

Endodontic Management of Four-Rooted Maxillary Second Molar using A Novel Single-File Rotary System : A Case Report

Banga Kulvinder Singh¹, Taparia Varun Ashokkumar¹, Mandwe Ashish¹

¹Department of Conservative Dentistry and Endodontics, Nair hospital dental college, Mumbai.

Corresponding Author

Banga Kulvinder Singh

E-mail ID: ksbanga@gmail.com

Introduction

The principal objective of root canal therapy is meticulous cleaning, shaping and obturation of root canal space with inert filling material. The presence of an untreated, missed canal is a major cause of failure. Root canal system of the molar teeth is complex and unpredictable. Molars having unusual root and root canal anatomies have been recorded⁽¹⁾. Peikoff et al. (1996) found four separate roots and four separate canals including two palatal canals in 1.4% cases of maxillary second molars⁽²⁾. In another study, Yang et al. retrospectively analysed CBCT images of 1957 maxillary molars and found prevalence of two palatal root in maxillary second molars to be 1.12%⁽³⁾. Among Indian population, Felsyremila et al in their CBCT study found 4(1.1%) cases of maxillary second molars with four separate roots⁽⁴⁾. Whereas, Neelakantan et al. found no second molar having four roots⁽⁵⁾. The following case report describes a Minimally Invasive Endodontic management of rare case of maxillary second molar with two buccal and two independent palatal roots using TruNatomy File Rotary System(DentsplySirona).

Case Report

A 38 year old man reported to Department of Conservative Dentistry and Endodontics complaining of pain in maxillary right back area since 2 weeks. The patient did not present with any relevant medical history. Clinical examination revealed deep disto-occlusal caries in maxillary second molar number 17. Radiographic examination showed disto-occlusal coronal radiolucency approaching pulp. Vitality test was performed and diagnosis of symptomatic irreversible pulpitis was made. Root canal therapy was advised and informed consent was obtained. The tooth was anesthetized, isolated and access cavity was prepared. Three canal orifices were located – Mesio-buccal, Distobuccal and Palatal. Canal patency was checked with No.8 K file. However, after

inserting the file in the palatal canal, it was observed that the file had tilted mesially. It hinted a different canal anatomy. Upon closer examination of the dentinal map under magnification, the access cavity was extended mesially and an extra palatal canal was found located mesial to the initially found palatal canal, which was confirmed radiographically. Working length was established using Electronic Apex Locator [Raypex 6 (VDW, Munich, Germany)] and the root canal instrumentation was completed using TruNatomy File Rotary System. Obturation was completed using lateral condensation technique. The patient was recalled at 1,3,6 and 12 months period and follow up radiographs were taken. The tooth was asymptomatic.

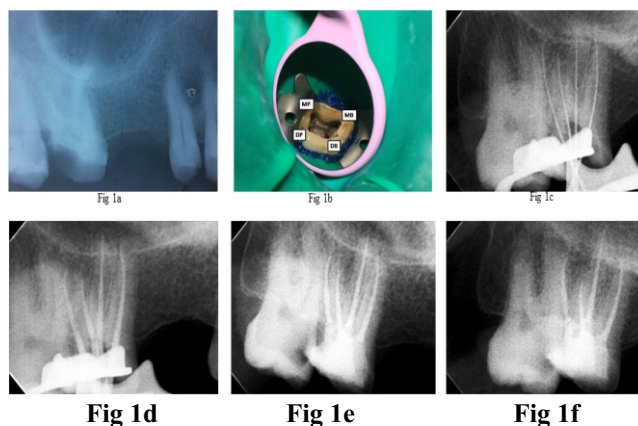


Fig 1a: Pre-Operative Radiograph, Figure 1b : Access Opening showing four canal orifices (MP= Mesio-Palata, MB = Mesio-Buccal, DB = Disto-buccal, DP = Disto-Palatal), Figure 1c : Working Length Radiograph, Figure 1d : Master Cone Radiograph, Figure 1e : Post-Obturation Radiograph, Figure 1f : 1 Year Follow up

Discussion

Maxillary second molar commonly has three separate roots. Available studies show that this tooth can have one to five roots⁽⁶⁾. Beatty reported maxillary molar having five root canals. Bond et al. and Martinez-Berna et al reported three-

rooted maxillary molars with six canals. Christie et al (1991) classified maxillary teeth with 2 palatal canals into three types. Type I maxillary molars having two widely divergent, long palatal roots. Type II molars having four shorter and parallel separate roots with blunt apices. Type III molars having constricted root morphology with the mesiobuccal, mesiopalatal, and distopalatal canal encaged in a web of root dentin⁽⁷⁾. According to this classification, the above case falls into Type II category. Preserving dentin to maintain structural integrity of tooth, while respecting the original root canal anatomy of tooth, must form an integral part of root canal preparation. Preservation of peri-cervical dentine is a key factor in determining the long-term prognosis in these teeth⁽⁸⁾. In addition to their superior fatigue resistance in curved canals and efficient shaping time, TruNatomy files are designed to shape root canal systems with maximum preservation of peri-cervical dentin. Krasner and Rankow proposed Laws of Access Opening based on consistent, identifiable, anatomic configurations of the pulp chamber⁽⁹⁾. Use of magnification can enhance the accuracy of endodontic procedures and help the clinician identify any probable extra canals⁽¹⁰⁾.

Conclusion

In this case, close observation of dentinal map under magnification and following the developmental root fusion lines as suggested by the 3rd law of orifice location, helped in identifying the position of second palatal canal. Therefore, it is imperative to understand of the laws of pulp chamber anatomy and adhering to them, to prevent missing canals. Knowledge of root canal system before undertaking any endodontic procedure is cardinal, since its lack of understanding could lead to missing the additional root canals leading to endodontic treatment failure.

Source of support : Nil

Conflict of interest : Nil

REFERENCES

- Pasternak-Ju'nior B, Teixeira CS, Silva RG, et al. Treatment of a second maxillary molar with six canals. *Aust Endod J* 2007;33:42-5.
- PEIKOFF, M. D., CHRISTIE, W. H., & FOGEL, H. M. (1996). The maxillary second molar: variations in the number of roots and canals. *International Endodontic Journal*, 29(6), 365-369. doi:10.1111/j.1365-2591.1996.tb01399.x
- Yang B, Lu Q, Bai QX, Zhang Y, Liu XJ, Liu ZJ. [Evaluation of the prevalence of the maxillary molars with two palatal roots by cone-beam CT]. *Zhonghua Kou Qiang Yi Xue Za Zhi*. 2013 Jun;48(6):359-62. Chinese. PMID: 24120006.
- Felsypremila G, Vinothkumar TS, Kandaswamy D. Anatomic symmetry of root and root canal morphology of posterior teeth in Indian subpopulation using cone beam computed tomography: A retrospective study. *Eur J Dent*. 2015 Oct-Dec;9(4):500-507. doi: 10.4103/1305-7456.172623. PMID: 26929687; PMCID: PMC4745230.
- Neelakantan, P., Subbarao, C., Ahuja, R., Subbarao, C. V., & Gutmann, J. L. (2010). Cone-Beam Computed Tomography Study of Root and Canal Morphology of Maxillary First and Second Molars in an Indian Population. *Journal of Endodontics*, 36(10), 1622-1627. doi:10.1016/j.joen.2010.07.006
- Wu D, Zhang G, Liang R, Zhou G, Wu Y, Sun C, et al. Root and canal morphology of maxillary second molars by cone-beam computed tomography in a native Chinese population. *The Journal of International Medical Research*. 2017;45(2):830-842
- Christie WH, Peikoff MD, Fogel HM. Maxillary molars with two palatal roots: a retrospective clinical study. *J Endod*. 1991 Feb;17(2):80-4. doi: 10.1016/S0099-2399(06)81613-4. PMID: 1919407.
- Tang W, Wu Y, Smales RJ. Identifying and reducing risks for potential fractures in endodontically treated teeth. *J Endod*. 2010 Apr;36(4):609-17. doi: 10.1016/j.joen.2009.12.002. PMID: 20307732.
- Morales MP, Sánchez JAG, Olivieri JG, Elmsmari F, Salmon P, Jaramillo DE, et al. Micro-computed Tomographic Assessment and Comparative Study of the Shaping Ability of 6 Nickel-Titanium Files: An In Vitro Study. *J Endod*. 2021;47(5):812-9. doi:10.1016/j.joen.2020.12.021.
- Wong, A. Wy., Zhu, X., Zhang, S. et al. Treatment time for non-surgical endodontic therapy with or without a magnifying loupe. *BMC Oral Health* 15, 40 (2015).