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Case Report

ENDODONTIC MANAGEMENT OF MANDIBULAR SECOND PREMOLAR WITH TWO ROOTS AND THREE ROOT CANALS: A CASE REPORT

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ABSTRACT

Aim: To report and discuss endodontic management for an unusual occurrence of three canals with three separate foramina and two roots in mandibular second premolar.

Summary: Internal morphology and anatomy of a root canal system is complex and differs for each individual tooth of which mandibular premolars have earned the reputation for having aberrant anatomy. Thorough knowledge of root canal morphology, appropriate assessment of the pulp chamber floor, and critical interpretation of radiographs are a prerequisite for successful root canal treatment. This article reports an unusual case of a mandibular second premolar with atypical canal pattern that was successfully treated endodontically. Radiographic examination revealed multiple canals in mandibular premolar having two roots. Highlight of this case report is finding of three canals in mandibular premolar with two roots.

Keywords: Aberrant anatomy, Dental pulp cavity, Mandibular premolar, Morphologic variation, Three root canals.

INTRODUCTION

The basic knowledge of root and root canal morphology and its variations is very important for successful endodontic treatment¹. Mandibular second premolar is typically described as single rooted tooth with a single root canal system. The ovoid-shaped root in cross section normally has developmental grooves or depressions on the mesial and distal surfaces^{1,2}. Proper knowledge of canal numbers and divisions helps to locate and negotiate them and aid in successful management. Even the frequency of root canals uniting during canal preparation and obturation as well as the possibility of any bifurcations or an additional canal helps in the proper diagnosis and treatment of endodontic cases³.

Failure to identify the existence of an additional root canal may end result in unsuccessful treatment and may be the origin of acute flare ups during and after treatment⁴.

Studies reported that due to the variations in canal anatomy, mandibular premolars are the most difficult teeth to treat endodontically; they have a high flare up and failure rate^{5,6}.

Zillich and Dowson⁷ have reported the incidence of 0.4% of mandibular second premolars with three canals whereas

Vertucci⁸ does not report any case of mandibular second premolar with three or more canals at the apex. The incidence of three roots is extremely rare (0.1%). Such anatomic variations are quite possible and shouldn't be thought of as exceptional.

Clinically reported cases showing the presence of three separate roots for the same tooth are very few and far between^{6,9,10,11}. This report addresses a case of nonsurgical endodontic management of mandibular second premolar with two separate roots and root canals with three foramina and two roots.

CASE REPORT

A 22-year-old female patient reported to the department of Conservative Dentistry and Endodontics with the chief complaint of "pain in right lower back tooth." Patient's medical history was non-contributory. Clinical examination revealed a carious lesion on the disto-occlusal surface of the crown of mandibular right second premolar [Figure 1].

The tooth was tender on percussion. Pre-operative radiograph of the tooth revealed a disto-occlusal carious lesion encroaching the pulp with slight widening of the periodontal

ligament space at the periapical area related to the mandibular second premolar and thickening of the lamina dura. The most remarkable radiographic finding was the distinctive pattern of the roots and canal system [Figure 1].

A diagnosis of irreversible pulpitis with apical periodontitis was made on basis of clinical and radiographic findings.

Access was gained to the pulp chamber after administration of local analgesia (2% lidocaine with 1:80,000 adrenaline) under rubber dam isolation using round diamond burs and endo Z bur in a high speed airtor handpiece. Three separate orifices were located: two buccal, and one lingual. Pulp tissue extirpation was done, patency was ascertained and working length determination radiograph was obtained with 10 K files (Dentsply, Maillefer, USA) placed in the root canals after it was estimated using apex locator (Root ZX Mini, J. Morita, Japan). [Figure 2]

Canals were cleaned and shaped sequentially with Revo S (Micro Mega, France), 17% EDTA (Prime Dental Products) was used and canals were irrigated using 6% sodium hypochlorite and a final rinse of saline. The apical preparation was done till the SU file size. Cotton was placed in pulp chamber and Cavite (3M ESPE, St. Paul, MN, USA) was used to close access cavity. During second appointment, master cone selection was done. [Figure 3]

Canals were dried and obturated using cold lateral compaction of gutta-percha cold lateral compaction of gutta-percha cones using a resin-based sealer Adseal resin sealer (META BIOMED).

Post obturation radiograph was taken. [Figure 4]



Figure 1: Preoperative radiograph

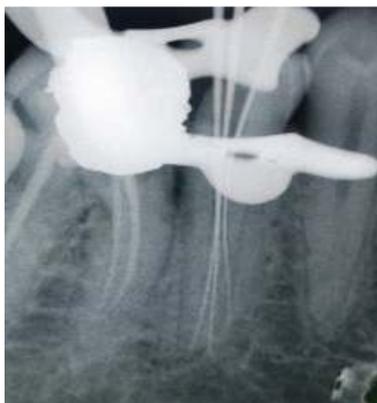


Figure 2: Working length



Figure 3: Master Cone Selection



Figure 4: Post Obturation Radiograph



Figure 4: Post Obturation Radiograph

DISCUSSION

The complex nature of root canal morphology of mandibular second premolar should be known and it is often a challenging task to carry out successful endodontic therapy with such teeth. Better quality radiographs taken at two different horizontal angulations^{12, 13} are supportive in providing information about the number of root canals a tooth can have. Careful interpretation of the PDL space helps in finding extra roots or canals.

Studies^{8, 14-16} citing the anatomy and morphology of mandibular premolars report that 98% of the teeth were single rooted. Incidence of two roots was 1.8%. Three roots when reported were found in 0.2% of the teeth studied. Four roots were rare and were found in less than 0.1% of the teeth studied.

Failure to identify occurrence of an extra root canal may result in ineffective treatment and may be the starting point of flare ups during and after treatment¹⁷. Differences of anatomy include factors like ethnicity, age, gender, unintentional bias in the selection of clinical examples of patients or teeth (specialty endodontic practice v/s general dental practice), as well as study design (*in vitro* v/s *in vivo*)⁵. Depending on race, since our patient was South Asian Indian, one study¹⁸ compared the number of roots and number of canals in mandibular premolars between South Asian Indian patients: they had an incidence of two roots in the mandibular second premolar tooth at 8% and three canals and foramina was zero whereas in first premolar it was 6% for incidence of two roots and 2% for three canals and foramina.

An adequate access cavity is very necessary for negotiation of the canals. Smaller K files^{8,19} are initially used as they get deviated buccally or lingually as the main canal divides at the midroot level. So a fine tactile sense is crucial and the files should be precurved suitably before negotiating the canals. Regardless of the existence of complex dental anatomy, shaping outcomes with nickel titanium instruments are mostly predictable and most important step should be coronal flaring which eliminates the iatrogenic errors.

Use of magnification has been demonstrated to improve the clinician's ability to visualize and access canals²⁰.

Dawn of Cone Beam Computed Tomography (CBCT), 3D imaging and tuned aperture computed tomography would be exceptionally valuable and should be used in rare cases for efficient assessment of root canal morphology, as this may make it easy and improve visualization of particular area to be diagnosed²¹. On the other hand, the high cost, ease of use and availability to patient and extra radiation as compared to standard radiographic methods makes its routine use limited.

Proper efforts to locate the point where the root or the canals divide should be done. If root canal divides more apically, it makes the treatment difficult. During obturation care must be taken.

CONCLUSION

In conclusion, the diagnosis and management of extra roots in mandibular premolars are indisputably an endodontic challenge. In the current cases, if the additional roots would have been missed, it could lead to perseverance of clinical symptoms and consequent failure of the endodontic treatment.

REFERENCES

1. Ingle J, Bakland I. Endodontics. 5th ed. Hamilton: BC Decker, 2002.
2. Ash M, Nelson S. Wheeler's dental anatomy, physiology and occlusion. 8th ed. Philadelphia: Saunders, 2003.
3. Vertucci FJ. Root canal morphology and its relationship to endodontic procedures. Endod Topics 2005; 10: 3–29.

4. Weine F. Endodontic Therapy. 6th Edition. Boston, MA, USA: Mosby; 2004. p. 366.
5. Slowey RR. Root canal anatomy. Road map to successful endodontics. Dent Clin North Am. 1979; 23(4): 555–73.
6. Padmanabh Jha, Vineeta Nikhil, Vipin Arora, Meshha Jha. The root and root canal morphology of the human mandibular premolars: A literature review. Journal of Restorative Dentistry 2013; 1 (1): 3-10.
7. Zillich R, Dowson J. Root canal morphology of mandibular first and second premolars. Oral Surg Oral Med Oral Pathol. 1973; 36(5): 738–44.
8. Vertucci FJ. Root canal morphology of mandibular premolars. J Am Dent Assoc 1978; 97: 47–50.
9. England MC Jr, Hartwell GR, Lance JR. Detection and treatment of multiple canals in mandibular premolars. J Endod 1991; 17: 174-178.
10. Nallapati S. Three canal mandibular first and second premolars: a treatment approach. J Endod 2005; 31: 474-476.
11. Pooja Kakkar and Anant Singh. Mandibular First Premolar with Three Roots: A Case Report. Iran Endod J, 2012 Autumn 7(4); 207-210.
12. Walton RE. Endodontic radiographic techniques. Dent Radiogr Phtogr 1973;46:51-9.
13. Fava LR, Dummer PM. Periapical radiographic techniques during endodontic diagnosis and treatment. Int Endod J 1997; 30: 250-61.
14. Cleghorn BM, Christie WH, Dong CC. The root and root canal morphology of the human mandibular first premolar: A literature review. J Endod 2007; 33: 509-16.
15. Calikan M, Pehlivan Y, Septeciolu F, Turkun M, Tuncer SS. Root canal morphology of human permanent teeth in a Turkish population. J Endod 1995; 21: 200-4.
16. Sert S, Aslanalp V, Tanalp J. Investigation of the root canal configurations of mandibular permanent teeth in the Turkish population. Int Endod J 2004; 37: 494-9.
17. Baisden MK, Kulild JC. Root canal configuration of mandibular first premolar. J Endod. 1992; 18: 505-508.
18. Shishir Singh, Mansing Pawar. Root Canal Morphology of South Asian Indian Mandibular Premolar Teeth. J Endod;2014;40(9):1338-41
19. England MC Jr, Hartwell GR, Lance JR. Detection and treatment of multiple canals in mandibular premolars. J Endod 1991; 17:174-8.
20. Fogel HM, Peikoff MD, Christie WH. Canal configuration in the mesiobuccal root of the maxillary first molar: A clinical study. J Endod 1994; 20:135-7.
21. Nair MK, Nair UP. Digital and advanced imaging in endodontics: a review. J Endod. 2007; 33(1):1–6.

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