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Endodontic Retreatment of Maxillary First Molar with Three Roots and Seven Canals: A Case Report

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Abstract

A 25-year-old female existing with mild pain and discomfort during mastication in her right posterior maxillary tooth. On clinical examination, the maxillary first molar tooth was restored with a composite filling. The tooth did not respond to heat or cold test, and it was tender to percussion. Radiograph examination revealed poor obturation of the canals and the periodontal ligament space was broad but there was no definitive periapical radiolucency. Conservative non-surgical root canal

treatment was performed; a total of seven root canals were detected and they were obturated by using the calcium-based sealer. Radiograph with RVG and CBCT also confirmed that all seven canals were properly obturated. Twelve months later, there were no clinical or radiographic changes of the treated tooth. These findings suggested that careful examination of the floor of the pulp chamber with RVG and CBCT help to find extra root canals.

Keywords: Endodontic Treatment, Maxillary First Molar, Seven Root Canals

Introduction

The maxillary first molar tooth appeared in the oral cavity at an early stage and therefore it is very prone to caries and need root canal treatment, if left untreated. Furthermore, it is characterized with anatomic complexities along with variations in the root canal anatomies. Although, maxillary first molar has 3 roots and 3 canals but many studies have been performed on the form, configuration, and number of root canals actually present in the maxillary first molar tooth. Based on the previous studies, wide variations in numbers and morphology of canals in each root of this tooth have been detected, and these includes one ^[3], two ^[4], four ^[5], five ^[6] and six ^[7-11] root canals or with a C-shaped configuration of the canals ^[12]. Furthermore, the mesiobuccal root of the maxillary first molar also contains a double root canal system where the rate of second mesiobuccal canal (MB2) was ranged from 18.6% to 96.1% ^[13, 14]. Moreover, the incidence of second distobuccal canal (DB2) was 1.6% to 9.5% ^[15, 16]. Finally, although rare but a third canal in the mesiobuccal (MB3), distobuccal (DB3) and palatal roots has been reported ^[17, 18]. In addition, the frequency of two root canals in the palatal root has also been found which was ranged between 0.2% to 7.0% ^[13, 15].

This case report describes the endodontic management of a maxillary first molar tooth that had 3 roots and 7 canals (3 separate MB, 3 DB and 1 palatal canal).

Case Report:

A 25-year-old female patient was referred to the Department of Conservative Dentistry and Endodontics, Military Dental Centre Dhaka with the complaints of mild pain and discomfort during mastication in her upper right posterior region. Her medical history was noncontributory. Patient also stated that she received endodontic treatment 3 months back but the problem remains.

On extra oral examination, there was no abnormality. The clinical examination found that the upper right first molar tooth was restored with composite resin. Furthermore, the tooth did not respond to heat or cold test and it was tender to percussion. Moreover, it was not mobile. Radiographic examination revealed poorly obturated canals and there was mild widening of

periodontal ligament space of maxillary right first molar tooth but no periapical radiolucency was observed. Based on the history, clinical and radiographical examination, the effected tooth was diagnosed as a case of chronic periapical periodontitis with incomplete obturation of maxillary right first molar tooth. Conservative non-surgical endodontic treatment was performed; a total of 7 canals (3 separate MB, 3 DB and 1 palatal canal) were detected (Fig 1-6).


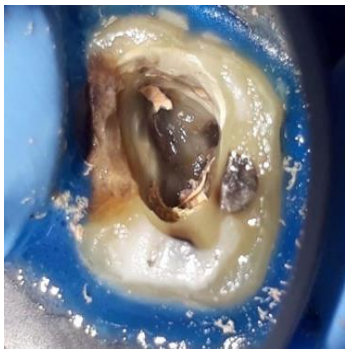

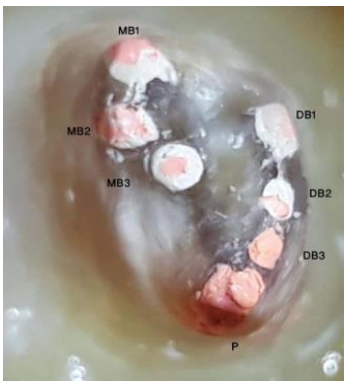
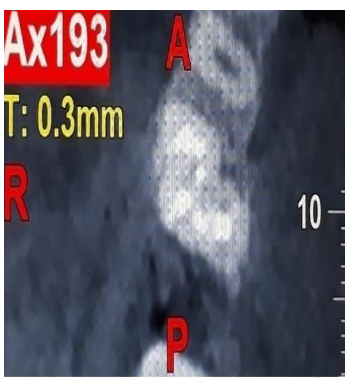

Treatment procedure:

At first, the consent of the patient was taken after informing the procedure accordingly. After mouth preparation and administration of local anesthetic solution, the tooth was isolated with rubber dam. A straight-line access cavity was made following the complete removal of restorative materials to visualize the pulpal floor. Gutta percha present in the canals are removed by retreatment files- D1,D2,D3 and GP solvent. The access cavity was then modified and floor of pulp chamber was cleaned properly. The careful exploration of pulpal floor with an endodontic explorer (DG-16) recognized the presence of seven canals, namely, MB1, MB2, MB3, DB1, DB2, DB3 and P.

After negotiation of all canals, necrotic pulp remnants were removed and flushed out by normal saline and 2.5% sodium hypochlorite solution. A working length measuring radiograph was taken and they were as follows: 19.5mm for

MB1, MB2, MB3 canal; 19mm for DB1, DB2, 17mm for DB3 canal and 21 mm for palatal canal from their respective cusps. All canals were then prepared by protaper files with Endomotor using copious irrigation with 0.9% normal saline and 2.5% sodium hypochlorite solution. The canals were then soaked with 2% chlorhexidine solution for one minute and finally 17% liquid EDTA was applied for 2-3 minutes. After drying the canals with paper point, calcium hydroxide paste was placed as an intracanal medicament. The access cavity was closed with zinc oxide eugenol cement and the patient was recalled after one week.

At next appointment, the patient was asymptomatic. The temporary restoration was removed and calcium hydroxide was flushed with normal saline followed by sodium hypochlorite solution. Then final irrigation was done with 17% liquid EDTA to remove the smear layer and the canals were dried with paper point. Protaper master GP points were inserted into the root canals and they were obturated by using the calcium-based sealer (Sealapex). Finally, RVG radiograph and CBCT was taken to confirm the number of the root canals and the completeness of root fillings. A total of seven separate canals were recognized. The tooth was then restored with composite resin. After 12 months of follow up, neither clinical nor any radiographic abnormalities was observed.

		
<p>Fig 1: Initial radiograph</p>	<p>Fig 2: Clinical view after restoration removal</p>	<p>Fig 3: Clinical view of access cavity & seven root canals</p>
		
<p>Fig 4: Intraoral mirror image after obturation</p>	<p>Fig 5: Postoperative CBCT scan</p>	<p>Fig 6: Postoperative RVG</p>

Discussion

Previous studies have indicated that due to the variations in root canal number and configuration of the maxillary first molar tooth, it is often difficult to treat this tooth by the conservative non-surgical root canal therapy. In most of the cases, additional radiographs with different angulations may often require to recognize the external and internal anatomic variations such as the presence of extra canals and /or roots.

In this case report, a maxillary first molar tooth having seven root canals- three in mesio-buccal (MB), three in disto-buccal (DB), and one in palatal (P), was successfully treated with conservative root canal therapy. Although, the second mesio-buccal canal (MB2) of the maxillary first molar tooth received attention by many authors^[15, 19] but in some cases, seven or eight canals are also reported (Table 1).

Table 1: Incidence of seven or eight canals reported in maxillary first molar

Author & published year	Total canals	Canal configuration*		
		Mesiobuccal	Distobuccal	Palatal
Kotoor <i>et al.</i> (2010) ^[20]	7	3	2	2
Kotoor <i>et al.</i> (2011) ^[21]	8	3	3	2
Badole <i>et al.</i> (2014) ^[22]	7	3	2	2
Raghavendra <i>et al.</i> (2014) ^[23]	7	3	2	2
Martins (2014) ^[24]	7	4	2	1
Almeida <i>et al.</i> (2015) ^[25]	8	3	3	2
Munavalli <i>et al.</i> (2015) ^[26]	7	3	2	2
Rodrigues <i>et al.</i> (2017) ^[27]	7	3	2	2
Bansal N <i>et al.</i> (2016) ^[28]	7	4	2	1
Yadav HK <i>et al.</i> (2017) ^[29]	7	3	2	2
Venumuddala VR <i>et al.</i> (2017) ^[30]	7	3	2	2
Present case	7	3	3	1

Column of "Canal configuration" are the no of canals in each root.

The preparation of access cavity also plays an important role to identify and negotiate the root canals. Usually, a triangle preparation is made by the orifices of the two buccal canals and the palatal canal. However, in the present case, a more trapezoid form of access was prepared to detect all canal orifices. Furthermore, single-cone obturation technique is used because many previous studies have suggested that it allows a good adaptation of gutta-percha to the canal walls because there is minimum space remains between the gutta-percha and the canal wall, which is usually filled by root canal sealer. The sealing ability or leakage of single-cone technique was also similar to other root canal filling techniques at coronal and apical area^[31, 32]. Therefore, we decided to use this technique for the present case.

The detection of canal orifices is usually performed by visualizing the canal bleeding points and the use of radiographic techniques facilitate to learn the morphology of the root canal system^[33, 34]. However, the two-dimensional view of the radiograph could miss the extra canals^[33]. Therefore, additional tools such as magnifying loupes and surgical operating microscope^[18], as well as examination of the pulp chamber floor with a sharp explorer, toughing of the grooves with ultrasonic tips, staining the chamber floor 1% methylene blue dye, sodium hypochlorite "Champagne bubble test," are also recommended by many authors. Furthermore, several clinical studies have suggested the use of CBCT for the confirmation of the root canal morphology^[8, 20]. Using CBCT, Lee *et al.* and Kim *et al.* analyses 458 and 814 maxillary first molars, respectively, and reported a prevalence of MB3 of 1.3% and 0.1%, respectively^[35, 36]. Therefore, in the present study, a multi-slice CBCT scan of the maxilla was performed because it obtained the transverse, axial and sagittal sections of 0.2 mm thickness. The CBCT images revealed three separate roots with seven distinct canals: 3 MB, 3 DB and 1 P canals.

Conclusion

It can be concluded that careful examination of the floor of the pulp chamber with RVG and CBCT help to find extra

root canals or any variations of the root canal during the root canal therapy.

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