



Received: 01-08-2023
Accepted: 11-10-2023

ISSN: 2583-049X

Rare Six-Canal Maxillary First Molar in Bangladeshi People

¹ Fatema Akter, ² Mozammal Hossain, ³ AKM Bashar

¹ MS Resident, Department of Conservative Dentistry and Endodontics, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

^{2,3} Professor, Department of Conservative Dentistry and Endodontics, Bangabandhu Sheikh Mujib Medical University, Shahbag, Dhaka, Bangladesh

Corresponding Author: **AKM Bashar**

Abstract

A male patient of 32-year-old was referred for non-surgical root canal therapy of tooth 16. The morphology of the tooth was identified with four well developed cusps and a 5th supplemental or Carabelli's tubercle, three mesiobuccal

canals and one distobuccal canal and a single palatal root with two canals. Maxillary 1st molar with 6 canals is not a random finding and so far reported first time in Bangladesh.

Keywords: Mesiobuccal, Distobuccal, Anaesthesia, Bangladesh

Introduction

An endodontic therapy takes success on a detailed understanding of the root canal anatomy, variation of pulp cavity morphology, the existence of additional cusps, roots, and atypical root canal morphology. [1-2] For the success of root canal therapy over long term, all the canal spaces must be accessed cleaned and filled. [3-4] But dealing with the anatomical complexity and differences presents ongoing difficulties. With one canal in each of the palatal, distobuccal, and mesiobuccal roots, as well as one or two in the mesiobuccal root, the maxillary first molar most frequently has three or four canals. The frequency of a 2nd mesiobuccal root canal (MB2) is 58.4% in Asian & of 2nd distobuccal canal is in between 1.6% and 9.5% in general. [5-6] However an uncounted number of clinical studies and case reports of maxillary first molars have been reported on various root canal morphologies (Table-1) [7-11]. The above case is a description of the successful treatment of maxillary first molar having 6 canals.

Table 1: Reported canal configuration of the maxillary first molar

| year | Author | P | MB | DB |
|------|----------------------------|----|-----|-----|
| 2010 | K Karthikeyan ⁷ | 2P | 2MB | 2DB |
| 2013 | Mamta Kaushik ⁸ | 1p | 3MB | 2DB |
| 2016 | SaadShahnawaz ⁹ | 2P | 2MB | 2DB |
| 2018 | KvKishan ¹⁰ | 1p | 3MB | 2DB |
| 2019 | PK Agrawal ¹¹ | 1p | 3MB | 2DB |

Case Report

A 32-year-old male patient came with complaint of pain in the right upper tooth. The pain was spontaneous in nature accompanied with night pain. The patient's medical history was not relevant to any systemic relation. Clinical examination exhibited extensive carious lesion close to the pulp of tooth 16. The pain was aggravated & lingering on cold stimulation & electric pulp test produced early response than contralateral same tooth, pointing to pulpal alteration due to inflammation. A radiolucent lesion on the distal portion of the crown that extended to the pulp was disclosed on radiographic examination (Fig 1). Following clinical and radiological evaluation, the right maxillary first molar was diagnosed with irreversible pulpitis, and endodontic therapy was advised.

In combination with adrenaline, 2% lidocaine was used to apply local anesthetic. A DG-16 explorer was used to explore three clearly defined root canal orifices one for each of the roots on the pulpal floor after access opening. A dark brown isthmus was present on mesiobuccal orifice, so shape of access cavity was changed from triangular to trapezoid form for straight line access

and troughing of the developmental group. With caution this area was further explored and inspected and removed the dentinal lips around the mesiobuccal root. Troughing was completed using ultra sonic tips & magnifying mirror through dark brown isthmus/developmental groove, at the junction of the wall & the floor, at the angles in the floor-wall junctions according to Krasner's Law, searched for additional canals. Three orifices (MB1, MM, MB2) on mesiobuccal root were explored (Fig 2). The canals' cleansing and the length of each root canal were determined by using an electronic apex locator (Apex ID, SybronEndo, Korea) & radiograph (Fig 3 a & b). By using NiTi (DentsplySirona) hand file 0.02 (K-file), biomechanical preparation was carried out. As irrigation Sodium hypochlorite (2.5%) solutions was used & Ca (OH)₂ was used as intra canal medicament. On a pre-seal radiograph an additional space was seen adjacent to palatal canal orifice, 0.25mm apical diameter gutta-percha inserted through that orifice which was perfectly fitting on that canal & revealed an extra palatal canal (P2) which was unintentionally prepared during palatal canal (P1) preparation (Fig 4). The apical diameter of master cones' were 0.25mm for each of the mesiobuccal (MB1, MM, MB2) and distobuccal canals, and 0.5 mm and 0.25 mm for the palatal's (P1 & P2) respectively (Fig 5 a & b). Using the lateral condensation process, canal obturated with gutta-percha cones (DentsplyMaillefer) and zinc oxide eugenol sealer. Post obturation CBCT was done for further confirmation of root canal morphology (Fig 6 a, b, c).

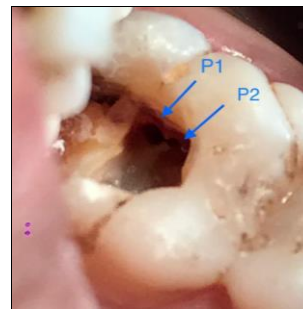


Fig 4: Two palatal canals (P1 & P2)

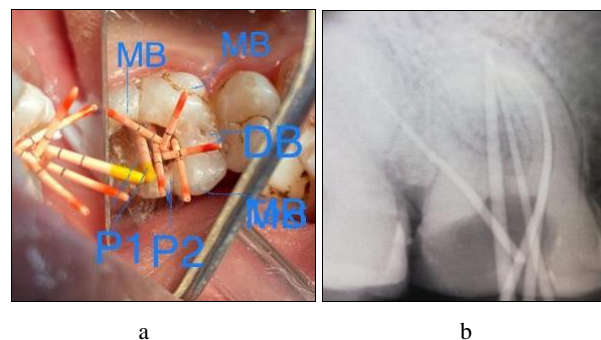


Fig 5: Pre-seal (a) clinical photograph (b) radiograph



Fig 1: Preoperative radiograph



Fig 2: Orifices of three mesiobuccal canal

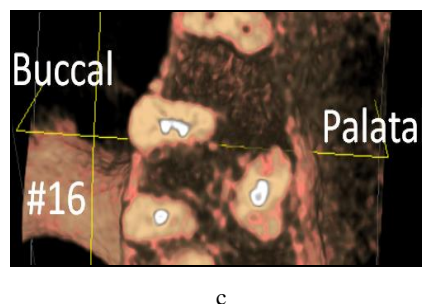
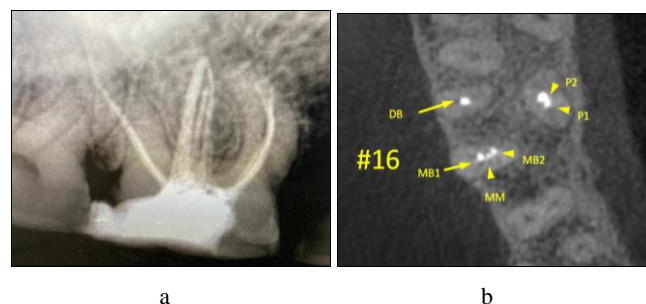


Fig 6: Post obturation (a) radiograph and (b, c) CBCT

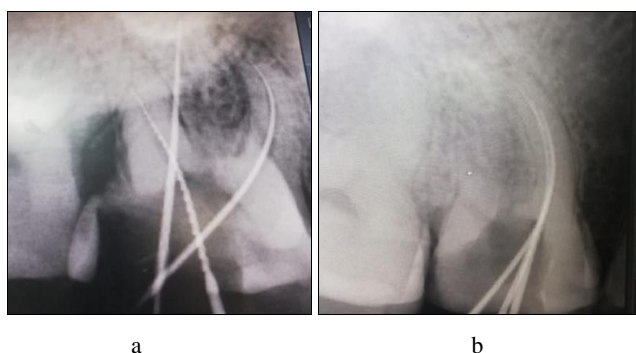


Fig 3: Working Length Determination (a) mesial, distal, palatal canals (b) 3M canals separately

Discussion

The maxillary first molar is typically described as having 4 cusps, 3 roots, and 3 or 4 root canals, however there may be a variant with additional cusps and roots fusion. [12] JG Kannapan [13] claims that 26-27% of Asians have carabelli's tubercles, which are present in 52.77 percent of maxillary first molars. If it is present it might take into account that there could be additional canals under this cusp. As per Zhang⁶ *et al*, there are six different types of root fusion in maxillary molars, including Type 1 (MBR fused with DBR), Type 2 (MBR fused with PR), Type 3 (DBR fused with PR), Type 4 (MBR fused with DBR, PR fused with MBR, or DBR), Type 5 (PR fused with MBR and DBR), and Type 6 (PR, MBR, and DBR).

Clinical evaluation, radiographic interpretation and meticulous observation of the pulp chamber floor may disclose the hint of the type of canal configuration and the site of canal orifices. If one orifice is not in the center of the root, another one likely exists, and if the distance between them is greater than 3 mm, they may remain discrete completely. ^[14] The MB2 orifice opening is typically located 2 to 3 mm palatal to the MB 1 orifice, mesial to an imaginary line joining the two orifices. ^[15] Usually a thin, red or white isthmus present in between the MB1 and MB2 canals. It is more common in the intersection of the middle and apical thirds of the root, where its prevalence rises from 30% to 50%. ^[16]

Vertuccis recommended utilizing ultrasonic tips to countersink or trough the developmental groove, which is palatal to the MB1 canal. For the ongoing process the groove should be enlarged mesially and deepened apically (0.5-3 mm) ^[17] Immediately apical to its orifices in the coronal 1 to 3 mm the MB2 canal typically displays a distinct mesial incline. ^[18-19] When MB2 and MB 1 shared an orifice, the opening is more oval in shape and when two canals present in the distal root, the orifice may be elliptical in shape. ^[20-21] In the above case diagnosis was possible based on clinical presentation with a supplemental cusp, size and location of orifices and presences of isthmus and radiographic interpretation.

The success of locating and negotiating root canals depends on proper access opening, probing, and visualization. Traditional access cavity may need to convert from triangular to trapezoid shape for accommodation of all the canal orifices. In addition to the alteration of the access chamber, other clinical tools for locating extra-canals include multiple different angle radiographs, champagne or bubble test" by using heated 2.6% NaOCl, surgical loupes, and operating microscopes.

Conclusion

However, each case should be carefully examined clinically and radiographically to identify any anatomical anomalies. All over the world even in Bangladesh, maxillary first molar having six canals is infrequent. The current instances support the diligent and comprehensive examination of the pulpal floor at high magnification with adequate lighting.

References

1. Albuquerque D, Kottoor J, Hammo M. Endodontic and clinical considerations in the management of variable anatomy in mandibular premolars: A literature review. *BioMed research international*, 2014.
2. Penumaka SL. Endodontic treatment of permanent mandibular first molar with 4 roots and 5 canals-clinical case reports. *Dentistry*. 2018; 8(469):2161-1122.
3. Tabassum S, Khan FR. Failure of endodontic treatment: The usual suspects. *European Journal of Dentistry*. 2016; 10(1):144-147.
4. Smith CS, Setchell DJ, Harty FJ. Factors influencing the success of conventional root canal therapy-a five-year retrospective study. *International Endodontic Journal*. 1993; 26(6):321-333.
5. Hiebert BM, Abramovitch K, Rice D, Torabinejad M. Prevalence of second mesiobuccal canals in maxillary first molars detected using cone-beam computed tomography, direct occlusal access, and coronal plane grinding. *Journal of endodontics*. 2017; 43(10):1711-1715.
6. Zhang ZH, Yao HL, Zhang Y, Wang X. Endodontic management of the maxillary first molar with special root canals: A case report and review of the literature. *World Journal of Clinical Cases*. 2020; 8(12):p2590.
7. Karthikeyan K, Mahalaxmi S. New nomenclature for extra canals based on four reported cases of maxillary first molars with six canals. *Journal of Endodontics*. 2010; 36(6):1073-1078.
8. Kaushik M, Mehra N. Maxillary first molars with six canals diagnosed with the aid of cone beam computed tomography: A report of two cases. *Case reports in dentistry*, 2013.
9. Ahmed SS, Zaman H, Maxood A. Endodontic treatment of maxillary molar with 6 canals: A case report. *International Dental Journal of Students Research*. 2016; 4:83-86.
10. Kishan KV, Das D, Chhabra N, Rathore VP, Remy V. Management of maxillary first molar with six canals using operating microscope. *Indian Journal of Dental Research*. 2018; 29(5):p683.
11. Agrawal PK. Management of maxillary first molar with six canals. *Indian Journal of Oral Health and Research*. 2019; 5(1):p23.
12. Langlais RP, Miller CS, Gehrig JS. *Color atlas of common oral diseases*. Jones & Bartlett Learning, 2020.
13. Kannapan JG, Swaminathan S. A study on a dental morphological variation. Tubercle of Carabelli. *Indian Journal of Dental Research: Official publication of Indian Society for Dental Research*. 2001; 12(3):145-149.
14. Gutmann JL, Fan B. Tooth morphology and pulpal access cavities. *Cohen's Pathways of the Pulp: South Asia Edition E-Book*, 2020, 192.
15. Stropko JJ. Canal morphology of maxillary molars: clinical observations of canal configurations. *Journal of Endodontics*. 1999; 25(6):446-450.
16. Ahmed HM. A critical analysis of laboratory and clinical research methods to study root and canal anatomy. *International Endodontic Journal*. 2022; 55:229-280.
17. Mufadhil AA, Aldawla MA, Madfa AA. External and Internal Anatomy of Maxillary Permanent First Molars. *In Human Teeth-Key Skills and Clinical Illustrations*, IntechOpen, 2019.
18. Stropko JJ. Canal morphology of maxillary molars: clinical observations of canal configurations. *Journal of Endodontics*. 1999; 25(6):446-450.
19. Vasudev SK, Goel BR. Endodontic miscellany: Negotiation and management of MB2 canal in maxillary second molar. *Endodontology*. 2003; 15(2):33-36.
20. Patel B, Patel B. Anatomy and root canal morphology. *Endodontic Diagnosis, Pathology, and Treatment Planning: Mastering Clinical Practice*, 2015, 179-212.
21. Versiani MA, Martins JN, Bettina Basrani. *The Root Canal Anatomy in Permanent Dentition*, 2018, p391.