

Diagnosis and endodontic management of two rooted mandibular second premolar: A case report

Saima Jamal*, Swathi, Rajaram Naik

Department of Conservative Dentistry and Endodontics, A.J Institute of Dental Sciences, Mangalore, Karnataka, India.

Corresponding author: *Dr. Saima Jamal, Department of Conservative Dentistry And Endodontics, A.J.Institute of Dental Sciences, NH-66, Kuntikana, Mangalore - 575004, India.

Abstract

For a successful root canal treatment familiarity with the normal and abnormal anatomy of the root canal system is very essential. The mandibular second premolar is found to have the most aberrant anatomy. It is usually described as a single rooted tooth with a single root canal. However, the possibility of two rooted mandibular second premolar is extremely rare (0.3%). Missed canals or roots are the major reason for failure of root canal treatment. This article reports and discusses the rare case of successful endodontic management of two rooted mandibular second premolar highlighting the anatomic variations of canals, knowledge of canal morphology, correct radiographic interpretation and the use of cone beam computed tomography (CBCT) to give a three dimensional image of the rare morphology of the tooth. It also discusses the precaution to be taken during access opening, cleaning and shaping and obturation for a successful treatment.

Keywords: Mandibular second premolar, two roots, root canal morphology, middle third bifurcation, endodontic treatment

Introduction

Knowledge of common root morphology and its frequent variations is a basic requirement for endodontic success [1]. Slowey has suggested that mandibular premolars, often called as “endodontist’s enigma” may present the greatest difficulty of all teeth to perform successful endodontic treatment [2]. The anatomic studies reported on the prevalence of number of roots and root canals in mandibular second premolar are limited. Anatomic studies have reported a single root in 99.6% of these teeth. Two roots were found in 0.3% of these teeth.

Three roots were found in only 0.1% of mandibular second premolar. Although uncommon, possible morphological anomalies reported in the literature include mandibular second premolar with two roots and two canals, three roots and three canals and four canals in one root [3]. Failure to recognize variations in root or root canal anatomy can result in unsuccessful endodontic treatment. Hence, it is imperative that the clinician be well informed and alerted to the commonest possible variation. Hoen and Pink in their analysis on teeth requiring re-treatment

found a 42% incidence of missed root or canal [4]. Thus, this paper attempts to alert the dental fraternity on the diagnosis, treatment and possibility of extra roots in mandibular second premolar, which if left untreated, can contribute to failure of treatment.

Case report

A 43 year old male patient reported to the department of Conservative Dentistry and Endodontics at A. J Institute of Dental Sciences and Hospital with the chief complaint of pain in lower right back tooth region since past one week. Patient's medical history was non- contributory. Clinical examination revealed silver amalgam restorative material on the distal surface of tooth #45. The tooth was tender on percussion. Vitality test of the tooth with the electric pulp tester gave an early response with the tooth in comparison with the adjacent teeth .A routine intraoral periapical radiograph showed a coronal radiopacity suggesting of a restorative material involving the pulp with respect to 45 (Fig 1A). The radiograph revealed unusual, complex root canal anatomy and vague outline of two roots. The diagnosis was made as acute irreversible pulpitis requiring endodontic therapy. The tooth was anesthetised and was isolated with a rubber dam. Access cavity was prepared and was modified into one that was wider bucco – lingually . Orifice location was not easy as the separation was from the middle third of the root. After obtaining the first canal patency, a # 10 K file (Dentsply) was precurved and inserted in the distobuccal direction to transverse the canal bifurcation in the second root. The working length radiograph was taken and it revealed the presence of at least two different roots, but

the confirmation of the number of root or root canals could not be made with the help of IOPA as it gives a two dimensional image (Fig 1B). Hence, to ascertain this rare and complex root canal anatomy of the tooth in a three dimensional manner, a CBCT was planned. In the panoramic view with respect to 45, the two roots were seen as the buccal and lingual root (Fig 2D). In the axial view, two canals and two roots can be seen which included a buccal canal and a separate lingual canal (Fig 2A and B). The final impression indicated 45 with two roots and two canals. Canal configuration was categorised as type III according to Weine's classification. After the diagnosis and the confirmation, the endodontic treatment was continued. Gates- Glidden drill (Dentsply) (3,2,1) with a brushing motion were used in crown down fashion to enlarge the main orifice to the level of bifurcation to achieve a straight line access The two canals were cleaned with hand K – files. The canals were subsequently irrigated with 5.25% Sodium Hypochloride (Neodent) and 17% EDTA (Dentsply) during the cleaning and shaping procedure. Calcium Hydroxide (Ultracal) was placed as interappointment dressing. In the next appointment Calcium Hydroxide was removed and the canals were thoroughly dried and the obturation was done simultaneously in both the canals using Gutta Percha (Dentsply) and AH Plus Sealer (Dentsply) by lateral condensation method (Fig 1C). Two roots of secondary premolar were appreciated well in post obturation radiograph. The permanent access was restored with composite (Fig 1D). The patient experienced no post treatment discomfort and subsequently porcelain fused to metal crown was placed. The patient was recalled for the follow- up after two months and was found to be asymptomatic (Fig 3).



Figure 1: A: Preoperative intraoral radiograph of mandibular second premolar showing an unusual anatomy of two roots. B: Working length radiograph. C: Periapical radiograph showing obturated canals. D: Permanent access restoration with composite.

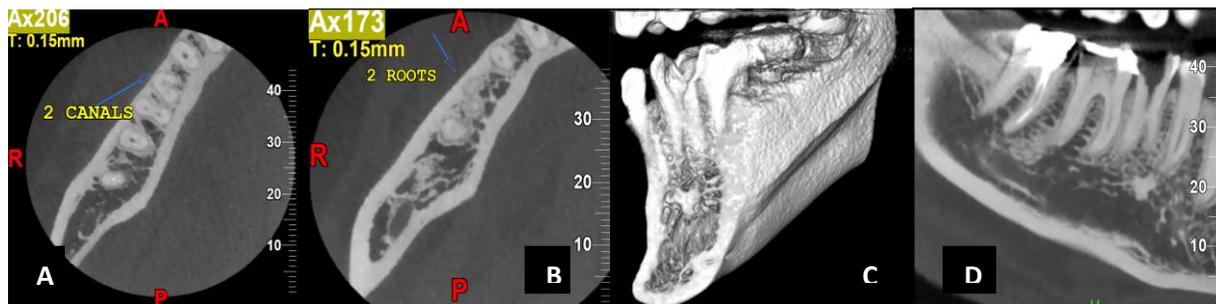


Figure 2: A: Axial view in the CBCT showing two canals. B: The Axial view in the CBCT showing two roots. C: 3 D image – Bone view shows cross section of two roots with bifurcation at the middle third. D: Panoramic view in CBCT shows two roots which bifurcates into two roots.



Figure 3: Follow-up after two months after the placement of porcelain fused metal crown.

Discussion

The presence of extra roots or canals in mandibular second premolar is a challenge to treat. The complete knowledge of the root canal anatomy with proper modification of conventional access opening and careful inspection of the chamber of the tooth is essential for recognition and adequate treatment of teeth with different anatomical variations. After access opening use of

microscopes and ocular loops is very helpful and makes the treatment easier. A wide range of opinions are reported in literature about the variation in root canal of mandibular premolar but very limited information is given on the variations in the number of root that occur in mandibular premolar. The challenge lies in detecting the variation from normal and its successful treatment. Inability to find and obturate a

canal has been shown a major cause of failure. So, one must use high end diagnostic aids before the commencement of treatment. A radiograph gives us a partial view as it is a two dimensional image. Hence it turns out to be of limited value. Considering all these factors a CBCT of the involved tooth was planned [5]. CBCT scanning is a non-invasive, 3D imaging technique and has many endodontic applications, including morphologic analysis. CBCT is advantageous in canal configuration [6]. The crucial step in finding the split canal was tactile examination of canal with a small precurved K- file tip [7]. As the pulp chamber was relatively small with reduces visualization, it was improved by enlarging the canals with Gates Glidden Drills. In order to prevent instrument breakage and to eliminate ledging or stripping in a difficult to access bifurcated teeth, K- files were used for cleaning and shaping. Proper access into the pulp chamber of a mandibular second premolar with two roots which bifurcates in the middle third is very necessary and was modified into one that was wider buccolingually as these roots were buccolingually oriented. Calcium Hydroxide was used as an interappointment dressing due to its antibacterial properties. Obturation of the two roots was done simultaneously. This prevents obturation material introduced into the first canal during the compaction procedure from passing into the second canal, hindering proper filling of the later. The diagnosis and treatment of extra root and root canals in mandibular premolar is a real endodontic challenge. Failure in the treatment of the teeth may result in flare ups during and after the treatment [8, 9]. Careful interpretation of angled radiographs, proper access preparation and a detailed exploration of the tooth are essential prerequisites for a successful treatment outcome [10].

Conclusion

Mandibular premolars are undoubtedly an endodontic challenge because of its abrupt anatomical variation. Clinician should be careful to identify the presence of unusual number of roots and their anatomy. Apart from conventional intraoral periapical radiograph the use of computed tomography will help us in making a confirmatory diagnosis. The presentation of mandibular second premolar with two root dividing in middle third enhances our knowledge about extreme variation encountered and lack of proper classification will continue to baffle the clinician in future.

Conflict of interest: None

References

1. Aggrawal A, Krishan S, Singh K, Bala D. Diagnosis and root canal treatment of mandibular 2nd premolar with two roots- A case report. *Int J Res Health Allied Sci* 2016; 2 (1):31-33
2. Savitri D, Singh R, Sujatha I, Chandra SMS. Endodontic treatment of mandibular first premolar with two roots dividing at two different levels report of two cases. *International Journal of applied dental sciences* 2015;19(4):141-144.
3. Hiremath MC, Srivastava P. Bilateral two rooted mandibular second premolar: Report of an unusual case. *IOSR-JDMS* 2015;14(4):117-120
4. Prakash R, Nandini S, Ballal S, Kumar SN, Kandaswamy D. Two rooted mandibular second premolars: Case report and survey *Indian J Dent Res* 2008;19:70-3.
5. Sheno P, Mute W, Kandhari A, Atara R. Endodontic treatment of mandibular second premolars with occult canals using CBVT. *International journal of dental clinics* 2011;3(4):68-69.
6. Verma M, Malik M. Sunodontia: Endodontic management of two rooted

- mandibular premolar using cone beam computed tomography- A case report. *Endodontology* 2013;25(2): 77-80
7. Chalil NM, Kini S, Jose S, Narayanan A, Salahudeen S, Peedikayil FC. Endodontic treatment of a mandibular second premolar with type IV Weine's root canal; A case report. Hindwani Publishing Corporation 2014.
 8. Papancheva TB. Endodontic management of an uncommon anatomic variation of mandibular second premolar: A case report. *Journal of IMAB* 2015, 21(4) 945-947.
 9. Joy SD, Amit SA, Prabha TS, Pratap SU, Priyanka C. Endodontic management of two rooted mandibular first premolar and diagnosis of other aberrations with the aid of spiral computed tomography. *Journal of advance Researches in biological Sciences* 2013;6 (1):82-85
 10. Kararia N, Chaudhary A, Kararia V. Mandibular left first premolar with two roots: A morphological oddity. *Contemporary clinical Dentistry*. April-June;3(2):234-236.