuccal 2 (MB2), distobuccal (DB1), and palatal canals. The palatal canal (MP) was not placed centrally so another palatal canal in the distal area was suspected. Access cavity was extended distally, and a second palatal canal (DP) was located. Further exploration led to detection of second disto-buccal canal (DB2). For each mesiobuccal, distobuccal and palatal roots, there were two distinct orifices seen on the pulpal floor (Figure 2). A pre-endodontic build up was done and rubber dam was applied. Pulp extirpation using barbed broaches was done in all six canals.

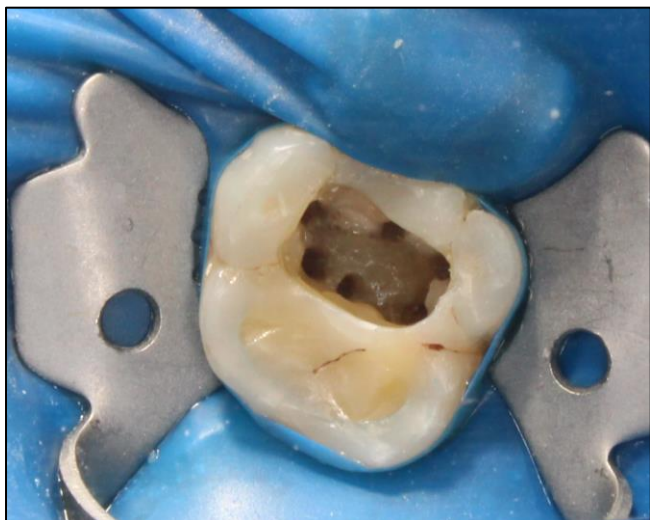


Fig 2 Maxillary First Molar with Six Canals; Two Mesio-Buccal, Two Disto-Buccal and Two Palatal Canals.

Electronic apex locator (Propex pixi, Dentsply Maillefer) was used to find the working length which was verified with an intra-oral peri-apical radiograph (Figure 3). Root canals were cleaned and shaped using HyFlex CM nickel-titanium rotary instruments (Coltene) files and chelating agent (MD-ChelCream, Meta Biomed) up to file size 30 with 4% taper for buccal canals and up to file size 40 with 4% taper for palatal canals. Irrigation between each instrumentation was done using sodium hypochlorite solution (2.5%) and normal saline. Canals were dried with paper points and Calcium hydroxide (Calcigel, Prevest DenPro) dressing was given. A temporary restoration of Orafil G

(Prevest DenPro) was placed in the pulp chamber to seal the access cavity.

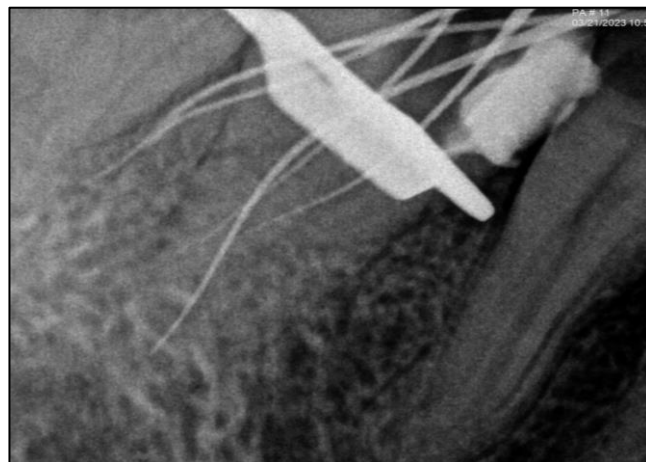


Fig 3 IOPA of Working Length Determination

In the next visit after 10 days, to confirm the anatomy of the extra canals in a three-dimensional aspect, a cone beam computed tomography (CBCT) imaging was suggested and a CBCT was taken. The presence of six canals was confirmed by CBCT. The report showed one extra mesiobuccal, one extra palatal, and one extra distobuccal canal systems (Figure 4). The first and second mesio buccal canals (MB1 and MB2) were independent canals (Vertucci's Type IV). The DB1 and DB 2 canals merged in the middle third of the canal to form a single canal (Vertucci's Type II). The MP and DP canals (Vertucci's Type IV).

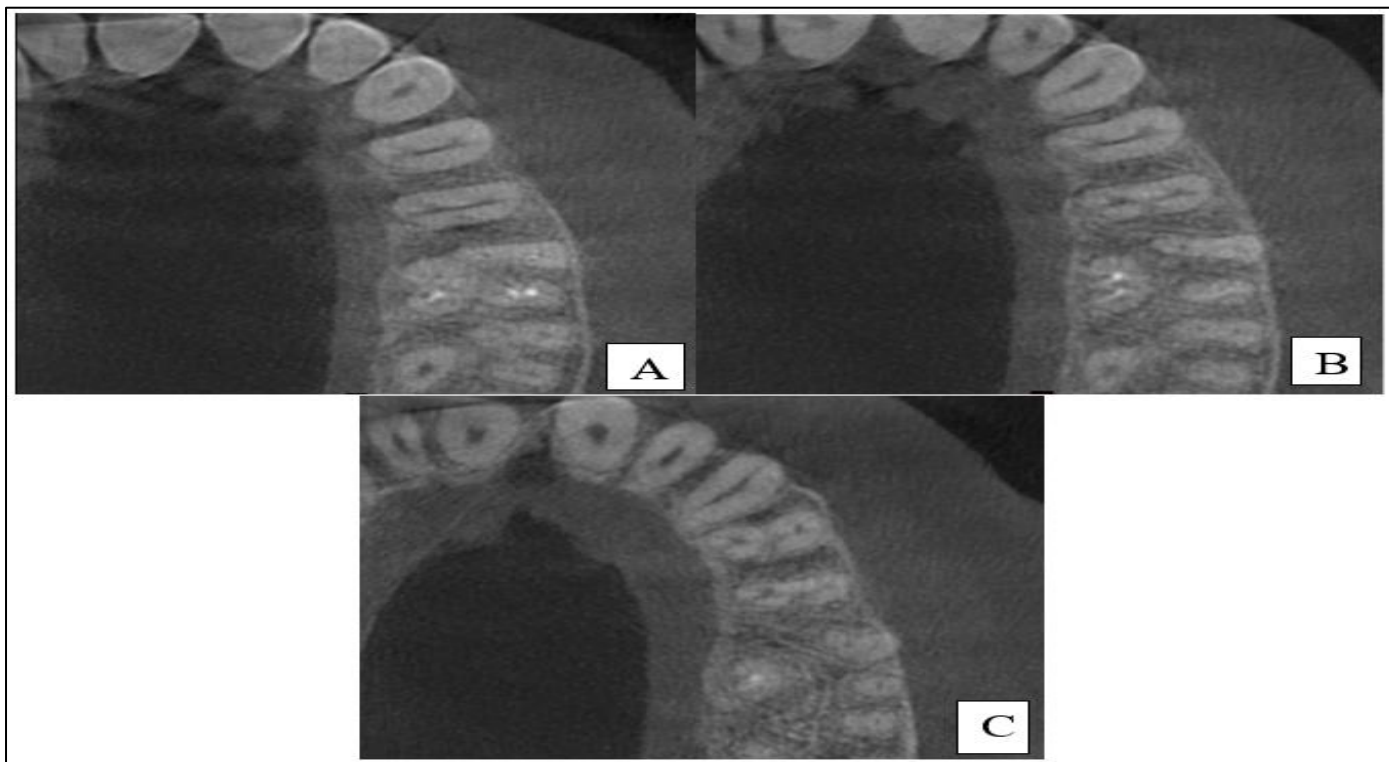


Fig 4 CBCT image: A: Coronal 1/3rd of the root canal showing two mesial, two distal and two palatal canals, B: Middle 1/3rd of the root canals showing two mesial, two palatal and merged distal canal, C: Apical 1/3rd of the root canal showing two mesial, one distal and one palatal canal.

At the second visit, the patient was asymptomatic. The access cavity was re-entered, and canals were irrigated with 2.5% sodium hypochlorite and normal saline. In order to remove the remaining calcium hydroxide, and increase the efficacy of sodium hypochlorite, irrigating solution was agitated using EndoActivator (Dentsply Sirona). Master cone IOPA was taken to verify the apical extent of the preparation (Figure 5). Final irrigation was done using 17% Ethylenediaminetetraacetic Acid (EDTA) solution. Absorbent points were used to dry the canals, and obturation was done using gutta-percha and bioceramic sealer (BioActive RCS, SafeEndo)(Figure 6).The tooth was then restored with a hybrid composite resin (Te-Econom plus, Ivoclar Vivadent) and the patient was advised a onlay or a crown restoration.



Fig 5 IOPA Radiograph showing Master cone Fit

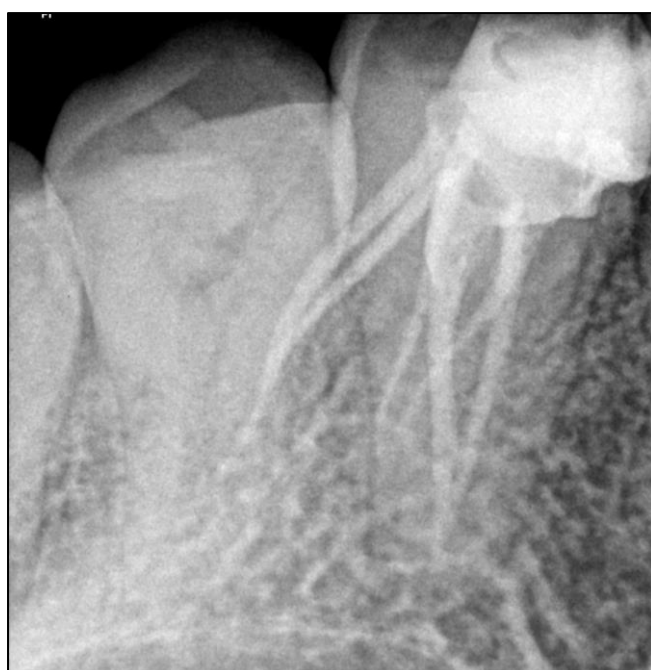


Fig 6 IOPA showing Obturation of all the Root Canals

III. DISCUSSION

Understanding the root canal morphology and its frequent variations is important for proper endodontic therapy. The outcome of root canal therapy greatly depends on the location of all the canals and thorough cleaning and three-dimensional filling of all the root canals of the root canal system. Several studies have shown anatomical aberrations in first molar especially maxillary, ranging from one to seven canals.¹ The usual anatomy of maxillary first molar is described to consist of single mesial, distal and palatal roots and 3 canals with a possible extra fourth canal, the mesiobuccal second canal (MB2).^{1,5,8} The occurrence of extra canal system in all three roots of a maxillary first molar is rare and few case reports can be found in literature.⁹⁻¹⁵ This case report highlighted the unusual anatomy of maxillary first molar with two canals in all three roots.

In our case, after conventional access was made, the location of palatal canal, which was too mesially, created a suspicion of possible presence of another palatal canal distally. Also, the distance between buccal and palatal canals were relatively wide increasing the possibility of second buccal canals.

The incidence of second mesio-buccal canal is well documented in literature and its world-wide prevalence is reported to be 73.8%. However, the presence of second disto buccal canal is rare with the incidence of 9.5%.⁶ Few case reports can be found in literature which shows two canals in distobuccal root.^{11,13,16-20} Additionally, the incidence of two palatal canals is found to be between 2-5.1%.^{7,8} In a retrospective study by Christie et al., endodontic treatment of 16 maxillary molars with two palatal roots were done and six extracted maxillary molars with two palatal roots were observed. Based on their observation, the teeth were classified into three types: Type I, Type II and Type III depending upon the degree of separation of the roots. Grade I included the roots totally independent. In the grade II the roots are partially fused and in grade III the roots are completely fused.²¹ In the present case, the two palatal roots were completely fused (Grade III) (Figure:4 and 5) with single root canal in each root and the distopalatal root was slightly shorter than the mesiopalatal root.

Normally, only radiographic images, in one or two angulations, are sufficient during root canal therapy to visualize root canals.²² In the present case, six canals were visible in the radiograph, but the number of palatal roots was not clear. In one angulation, it looked like Vertucci's Type II configuration, whereas in other it looked like two different roots with Vertucci's Type I configuration in each root. So, a CBCT for more precise diagnosis was taken during the second appointment which showed two fused roots with separate canals in each (Figure 4). Since calcium hydroxide was used in initial appointment, few remnants of it could be appreciated in the canals in CBCT.

Location and proper instrumentation of all the canals of the tooth is very crucial for successful endodontic therapy. Thorough knowledge of possible number and location of

roots and root canal will always assist the clinician to explore for such anatomical aberration and provide a successful endodontic therapy.

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