Mandibular premolar with two roots and two root canals: a case series

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Abstract

Aim: The aim of present case report is to document the management of rare case of mandibular premolar with two roots and two root canals.

Summary: The present case report documents the successful endodontic management of a mandibular premolar with two roots and two canals with Vertucci's Type I canal configuration which was diagnosed using cone-beam computed tomography (CBCT) as a diagnostic aid. In the present case, the presence of only two roots and two canals was confirmed with radiographs and radiovisiography, so no further attempt was made to search for any other canal, which could cause iatrogenic errors.

Although the incidence of presence of two roots and two canals is not high, it is important to take these variations into consideration during root canal treatment of maxillary molars to prevent iatrogenic errors and to ensure success.

Keywords: mandibular premolar, two roots, two canals

Introduction

For achieving success in root canal treatment, it is important to know about the variations in morphology of tooth and internal anatomy of the root canal system. Vertucci's classification is a standardized method for categorizing known root canal anatomical variations [1]. Variations in root and root canal anatomy can be considered a challenge to endodontic diagnosis and treatment. Mandibular premolars may have complicated root and canal morphology; therefore, their anatomy has been evaluated extensively in various studies [2]. Literature review shows a wide range of variations in the frequency of occurrence of number of roots, number of canals in each root [3].

According to Slowey mandibular premolar is an 'Enigma to Endodontist' According to Zillich 11.7 % - Two canals 0.4 % - Three canals. Incidence 1.8 % in mandibular first premolar and 0.4 % mandibular second premolar However, diagnosis of such anatomical variation is important for successful treatment. Conventional radiographs are routinely used to assess root canal anatomy, but these radiographs are only a two-dimensional image of a three-dimensional object. Cone-beam computed tomography (CBCT) for the pre-operative assessment and diagnosis of unusual root canal morphology helps in the correct endodontic management of complex and challenging cases [4, 5].

The present case report documents the successful endodontic management of a Mandibular First Premolar with Two roots and Two roots canals which was diagnosed during routine radiographic examination.

Case report

A 25-year old and 34-year-old male patient reported to the department with the chief complaint of pain in his right and left mandibular premolar for the past 2 days. Clinical examination revealed food lodgement and caries in mandibular premolar. The tooth was sensitive with early response to temperature variation and electric pulp test and was tender to vertical percussion. Radiographic examination revealed distal radiolucency involving enamel, dentin & pulp. Mesial and distal angulations revealed two different roots & two separate canals at the level of apical & middle one third. (Figure 1). On the basis of clinical and radiographic data a diagnosis of irreversible pulpitis with apical periodontitis was established. Also, pre-operative radiograph, radicular pattern shown the presence of two conical overlapping roots only. To confirm the actual morphology of tooth Radiovisiography was done, that revealed the presence of two roots (one buccal and one lingual) and presence of single canal. (Figure 2)

Under local anesthesia and rubber dam isolation, access cavity was prepared. On deroofing the pulp chamber dentinal map connecting two orifices was seen. One orifice was present in the buccal aspect, and other orifice was present in the lingual aspect (Figure 3). The shape of access cavity was ovoid. The

canals were negotiated with 10 no K file (MANI, JAPAN) and working length was determined with apex locator (Root ZX, J Morita, Japan) that was confirmed radiographically (Figure 4 and 5). Canals were prepared with rotary endodontic instrument (Protaper, Dentsply Switzerland) upto F1 using crown down technique. Intermittent irrigation with 2.5% sodium hypochlorite and 17% EDTA and then final irrigation was done. After drying the canals with paper points, master cone radiograph taken (Figure 6) the canals were obturated with F1 Gutta-percha cones (Dentsply, Maillefer, Switzerland) (Figure 7). The access cavity was permanently restored with resin composite (Figure 8). The patient was asymptomatic during the follow-up period 15 days 1 month and 3 months.

Discussion

For predictable success in endodontic therapy, the knowledge about the morphology of the teeth and possible variations is very important. The main concern for endodontist remains the number of root and root canals. Sometimes root canal treatment fails because the clinician fails to detect all the canals present in the tooth [6, 7]. It is therefore important that, we should understand the variables that have a direct impact on the detection and treatment of root canals. Many studies have evaluated the root canal morphology of the mandibular premolars; because this tooth presents a complex morphology that often renders treatment difficult [8, 9].

The presence of extra roots or canals in mandibular premolars is undoubtedly an endodontic challenge. Slowey has suggested that mandibular first premolar is an "Enigma to endodontists" may present the greatest difficulty of all teeth to perform successful endodontic treatment. Development of roots begins soon after enamel and dentin formation reach the future cemento-enamel junction.

In multi rooted teeth - before root formation, root sheath forms the epithelial diaphragm which undergoes differential growth resulting in division of the root trunk into two, three, or more number of roots.

Depending on the number of divisions, number of roots are formed. Recognition of the aberrant anatomy requires thorough knowledge of the root canal morphology, critical interpretation of the diagnostic aids, appropriate assessment of the pulp chamber floor and operative skills of the clinician. One of the common reasons for having difficulty in identifying the second canal is inadequate access which leaves a shelf of dentin over the second canal. The second canal generally leaves the main canal at a sharp angle nearly at a right angle.

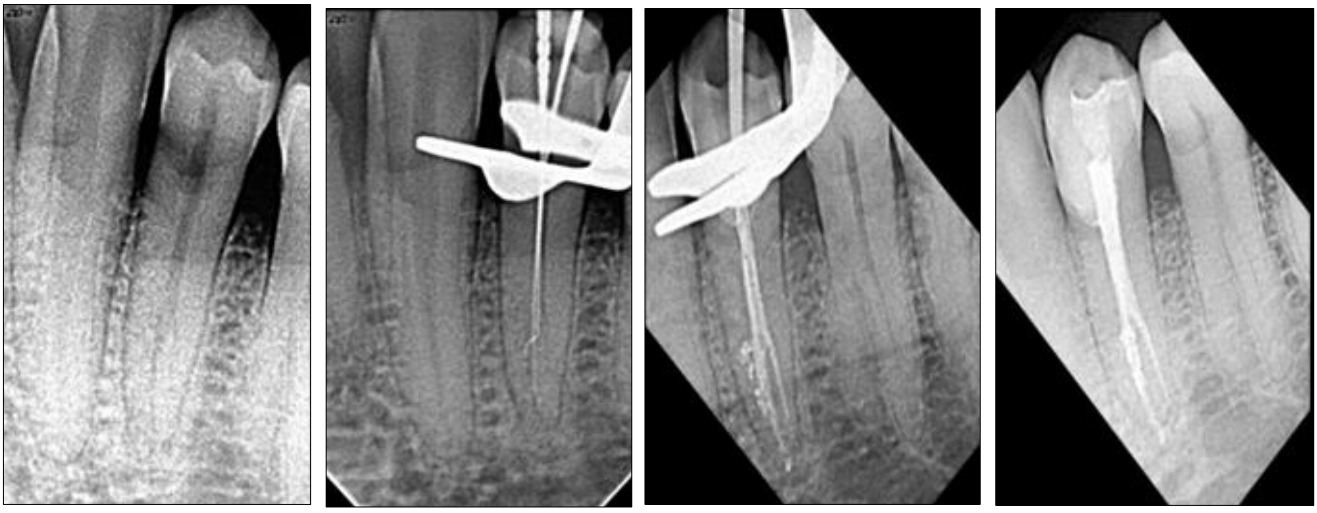
Slowey recommends the visualization of such canal configuration as a lowercase letter 'h' where the main canal would be the straight-line portion of the 'h' and the second canal exists about mid-root at a sharp angle from the straight canal.

Also, an important step needed in such canal was a modification in access which required an adequate flaring of the canal coronal to the bifurcation for unobstructed passage of instruments into the second canal. Careful manual exploration of the bifurcated canal should be done with a procurved 10K file which will provide a tactile sensation as the instrument moves in an eccentric direction on deeper penetration into the canal and also prevents the instrument separation.

Radiographs are essential diagnostic aid before initiating endodontic treatment as it is useful in identifying variations from the normal, helping in diagnosis and treatment planning. Multiple pre-operative radiographs or an additional radiograph from a 20° mesial or distal projection may be helpful in detecting unusual root canal morphology [10]. The presence of additional or less root canals has been reported and discussed by several authors using a variety of study methods, including radiography, magnification, clinical evaluation, dye injection, tooth sectioning, and scanning electron microscopy [11]. Chances for endodontic failures are high if clinician missed to identify the additional root canals.

Conclusion

A thorough knowledge about the root canal anatomy is very important in order to treat it successfully. A practitioner must be able to identify and evaluate such types of rare cases so that it will avoid the further iatrogenic complications. In search of cases in addition to radiographs, tool which offers better understanding of the canal morphology.



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(5) (6) (7) (8)

Fig 1

References

1. Vertucci FJ. Root canal anatomy of the human permanent teeth. Oral Surg Oral Med Oral Pathol, 1984; 58:589-99.
2. Gopikrishna V, Bhargavi N, Kandaswamy D. Endodontic management of a maxillary first molar with a single root and a single canal diagnosed with the aid of spiral CT: A case report. J Endod, 2006; 32:687-91.
3. Ma L, Chen J, Wang H. Root canal treatment in an unusual maxillary first molar diagnosed with the aid of spiral computerized tomography and *in vitro* sectioning: A case report. Oral Surg Oral Med Oral Pathol Oral Radiol Endod, 2009;107:e68-73.
4. Kottoor J, Hemamalathi S, Sudha R, Velmurugan N. Maxillary second molar with 5 roots and 5 canals evaluated using cone beam computerized tomography: A case report. Oral Surg Oral Med Oral Pathol Oral Radiol Endod, 2010; 109:e162-5.
5. La SH, Jung DH, Kim EC, Min KS. Identification of independent middle mesial canal in mandibular first molar using cone-beam computed tomography imaging. J Endod, 2010; 36:542-5.
6. Cantatore G, Berutti E, Castellucci A. "Missed anatomy: frequency and clinical impact," Endodontic Topics, 2006; 15(1):3-31.
7. Bansal P, Nikhil V, Malhotra P, Singh V. Maxillary first molar with two roots and two root canals: A rare case report. Endodontology, 2018; 30(1):84-87.
8. Malagnino V, Gallottini L, Passariello P. Some unusual clinical cases on root anatomy of permanent maxillary molars. J Endod, 1997; 23:127-8.
9. Slowey RR. Root canal anatomy. Road map to successful endodontics. Dent Clin North Am, 1979; 23:555-73.
10. Zillich R, Dowson J. Root canal morphology of mandibular first and second premolars. Oral Surg Oral Med Oral Pathol, 1973; 36:738-44.
11. Vertucci FJ. Root canal morphology of mandibular premolars. J Am Dent Assoc, 1978; 97(1):47-50.
12. Rahimi S, Ghasemi N. Maxillary first molar with two root canals. Sultan Qaboos University Medical Journal, 2013; 13(2):E346-349.
13. Grossman's endodontic practice, 13th ed.
14. Cohen's pathways of pulp, 11th ed.
15. Ingle's textbook of endodontics 6th ed.