

Endodontic management of a mandibular second premolar with two roots and four root canals: A Case Report

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ABSTRACT

Mandibular premolars are known for their aberrant anatomy. Root canal morphology can be very complex and requires a careful assessment for endodontic therapy to be successful. CBCT scans are a helpful guide in morphological variations especially in cases of multiple canals as in this case report of mandibular second premolar with two roots and four root canals.

Keywords: mandibular second premolar, variations, cone-beam computed tomography.

INTRODUCTION

Basic knowledge of the root and root canal morphology and their variations are important to achieve successful endodontic treatment(1). Slowey(2) had suggested that the mandibular premolars, often called as “Endodontist’s enigma” are the most difficult teeth to treat endodontically due to their variations in canal anatomy. Variation in root canal morphology was suggested as the most likely reason of endodontic flare-ups and failures. The etiology of these morphological variations can be explained by factors such as age, gender and ethnicity(3). Mandibular second premolars commonly have a single root with a single canal(4) while several studies(1,5,6) reported more than one root and canal. Such complex cases require careful assessment to carry out successful endodontic treatment.

This case report describes the endodontic treatment of a rare case of a mandibular second premolar with two roots and four root canals diagnosed using cone-beam computed tomography (CBCT).

CASE REPORT

A 38 years old male patient reported to the department of conservative dentistry and endodontics with the chief complaint of pain and swelling in the lower left back tooth region. Patient’s medical history was non-contributory. On clinical examination deep distoproximal carious lesion (Fig_ 1) was associated with tooth # 35 and a root stump #36 was present. Tooth #35 (premolar) was tender to percussion and purulent vestibular discharge was present. Vitality test with electric pulp tester and cold showed no response. Radiographic examination (Fig_2) revealed periapical radiolucency and an aberrant anatomy with minimum of two roots and two canals. A diagnosis of chronic periapical abscess was made and endodontic treatment was planned in #35 and extraction of #36. The patient was explained about the treatment and an informed consent was taken from the patient.

Tooth #36 was extracted. Following isolation under rubber dam (Hygienic-Coltene Whaledent) (Fig_3) access cavity was prepared with a round diamond bur (Mani) followed by endo-Z bur (Dentsply). While negotiating with #10 K-file (Mani) multiple canals were revealed. As the number of canals were not getting confirmed on radiographical examination (Fig_ 4), so a CBCT examination was done. Axial views of CBCT examination revealed 2 roots and 3 canals in the middle third region (Fig_5) and 2 roots and 4 canals in apical third region (Fig_6) which makes it total of 2 roots and 4 canals in tooth # 35. After confirmation of canals working length was measured using apex locator (Propexixi :Dentsply Maillefer) and later confirmed with radiographs (Fig_7). Cleaning and shaping of the canals were performed till 20/0.04 Blue flex file system under copious irrigation with 3 % NaOCl and saline in between each

instrument. Triple antibiotic paste was given as intracanal medicament for 2 weeks and temporary dressing was given. The patient was recalled and as the tooth was asymptomatic obturation was planned. The master cones were selected by tug back and radiographic confirmation (Fig_8). After drying the canals with sterile absorbent points the canals were obturated with guttapercha and seal apex sealer (Sybron Endo) by lateral condensation technique. Post obturation radiograph (Fig_9) was taken followed by post endodontic composite restoration. Patient was recalled after 1 year for further evaluation. Clinical and radiographical examination (Fig_10) was done.



Fig_1



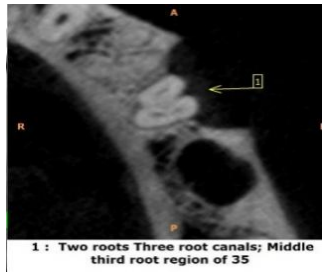
Fig_2



Fig_3



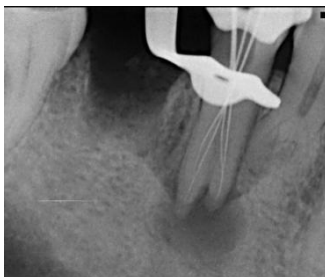
Fig_4



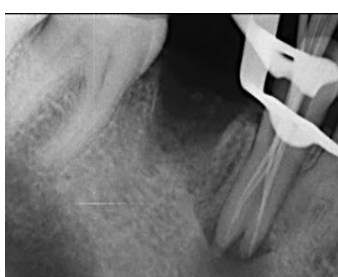
Fig_5



Fig_6



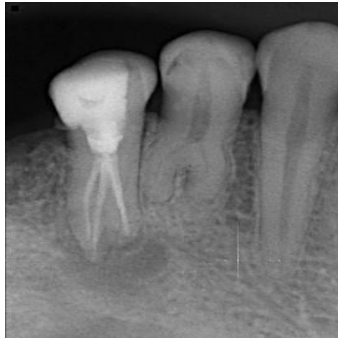
Fig_7



Fig_8



Fig_9



Fig_10

DISCUSSION

This case report illustrates rare case of root canal system of the mandibular second premolar and its management. These teeth can present with extremely complex root and canal system morphology, and if not considered can lead to difficulties in making a diagnosis and also while performing root canal treatment (7,8,9,10).

In 1978, Vertucci reported eight different root canal morphologies of mandibular premolars and found that the frequency of multiple root canals such as three or four canals was extremely rare (9).

Conventional IOPA radiographs produce two-dimensional images of a three-dimensional object resulting in superimposition of images, so they are of a rather limited use in complex root canal anatomy cases. Interpretation based on a two-dimensional radiograph may alert the clinician to the presence of aberrant anatomy but cannot fully confirm the morphological variation of root canals and their interrelations (10,11). Due to this reason, either radiographs are taken at different horizontal angulations or advanced imaging techniques are used. The use of advanced imaging techniques like CBCT has been proven to be beneficial in such cases as they are more accurate in detecting the roots and root canals present as in this case (12,13).

In addition, the access cavities in these teeth are relatively small, hence reducing the visualization of the area. A wider endodontic access is necessary to locate extra root canals (14). While locating the root or the canals, it should be considered in mind that the more apically the root canal divides, the more difficult it is to access and obturate efficiently. Hence, smaller K files are used initially as they can deviate buccally or lingually as the main canal divides. A good tactile sense is important and the files have to be precurved appropriately before negotiating all the canals (11). Also during obturation, canal patency has to be maintained in each canal individually. Failure to recognize the extra canals and obturate them can lead to acute flare-ups during treatment and subsequent failure in endodontic therapy (15). Yadav et al (16) in their study on Indian population reported that most of the mandibular 2nd premolars have a single root in 93.5 % and 6.4% had more than one root, which is much higher in north Indian subpopulation than other ethnic group studies (17-20). The incidence of single canal in mandibular second premolars is 93.2%, two canals is 3.8%, 3 canals is 1.9% and 4 canals is 0.6%.

Matherne et al (21) reported the superiority of computed tomography over other diagnostic techniques in negotiating the additional canals. In the present study, axial images of CBCT were used to confirm the additional roots or canals. Thus CT imaging is not only non-invasive but also highly sensitive method for morphological studies in living samples (22).

CONCLUSION

It was concluded from this case report that even in a tooth with complex root canal morphology, such as a mandibular second premolar with four root canals, conventional nonsurgical endodontic treatment can give successful and predictable results. In such cases, the clinician must carefully interpret the radiographs and must be vigilant on clinical inspection of the floor of the chamber for a successful treatment outcome. Diagnostic aids like CBCT seems to be very useful in cases of multiple canals as in this case because it provides the three-dimensional interpretation which is not possible with conventional radiographic technique.

AUTHOR'S CONTRIBUTION

AUTHOR NAME	CONTRIBUTION
Dr. Ankita	Conception ,design of the work & treatment of patient
Dr. Bonny Paul	Drafting the work & final approval
Dr. Shiv Kumar Mantri	Analysis and interpretation of data
Dr. Kavita Dube	Acquisition & analysis of data
Dr. Farheen Akhtar	Design of the work

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