CASE REPORT

Maxillary first molar with six canals: A case report

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Abstract
The endodontic treatment of a maxillary molar with peculiar root canal morphology can be diagnostically as well as technically challenging. Presence of extra canals, lateral canals, and deltas are often encountered. The case report being presented is that of a maxillary first molar with six root canals-three in mesio-buccal, two in disto-buccal (DB), and one in palatal.

Keywords: Additional canals, maxillary first molar, surgical microscope

Introduction
Successful endodontic therapy requires proper access to the pulp chamber, adequate cleaning and shaping, and three-dimensional root canal obturation. Thorough knowledge of the root canal anatomy forms the foundation for successful root canal treatment.[1]

Incomplete elimination of bacteria or their products from the root canal system may lead to failure of the root canal therapy. The internal anatomy of teeth cannot always be pre-assessed and unusual variations, and distinctions may often present themselves to clinicians. Complete clinical and radiographic examination, as well as thorough knowledge of the morphology of these teeth, is necessary for preventing treatment failures. Reports[2,3] have shown that the dissemination of studies of such cases makes clinicians aware of the possibility of such variation and enhances their ability to find and treat accessory canals. This is generally expected to result in an improved success rate in terms of prognosis for root canal treated teeth.

Maxillary first molars have often been an area of interest as they are known for their dissimilar morphologies and variations in the number of canals present. Most commonly, they have three roots and four canals. Special attention is always paid to the second mesio-buccal canal (MB2), which, according to many authors,[4,5] commonly presents variation.

Case Report
A 34-year-old male patient reported to the Department of Conservative Dentistry and Endodontics, The Oxford Dental College, Bengaluru, Karnataka, India, with pain in his upper left back tooth region. The pain persisted since 2 weeks; it was of sudden in onset, shooting type, radiating to the left ear and aggravated when the patient was eating or sleeping. It was initially relieved by medication, but its efficacy decreased gradually.

Patient did not give any significant medical history and had no known allergy to drugs. On clinical examination, it was found that the patient had deep dental caries in left maxillary first molar. The tooth was tender to percussion, without mobility or periodontal pockets. Vitality test with heated gutta-percha (Dentsply Maillefer, Ballaigues, Switzerland) resulted in lingering pain which was intense and cold test (Endo Frost, Roeko, Langenau, Germany) and electric pulp test (Parkel electronics division, Farmingdale, NY, USA) produced an early response. The case was diagnosed to be symptomatic irreversible pulpitis with symptomatic apical periodontitis.

The case report being presented is of such a maxillary first molar which presented with 6 canals MB1, MB2, MB3, DB1, DB2, and P (Palatal).
The treatment plan opted was root canal treatment, followed by full coverage crown.

Treatment was initiated with anesthetizing the tooth with 1.8 mL 2% lignocaine containing 1:200,000 epinephrine (Xylocaine; Astrazeneca Pharma Ind Ltd, Bangalore, India.) and relieving from occlusion. The access cavity was prepared under rubber dam, and the chamber was irrigated with 3% NaOCl. Location of MB MB1, MB2, DB1, DB2, and (palatal) P canals orifices was done using DG 16 explorer (Hu-Friedy, Chicago, IL, USA) and coronal flaring was done with gates-gllidden drills no. 2 and 3 (Dentsply-Maillefer, Ballaigues, Switzerland) to improve the straight-line access.

- The canals were negotiated for patency using K-flex files and working length was recorded using electronic apex locator (Root ZX; Morita, Tokyo, Japan) and initial hand filing till #20 was done in the canals. The working length was later confirmed by radiograph.
- The canals MB1, MB2, DB were instrumented with #30 4% RaCe instruments and #40 6% for palatal canal.

As the treatment proceeded, the patient presented with decreased pain but mild discomfort was still present. The access opening was refined from trapezoidal to quadrangular under a surgical operating microscope (Carl Zeiss, Germany) under rubber dam. A DG 16 explorer (Hu-Friedy, Chicago, IL, USA) revealed the presence of another additional canal DB2, where 5 canals were appreciated [Figure 1].

Working the length radiograph [Figure 2] was taken at this stage with the dam supported with wedges rather than clamp so as to visualize the course of the files. This was followed by rotary instrumentation with RaCe files (FKG, Switzerland) under irrigation with 3% NaOCl in between the files.

During the course, another bleeding point was identified on the MB aspect of the chamber and the area was thoroughly inspected where explorer experienced a catch and was present in between MB1 and MB2. The presence of third MB3 was confirmed by inserting two different files which did not go into the same canal. The length of the canal was measured using apex locator and cleaning and shaping of all the 6 canals was completed [Figure 3].

Mastercone radiograph was taken [Figure 4]. Final irrigation was done with EDTA (premier Dental Products) and the canals were completely dried with paper points (Dentsply Maillefer) followed by lateral compaction technique of obturation with gutta-percha (Dentsply Maillefer) and AH plus resin sealer (Maillefer, Dentsply, Konstanz, Germany). Post-obturation radiograph is as shown in Figure 5.

The patient was asymptomatic on follow-up and was posted for full coverage crown for the tooth.

**Discussion**

A tooth, when viewed from the anatomy aspect, is a very complex system which consists of a number of foraminae which open at different locations- lateral, collateral, accessory, etc., and it need not be a simple root canal. The disinfection of such a canal is challenging and depends on many factors such as irrigants and instrumentation and intracanal medicaments. Inadequate disinfection will lead to treatment failure and in such a scenario, not identifying root canals makes it obvious that proper...
disinfection is impossible to attain. Hence, location of all the canals plays a vital role in the root canal preparation.

The methods to explore additional canal orifices have always been an important area of discussion and various tools have been used for this purpose. They are:

- Magnifying loupes and surgical operating microscope
- Examination of the pulp chamber floor with a sharp explorer, troughing of the grooves with ultrasonic tips, staining the chamber floor with 1% methylene blue dye, performing the sodium hypochlorite “champagne bubble test,” and visualizing canal bleeding points are the commonly followed methods for detection of canal orifices
- Fiber-optic transillumination was also used to locate the developmental line between the MB and mesiolingual orifices aids in locating root canal orifices.

In this case, the presence of the bleeding on the pulp chamber floor was indicative of more canals and sharp explorer, and operating microscope aided in the location.

Apart from these, cone beam computed tomography (CT) and micro-CT are also being used as adjuncts in detecting extra canals. In the present case, they were not preferred to examine the canals because of the radiation dose exposure that the patient would receive. Above all, the use of surgical operating microscope has adequately served the purpose.

Martínez-Berná et al. reported the maxillary first molar with three MB (separate canals with separate foramina). Following which few other reports have also been published.

Conclusion

Variations in morphology are common. An open mind to these exclusions along with knowledge would be helpful in better treating the case, and thus improving the success rates in endodontic therapy. Documentation of such cases would be helpful for reference and management of similar cases.

References