

ENDODONTIC MANAGEMENT OF MANDIBULAR SECOND PREMOLAR WITH THREE CANALS

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Abstract

Mandibular premolar can present a complex pulp anatomy. Apart from the usual single root and single canal a many other variations may be seen. Hence not only a thorough knowledge of the root canal anatomy but also it's variations are indispensable pre requisites for the success of any endodontic treatment. Good magnification and CBCT scans will definitely be beneficial for successful endodontic treatment. The present case provides evidence that mandibular premolars may have more than one canal.

Keywords: mandibular premolar, aberrant anatomy

Introduction

The human dental pulp takes on various configurations and shapes. A three dimensional determination of the internal structure of the teeth is always a challenge. From the work of Hess and Zurcher to the most recent studies on complexities of the root canal system, it has been proved that root with a graceful tapering canal and a single apical foramen is the exception rather than the rule. Mandibular premolars are teeth known for their aberrant anatomy. Various studies over a period of years have reported these teeth to have more than one canal [1-3]. Hoen and Pink reported 42% incidence of missed roots or canals in teeth requiring retreatment⁴. Hence not only a thorough knowledge of the root canal anatomy but also its variations are important for the success of any endodontic treatment.

According to Slowely, due to variations in canal anatomy, mandibular premolars are the most difficult teeth to treat endodontically. This case report presents a mandibular second premolar with three canals and discusses the significance of treating such cases.

Case Report

A female patient aged 17 years with a non contributory medical history reported to the department of conservative dentistry and endodontics, with severe pain in her mandibular left second premolar. The pain increased on lying down and was relieved by cold water. Clinical examination revealed a deep carious lesion associated with mandibular left second

premolar. There was no pain on percussion and absence of any sinus tract. Vitality test with dry ice (RC Ice, Prime Dental) revealed an early response. Radiograph of the same tooth revealed a large radiolucency in the crown portion with no periapical lesion. It also revealed an unusual pattern of the root suggesting more than one canal. A diagnosis of acute irreversible pulpitis was made and it was decided to carry out endodontic treatment of the same tooth after which an informed consent of the patient was taken. After 2% lignocaine was administered, the concerned area was isolated with rubber dam (Hygenic-Coltene Whaledent). A conventional access cavity was prepared to expose the canal orifice. A close examination revealed two additional orifices, one mesially and buccally and one distally. The access cavity was modified slightly to include the additional orifices. The pulp tissue was removed and the working length of all three canals were measured using apex locator (ROOT ZX: MORITA) and later confirmed using radiographs (Figure 1). The radiograph revealed three canals and two roots. The canal orifices were widened using gates glidden drills (MANI) and later biomechanical preparation was carried out using flexofiles (Densply Maillefer). The canals were irrigated with saline and 5% sodium hypochlorite. Instrumentation was done to a final apical size of 30. The canals were dried with absorbent points and later on the access cavity was sealed with a temporary dressing (Cavit G). The patient was recalled after 4 days and the tooth was found to be asymptomatic. The temporary dressing was removed and the canals were once again irrigated with saline and 5% sodium hypochlorite. The master cones were selected by tug back and radiographic confirmation (Figure 2). After drying the canals with absorbent points, the canals

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were obturated using gutta percha cones and Sealapex (SybronEndo) as sealer by lateral condensation technique. A radiograph was taken to confirm the obturation and the access cavity was sealed with the same temporary dressing (Figure 3). The patient was recalled after 7 days and was found to be asymptomatic. Hence it was decided to go ahead

with the permanent restoration and full coverage crown on the same tooth (Figure 4). After two years the patient decided to undergo orthodontic treatment. A follow-up radiograph was taken (Figure 5) and the patient was found to be asymptomatic.

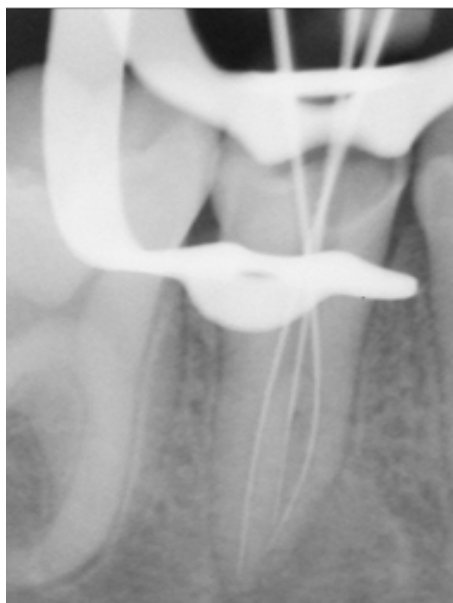


Figure 1. Working length.



Figure 2. Master cone.



Figure 3. Obturation.



Figure 4. Crown.



Figure 5. Follow up.

Discussion

Variations in root canal morphology represent a usual phenomenon. The mandibular premolar is a very good example of complex anatomy. Studies on the root canal morphology of mandibular premolars have reported a fairly high percentage of these teeth to have more than one canal [1-3,5] Zillich and Dowson [6] in 1973 and El Deeb [7] in 1982 reported that the prevalence of three root canals with three distinct orifices that end in separate foramen was 0.4%. De Moor et al. [8] reported the atypical occurrence of three canals in the second premolar of which two were found in the distal half of the furcation area and one orifice was found on the mesial wall of the pulp chamber. Trope et al. [9], Sabala et al. and Amos [1] carried out an in vivo study on mandibular premolars. They reported their results on root number and internal canal morphology by the patients treated rather than by the total number of teeth. They found two or more canals in mandibular second premolar tooth in 5.2%, 4.4% and 2.5% of the patients respectively.

Studies of morphologic difference with respect to ethnicity have also been reported. Trope et al. [9] compared the number of roots and canals in mandibular premolars between African American and Caucasian patients. They reported their results by the number of patients rather than by the total number of teeth. The incidence of two or more roots in mandibular second premolar tooth was 4.8% of the time in African American compared to 1.5% in the white patient group.

Studies on differences on the number of roots and canals on the basis of gender have also been reported. Serman and Hasselgren [10] found gender differences with respect to the number of canals and roots in an analysis of radiographic surveys of 547 patients. More women had multiple roots and/or canals than men (50 women versus 29 men) in mandibular first premolar, however more men exhibited multiple roots and/or canals (29 men versus 15 women) in mandibular second premolar.

Thikamphaa Bertand Sahn Gyoony Kim in his case report of endodontic treatment of a C shaped mandibular second premolar with four root canals and three apical foramina stated that C shaped premolar requires careful instrument strategy due to the difficulty in disinfecting canals owing to the thin root area. Also in the same patient an incidental finding of C shaped root canal morphology of all mandibular premolars on CBCT scan was seen.

In a mandibular second premolar, a single apical foramen may be found in more than nine out of ten cases, however two or more foramina might occur approximately 8.2% of the time. Contrastingly the incidence of two or more foramen in first mandibular premolar is 21.1%.

Seema Yadav in her case report of endodontic management of mandibular premolar with two roots emphasized the importance of magnification for management of branched canal configuration.

Ekim Onur Orhan et al. carried out a study on

endodontic outcomes in mandibular second premolars with complex apical branching. Twenty-six mandibular second premolars with complex apical branching were selected. They concluded that the outcome of endodontic treatment may be influenced by the treatment type.

The present case shows two roots with three different canals and two separate foramina. One should never underestimate the complex anatomy of the root canal morphology of mandibular second premolar. Various hints would guide the clinician to diagnose additional roots or canals. Pre-operative radiographs straight and angled using parallel technique would give clues to the number of roots that exist. Yoshioka et al. mentioned that sudden narrowing of the root canal system on a parallel radiograph indicates canal multiplicity.

Microscopes are widely used to explore the pulp chamber and identify the orifices with their better visualization. Also attention to color changes on the pulpal floor and wall during inspection is helpful in locating orifices. Of late CBCT have been used in endodontics for the evaluation of root canal anatomy. An advantage of computed (CT) scanning over the conventional radiograph is that it allows the operator to visualize multiple sections of the roots and their canals. According to Nance et al. the detection of canals increased significantly by CT scan compared with conventional radiography.

Conclusion

Treatment of multiple canals can be quite challenging to the clinician. The present case provides evidence that mandibular premolars can have more than one canal. This case report emphasizes the need for knowledge of root canal anatomy and instrumentation techniques. CBCT scan and good magnification will definitely aid in treating these complex root canals. Hence, it is important to make every attempt to locate and treat all the root canals for a successful endodontic treatment.

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