



Identification And Management Of A Rare MB3 Canal In A Maxillary Molar: A Case Report

Dr. Pradnya V. Bansode¹, Dr. Seema D. Pathak², Dr. Madhuri Ambhure³, Dr. Shriya R. Ostwal^{4*}

¹Head of Department, Professor, ²Professor, ³Associate Professor, ⁴MDS Student,
Department of Conservative Dentistry and Endodontics, GDC and Hospital, Chh. Sambhajinagar /MUHS, India

***Corresponding Author:**

Dr. Shriya R. Ostwal

MDS Student, Department of Conservative Dentistry and Endodontics,
GDC and Hospital, Chh. Sambhajinagar /MUHS, India

Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

Maxillary first molars frequently exhibit complex root canal morphologies, with a second mesiobuccal canal (MB2) often encountered during treatment. However, the identification of a third canal (MB3) within the mesiobuccal root is uncommon and, if overlooked, may compromise endodontic success. This case report describes the endodontic management of a 19-year-old male with irreversible pulpitis in the maxillary right first molar. Careful exploration under magnification revealed three distinct canals in the mesiobuccal root, with the MB2 and MB3 canals merging apically. Root canal preparation was completed using rotary NiTi files with sodium hypochlorite and EDTA irrigation. Bioceramic sealer and warm gutta-percha obturation techniques were used. Accurate diagnosis and the use of enhanced magnification played a vital role in the successful management of this unusual canal configuration. The case emphasizes the importance of attention to anatomical variations in achieving optimal endodontic results.

Keywords: Maxillary molar, Mesiobuccal canals, Root canal variation, MB3, Canal morphology

Introduction

A thorough understanding of the root canal anatomy of maxillary first molars is critical for the success of endodontic treatment. Among the three roots, the **mesiobuccal (MB) root** is often the most anatomically complex, with the presence of a **second canal (MB2)** now widely recognized [1]. However, the occurrence of a **third canal (MB3)** within the same root is an **uncommon anatomical variation** that is easily missed without the aid of magnification or advanced imaging technologies such as CBCT [1,2].

Failure to detect and treat these additional canals may lead to **incomplete debridement**, persistent infection, and eventual **endodontic failure** [1,2]. Although MB3 canals are rarely encountered, studies using modern diagnostic tools have reported their presence, reinforcing the need for **careful exploration of the**

pulpal chamber, especially in younger patients where the canals are less likely to be calcified [3,4]. Technologies improve visualization and enable clinicians to detect **hidden or accessory canals**, ultimately enhancing treatment outcomes.

In 1967, Weine [3], using in vitro data and two clinical cases, highlighted the clinical significance of the MB2 canal correlating its presence with failed endodontic treatments. Since then, the in vivo prevalence of the MB2 in the maxillary molars has been addressed in several publications and may reach a percentage as high as 93% [8].

MB3 canal can be defined as a third main root canal located in between MB1 and MB2 main canals of the Mesiobuccal root of maxillary molars. Literature regarding morphological description of MB3 canal is

scarce and most of the information comes as a clinical report or an incidental finding of laboratorial studies, but not as the main topic of the research [6]. A recent review on the internal anatomy of maxillary molars reported a global proportion of MB3 in 0.5% of 12,200 maxillary first molars and 0.3% of 4090 maxillary second molars. However, a high percentage frequency (11.3%) of MB3 in maxillary first molars was also reported in a recent study using the clearing technique [7]. It is important to take into account that previous reports on the presence of the MB3 canal comprised the use of intra operative data, in vivo imaging approach, such as CBCT, or ex vivo data obtained using clearing technique, which may explain the differences in the results.

Studies specifically addressing the mesiobuccal root have reported that the incidence of extra root canals in vitro is greater than in vivo. Apart from this, a wide variation of root and canal configurations of the maxillary first molars have been documented in the dental literature. Most of the in vitro studies addressing the mesiobuccal root canal anatomy have not reported the presence of a third canal in the mesiobuccal root. Two such studies have reported their incidence to be between 1.1% and 10% [1]. However its presence has been documented in only a few case reports.

This article presents a rare clinical case of a **maxillary first molar exhibiting three separate canals in the mesiobuccal root**. The case highlights the **diagnostic approach, clinical technique, and importance of magnification** in managing complex root canal anatomy.

Case

A 19-year-old male patient reported to the Department of Conservative Dentistry and Endodontics with a chief complaint of intermittent pain in the upper right posterior region. The pain was localized to the right maxillary first molar (tooth #16)

Clinical

Intraoral examination revealed fair oral hygiene and a proximal carious lesion associated with the right maxillary first molar. There was no evidence of sinus tract or swelling. Electric pulp testing (EPT) revealed a delayed response, and the tooth was tender on percussion.

Presentation:

Examination:

Radiographic

A preoperative periapical radiograph showed radiolucency in the mesio-occlusal and distal aspects of the crown, suggestive of extensive caries approaching the pulp. There was no periapical pathology. Based on clinical and radiographic evidence, a diagnosis of **irreversible pulpitis** was made.

Treatment Procedure

After achieving local anesthesia using 2% lignocaine with 1:100,000 adrenaline, access was gained to the pulp chamber. Initially, the mesiobuccal (MB1), distobuccal (DB), and palatal(P) canals were identified. Given the frequent presence of an MB2 canal, further inspection was carried out under 3.5x magnification using dental loupes.

Following this surprisingly, **two additional canal orifices** were discovered in line with the MB1 canal [Fig.2]. Using a No.10 K-file, both canals were gently negotiated and followed to a considerable working length without difficulty. These were presumed to be **MB2 and MB3**. A radiograph was taken and confirmed the presence of three canals in the mesiobuccal root [Fig 1]. Interestingly, the MB2 and MB3 canals were seen to **merge in the apical third** of the root.

The working lengths of all canals were confirmed with an **Electronic apex locator and Radiograph** [Fig 3]. Root canal shaping and cleaning were done using **rotary NiTi files**, under copious irrigation. **5.25% sodium hypochlorite** was used as the main irrigant, interspersed with **normal saline**. **EDTA** solution was used as a chelating agent and lubricant. After the final rinse with normal saline, canals were dried with sterile paper points.

For obturation, **bioceramic sealer** was used. The **palatal canal** was filled with a **25.06 gutta-percha cone**, and the **distobuccal, MB1, MB2, and MB3** canals were filled using **25.04 gutta-percha cones** [Fig 4]. A postoperative radiograph confirmed the quality of the obturation, including the merging of MB2 and MB3 [Fig 5].

The patient was pain-free at the follow-up appointment and showed no signs of post-treatment complications. He was advised to return for the final prosthetic restoration.

Discussion

Identifying additional canals in molars, especially a third one in the mesiobuccal root, requires careful attention. Tools such as magnification and proper illumination, along with a systematic clinical approach, significantly increase the chances of locating these extra canals. Missing an MB2 or MB3 canal can lead to treatment failure [1]. This case reinforces the importance of not assuming canal anatomy and always exploring thoroughly.

Conclusion

This case demonstrates the successful identification and treatment of three separate canals in the mesiobuccal root of a maxillary first molar. The use of magnification and attention to detail helped achieve an optimal endodontic outcome. Being aware of such anatomical variations is essential for clinicians to provide effective and long-lasting treatment.

References

1. Nayak G, Singh KK, Shekhar R. Endodontic management of a maxillary first molar with three roots and seven root canals with the aid of cone-beam computed tomography. *Restor Dent Endod.* 2015;40(3):241-248.
doi:10.5395/rde.2015.40.3.241
2. Vertucci FJ. Root canal anatomy of the human permanent teeth. *Oral Surg Oral Med Oral Pathol.* 1984;58(5):589–599.
[https://doi.org/10.1016/0030-4220\(84\)90085-9](https://doi.org/10.1016/0030-4220(84)90085-9)
3. Cleghorn BM, Christie WH, Dong CC. Root and root canal morphology of the human permanent maxillary first molar: a literature review. *J Endod.* 2006;32(9):813–821.
<https://doi.org/10.1016/j.joen.2006.04.014>
4. Siqueira JF, Rôças IN. Clinical implications and microbiology of bacterial persistence after treatment procedures. *J Endod.* 2008;34(11):1291–1301.
<https://doi.org/10.1016/j.joen.2008.07.028>
5. Baratto-Filho F, Zaitter S, Haragushiku G, et al. Analysis of the internal anatomy of maxillary first molars by using different methods. *J Endod.* 2009;35(3):337–342.
<https://doi.org/10.1016/j.joen.2008.11.009>
6. Plotino G, Grande NM, Pecci R, Bedini R, Pameijer CH, Somma F. Three-dimensional imaging using microcomputed tomography for studying tooth macromorphology. *J Am Dent Assoc.* 2010;141(Suppl 3):3S–6S.
<https://doi.org/10.14219/jada.archive.2010.0361>
7. Kim Y, Lee SJ, Woo J, Versluis A. Anatomical variations in MB root canals and their clinical impact: A CBCT-based review. *Restor Dent Endod.* 2018;43(3):e30.
<https://doi.org/10.5395/rde.2018.43.e30>
8. Stropko JJ (1999) Canal morphology of maxillary molars: clinical observations of canal configurations. *J Endod* 25:446–450.

Fig.1 Radiograph showing 3 canals in the mesiobuccal root



Fig. 2 Intraoral images of the access opening showing three canals in the mesiobuccal root (Images taken through intraoral camera)



Fig. 3 RVG Radiographic images showing working length confirmation for the canals : MB1, MB2, MB3, DB and P

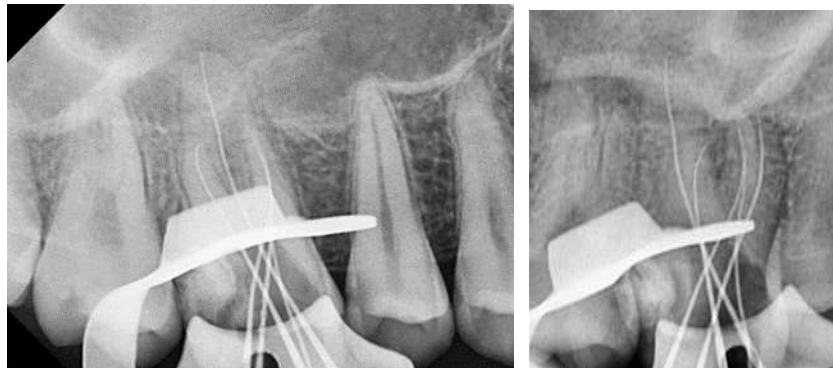


Fig.4 RVG Radiographic images showing Mastercone selection for the canals : MB1, MB2, MB3, DB and P

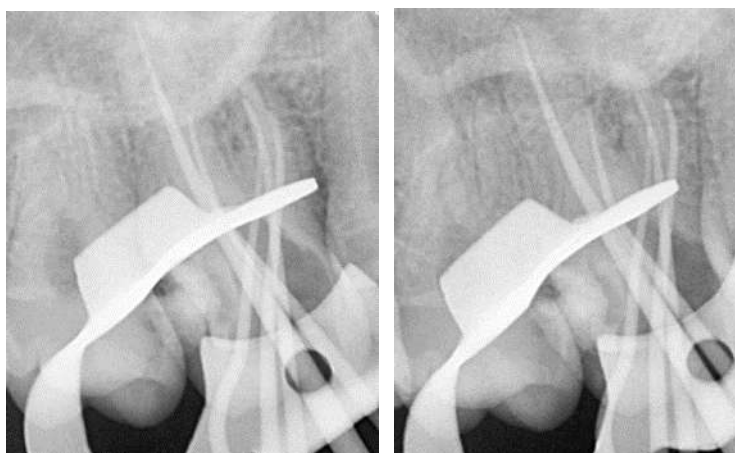


Fig.5 Post-operative RVG Radiographic image showing successful endodontic management for maxillary 1st molar

