Management of a permanent maxillary second molar with two disto buccal canals: A case report with the literature review

Divya Jindal, Deepak Raisingani, Suchita Vishnoi, Nidha Madan

Department of Conservative Dentistry and Endodontics, Mahatma Gandhi Dental College and Hospital, Jaipur, Rajasthan, India

Abstract

Human molars show considerable anatomic variations with respect to number of roots and root canals. The most common form of the permanent maxillary second molar has three roots and four canals, two mesiobuccal canals and one distobuccal (DB) and palatal canal each. About 98.3% of maxillary second molar have been reported to have a single DB canal. Two canals were found only 1.2-2.2% of the time, hence showing the second disto buccal canal to being a rare occurrence. This case report presents the management of a maxillary second molar with two disto buccal root canals confirmed with the aid of conventional radiographic method.

Keywords: Distobuccal root canal, maxillary second molar, root and canal anatomy

Introduction

The treatment of the entire root canal system is essential to maximize the possibility of obtaining success in the endodontic therapy. It is necessary for the clinician to have a thorough knowledge of the dental anatomy, as well as of its variations. Most of the studies regarding anatomical variations of maxillary molar teeth deal with the first molar. Studies involving the anatomical variations in second maxillary molars are rare.

In a study 220 maxillary first and 205 second molars were collected from Indian population and were scanned by using cone beam computed tomography (CBCT) and it was seen that single-rooted maxillary first and second molars showed Types I, IV (0.5%) and Type III (1%) canal systems, respectively. Buccal roots of two-rooted first molars showed Type I and Type IV canal systems, whereas two-rooted second molars showed wide variations in the anatomy of canals. The most common canal morphology in case of the mesiobuccal (MB), distobuccal (DB) and palatal roots of both first and second molars was type I (51.8% and 62%, respectively in case of MB roots). Additional canal types were identified in 2.2% of first molars and 9.3% of the second molars.[1]

In another study of 50 maxillary second permanent molar, it was found radiographically in MB root, two root canals were found in 78% and 20% of the specimens in mesiodistal and buccolingual direction respectively. In the DB root, two root canals were seen in 4% and 6% of the specimen in mesiodistal and buccolingual direction respectively.[2]

Kim et al. studied 814 maxillary first and 821 second molars from Korean patients of Mongoloid origin by using in vivo CBCT methods and it was seen that single roots were found in 0.25% and 4.63% of the first molars and second molars, respectively. However, the incidence of fused roots was 0.73% in case of first molars and for the second molars it was 10.71%. In 802 three-rooted maxillary first molars, additional canals were found in 63.59% and 1.25% of the MB and DB roots, respectively. In 660 three- or four-rooted maxillary second molars, additional
canals were found in 34.39% of the MB roots, 0.30% of the midbuccal roots, 0.30% of the DB roots, and 1.82% of the palatal roots. In 88.10% of the first molars and 82.07% of the second molars, bilateral symmetry of the MB roots was found.\(^1\)

The purpose of the present study is to report a clinical case of a second maxillary molar with five canals.

**Case Report**

A 27-year-old man presented to the Department of Conservative Dentistry and Endodontics, Mahatma Gandhi Dental College, Jaipur with the chief complaint of the spontaneous toothache in his left posterior maxilla since 2 days. History revealed intermittent pain in the same region on having hot and cold food and fluids from last 1 month. The patient’s medical history was non-contributory.

A thorough clinical examination showed a carious maxillary left second molar, which was tender to percussion. The tooth was immobile with healthy periodontal conditions. A pre-operative radiograph [Figure 1] revealed mesio-occlusal radiolucency, approaching the pulp space with periodontal ligament space widening in relation to the MB root. From both clinical and radiographic findings, the diagnosis of symptomatic irreversible pulpitis with apical periodontitis was made, and the treatment plan, which consisted of endodontic management, 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 India Ltd., Bangalore, India.). An endodontic access cavity was established. Clinical examination with a DG-16 endodontic explorer (Dentsply Maillefer, Ballaigues, Switzerland) revealed five canal openings two in each of the DB, MB and one in palatal root [Figures 2 and 3].

Cleaning and shaping were performed using hyflex nickel-titanium rotary instruments (Coltene Whaledent) with a crown-down technique. Irrigation was performed using normal saline, 5.25% sodium hypochlorite solution, and 17% ethylenediaminetetra-acetic acid. Final irrigation was done using 2% chlorhexidine digluconate. The canals were then dried with absorbent points (Dentsply Maillefer), and obturation was done using cold lateral compaction technique of gutta-percha compaction (Coltene Whaledent) and AH plus resin sealer (Maillefer, Dentsply, Konstanz, Germany) (Figures 4 and 5). Post endodontic restoration was placed, and the patient was recalled for follow-up and full coverage crown. The final radiograph revealed the unusual anatomy of five root canals filled with gutta percha [Figure 6].

**Discussion**

The clinician should give special attention to the evidence of the occurrence of anatomical variations throughout the procedure. In the present case, during access, removal of the coronal pulp and exploration of the canals, the presence of the bleeding on the pulp chamber floor was indicative of more canals and aided in the location of the two DB canals. There were five different orifice openings; these canals had separate apical foramen.

**Figure 1:** Pre-operative

**Figure 2:** Intraoral image

**Figure 3:** Working length
Periapical radiographs taken in different angulations are an essential part of endodontic treatment; however, they are taken in a buccal-lingual direction and give only two-dimensional information about a three-dimensional (3D) object.

In recent years, advanced techniques like CT are being used to evaluate root canal morphology as a 3D image. Spiral CT is a recent advance in CT technology. It has proved to be a useful tool in diagnosing complex root canal anatomies. CBCT scanning is a relatively newer diagnostic imaging modality that has been used in endodontics for the effective evaluation of the root canal morphology.

The use of microscopes during endodontic treatment in dental clinics has become more widespread, and this practice has made the detection of hidden accessory canals easier. According to Buhrley et al., magnification with microscopes or dental loupes permits approximately a threefold higher detection rate of mesiolingual canals than is obtained with the naked eye. However, it is not necessary to use a microscope to detect every hidden root canal orifice in the pulp chamber, as illustrated in the present case.

Despite Krasner and Rankow having defined the laws of orifice location of the root canals, drawing conclusions that the orifices of the root canals are always located at the junction of the walls and the floor, at the angles in the floor-wall junction and at the terminus of the root developmental fusion, in the case described herein and as shown in, two DB canals were located at the center of the pulp chamber floor. Despite such general suggestions about access, it is most important that careful attention is paid to any evidence of additional canals.

**Methods of detecting additional canals**

Different methods of locating extra canals have been discussed by many authors:

1. Additional off-angle radiographs (at least three radiographs at varying horizontal angles)
2. Use of CBCT
3. Use of magnification (loupes and dental operating microscopes)
4. Examine dentinal map minutely and use DG 16 to explore the floor of the pulp chamber
5. Look for hemorrhagic spots (indicate the presence of extra canals)
6. Perform champagne or bubble test with sodium hypochlorite
7. Staining the pulp chamber with dye (e.g. 1% methylene blue)
8. Use of ultrasonic tips, special round burs, and thin tapering finishing burs to remove a small amount of tooth structure or calcification and trough the line angles of the pulp chamber will help
9. Modify the conventional outline form to include the extra canals
10. Ensure adequate straight-line access to improve visibility.

In contrast to maxillary first molars, a case of a maxillary second molar with five root canals have not previously been reported. This case report presents a variation of the maxillary second molar that dental practitioners do not frequently encounter.
Conclusion

For a successful endodontic treatment, the possibility of encountering maxillary second molars with more than three or four canals should not be ignored.

References