Most Treated and Least Understood Molar: A Case Report

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INTRODUCTION

Inadequate obturation has been shown to be the reason for a majority of endodontic failures. This is why, an operator needs to have a thorough understanding of the anatomy of teeth and their canals to ensure endodontic success. Variable root canal morphology becomes a challenge to treat. Hence the use of latest adjuncts like radio-visuography (RVG) and clinically the use of magnification loops would help in the accurate management of such cases. This clinical case report presents a case of six canals in the three roots of maxillary first molar which is a rare case.

KEYWORDS: Additional Canals, Multiple Canals, Maxillary First Molar, Root Canal Therapy, Variable Root Anatomy

CASE REPORT

A 31-year-old patient appealed to the clinic with a complaint of pain and swelling in the upper left tooth back region since 10 days. The tooth was tender on vertical percussion. Periodontal probing and the mobility of the tooth were under physiologic limits. The Radiographic assessment was performed to confirm the diagnosis (Figure 1- Pre-operative Radiograph). An RVG was done using shift cone technique, for better understanding of root canal anatomy. Radiography indicated some abnormality. Six canals, palatal 1 and palatal 2, mesiobuccal 1 and mesiobuccal 2, and distobuccal 1 and distobuccal 2 were identified with the help of conventional access opening and observation under magnification loupes.

The tooth was anaesthetized with 1.8 ml of 2% lidocaine containing 1:80,000 epinephrine (lignox 2%), followed by rubber dam isolation technique. A conventional access cavity was done initially and later it was modified according to the shamrock modification (Figure 2- Access Cavity Preparation). The help of ultrasonic trephining, additional canals were identified. The three rooted tooth revealed 2 canals in each root (palatal root, mesiobuccal root and distobuccal root) under magnification loupes. This was followed by a microscopic evaluation for further confirmation.

This unusual morphology was evaluated three dimensionally, by using an intra-oral camera with radio-visuography (rvg). The image obtained from the patient revealed the abnormal canal morphology of the tooth.

The next visit was followed by working length determination, and thorough cleaning and shaping of the canals (Figure 3- Working Length Determination, Figure 4- Working Length Determination with Rubber Dam). Pro-taper Ni-Ti instruments were used for the cleaning and shaping. This was followed by copious saline and irrigation and intracanal medication are pre-requisites for a successful therapy. These enable for a thorough cleaning, disinfection and obturation of the canals. Extra canals have always been complex for the operator primarily at the stage of assessment.

Failure to recognize even a single canal may lead to the failure of the entire treatment process. An in-depth knowledge of the morphology of teeth, combined with thorough clinical and radiographic examination are quintessential for endodontic success.

The internal anatomy of 370 maxillary molars was studied by T.Pe² Cora et al. (1992), which showed that the frequency of occurrence of a second mesiobuccal canal in the maxillary first, second and third molars was 25%, 42% and 32% respectively.² Few have also reported the occurrence of 2 canals in each of the palatal, mesiobuccal and distobuccal roots.⁴⁻⁵

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2.5% sodium hypochlorite irrigation to flush out all the debris and pulpal remnants.

The canals were dried thoroughly, followed by the placement of master cone (Figure 5- Master cone Placement). And obturation was done using gutta percha, by cold lateral compaction technique (Figure 6- Obturation). A resin based sealer was used for the obturation. The tooth was then restored using resin modified glass ionomer cement. During the follow up, the patient was found to be asymptomatic and was advised a full coverage porcelain crown.

**DISCUSSION**

The endodontists are constantly challenged by the complex nature of the root canal system of a maxillary first molar. The occurrence of double canals in the roots of a maxillary molar is unusual.6

Most of the times the presence of extra or more than normally found canals in a tooth are discovered after the endodontic therapy, due to continuous discomfort.7
Normally, the maxillary first molar has three roots and three canals. The frequency of occurrence of fourth canal ranges from 50.4% to 95%. A fifth canal 2.25%. 

A few authors have also reported cases with 6 canals. Weine et al found that the teeth with a fourth canal occurred more frequently than the teeth with three canals (51.5% vs. 48.5%). And the inability to detect the second canal in the mesiobuccal root of a first molar usually was the reason for the failure of the root canal treatment.

In a clinical analysis, where maxillary first molars were evaluated, a fourth canal frequency was seen in 67.14% of the teeth. A tooth with 7 root canals was found to occur in 0.72% of the cases. The occurrence of more than one root canal in the mesiobuccal root, was found in 92.85% of the teeth.

Additional root canals were located in the mesiobuccal root in 92.85% of the teeth. Clinical assessment showed that the teeth that exhibited 4, 5, and 6 root canals, showed a frequency of 53.26%, 0.35%, and 0.35% respectively. Table 1 provides a list of multiple canal findings.

In 1927, okumara found that of 299 extracted teeth, 53% had 2 canals in the mesio-buccal (mb) root, 2.9% in the distobuccal (db) root, and 0.3% in the palatal root. Bond et al. 1988 reported a case of maxillary first molar with six canals: with two canals joining in the apical third of the palatal root, two canals with separate foramina in the mesiobuccal root, and two canals with separate foramina in the distobuccal root.

Hence, one must assume that there is a fair chance of finding more than traditionally occurring three canals in all the molar teeth.

The additional canals can generally be detected by the help of different methods like proper radiographic interpretation, cone-beam computed tomography (CBCT), operative microscope, methylene blue staining, sodium-hypochlorite champagne test, red line test and ultrasonic troughing to name a few.

**CONCLUSION**

This case, reports the incidence of variable root canal morphology, with three roots and two canals in each root. A precise understanding of pulpal morphology coupled with angled radiographs becomes essential for the endodontic process. With the progress in technology, aid from advanced diagnostic aids like RVG can be taken to confirm the canal morphology and observe the anatomy in fine details.

**REFERENCES**


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<td>J. L. BOND</td>
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Table 1: List of Multiple canal findings by different researchers.


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