

Endodontic Management of Permanent Mandibular First Premolar with Type V Canal Configuration: Case Report

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Abstract

Effective endodontic treatment relies on a strong understanding of root canal anatomy, specific evaluation of the pulp chamber floor, critical interpretation of radiograph, and chemo-mechanical planning accompanied by three-dimensional obturation of root canal system. The risk of extra root /canal should be considered even in teeth with a small incidence of irregular root canal morphology. Mandibular premolars have acquired the distinction for having aberrant anatomy. This article reports and discusses the successful endodontic management of mandibular first premolar with one canal bifurcating into two canals.

Keywords: Mandibular first premolar; Abnormal morphology; Vertucci type-V; Root canal therapy.

Introduction

The main objective of root canal therapy is to achieve proper cleaning and shaping, as well as filling the entire root canal system. Failure to do that may lead to post-treatment disease and complications [1,2]. Mandibular permanent premolars with their pulpal areas having an irregular anatomical variation at a significant rate contribute to difficulties in management planning [3-7]. Many studies show that the average occurrence of one root canal system in mandibular permanent first

premolar ranged from 69.3% to 86% and two canals varied from 14% to 25.5% [8-11]. Mandibular permanent first premolar particularly in the Saudi population had a single root occurrence in 96.4% of teeth, 3.1% with two roots and 0.5% for three roots. Type V canal configuration accounted only for 1.5% of all mandibular first premolar teeth studied [12].

Case Report

A 20-year-old Saudi male patient referred to the Endodontic Clinics in Dental

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Hospital of Riyadh Elm University, Riyadh, Saudi Arabia for management of his mandibular left permanent first premolar tooth (#34) with a chief complaint of pain with biting. The medical history was non-contributory. Clinical Examination, a defected temporary restoration with sensitivity to percussion was noted. The periodontal examination was normal. The tooth was previously root canal initiated. Radiographic evaluation revealed an apical radiolucency confined to the root apices with clear one canal bifurcating in the middle of the root into two canals (figure 1).

Figure 1: Preoperative Radiograph tooth #34.



A diagnosis of previously initiated therapy with symptomatic apical periodontitis based on all investigations was made, with the necessity for root canal treatment and subsequent coronal restoration.

The tooth was anesthetized by using 2% solution of lidocaine containing 1:100,000 epinephrine and the rubber dam was placed. Following the removal of temporary restoration, careful examination of the pulpal floor under a dental operating microscope (Global Dental Microscopes,

Global Surgical Corporation, U.S.A) revealed buccal and lingual orifices. The access cavity outline was modified to establish straight-line access for all root canals. The working length was established using Root ZX II (J. Morita, Tokyo, Japan) with two #10 k files and confirmed radiographically (Figure 2).

Figure 2: Radiographic view after determining the working length.



Instrumentation was achieved by using ProTaper Next files (Dentsply, Maillefer, Ballaigues, Switzerland) to size X2 in bifurcated canals, copious irrigation with 2.5% NaOCl and 17% EDTA was carried out during the instrumentation phase. All canals were dried with sterile paper points and matching gutta-percha master cones were inserted to the full working length and apical tug back was confirmed. The filling phase consisted of vertically compacting the master cones and AH-plus sealer (Dentsply Maillefer, Ballaigues, Switzerland) after searing them at the level of bifurcation, then filling the remaining coronal portion with a thermo-plasticized gutta-percha obturation technique using Obtura III (Max System, Obtura Spartan U.S.A). Finally, the access cavity was sealed with Fuji resin-modified glass ionomer

filling (ChemFil, Dentsply Detrey, Germany) (Figure 3).

Figure 3: Postoperative radiograph.



The patient was referred to the prosthodontic clinic for further treatment (Figure 4).

Figure 4: Post, Core, and Composite.



Discussion

Proper root canal therapy includes locating, cleaning, shaping, and obturating all root canals. Failure to comply with any

of these standards could cause posttreatment infection, pain, and/or complications of the treated tooth [1,14].

Mandibular permanent premolars with their root canal systems can be considered to become the most complicated teeth to treat due to its broad alterations in internal and external root development as well as for the fact that the division of the roots and/or root canals in these teeth usually occurs in the middle and apical thirds making it more difficult to identify these morphological variations [5].

Mandibular permanent first premolar particularly in the Saudi population had a single root occurrence in 96.4% of teeth, 3.1% with two roots, and 0.5% with three roots. Type V canal configuration accounted only for 1.5% of all mandibular first premolar teeth studied [12]. In Saudi Arabian southern region subpopulation, 80% had a single root, 18% had two roots, whereas 2% were three rooted. 72% had a single canal, 26% had two canals, and 2% teeth had three canals. 16% had Type V canal configuration which may show different occurrences in different regions in Saudi Arabia [13].

A careful reading of diagnostic periapical radiographs taken at more than one angle is critical for the identification of teeth anatomical variations [15,16]. Highly developed radiographic approaches such as CBCT are very useful for diagnosing anatomical variations if traditional radiographic techniques give insufficient details and more data is a need [17].

Improving visualization with a dental operating microscope (DOM) can help to better explore the floor of the pulp chamber, find canals orifices, and identify any differences that may not be seen easily due to the restricted access opening [18].

Modification of the access cavity, enlarging the coronal third of canal up to the bifurcation to gain access and enable a proper shaping of the bifurcated canals up to the working length.

Obturation of the root canal space in such cases may need a combination of different techniques and devices to achieve a three-dimensionally fill. In this case, a combination of vertical compaction of the master cones sealed off at the level of bifurcation along with the use of thermo-plasticized gutta-percha technique to backfill the remaining large coronal part of the canal was selected.

Knowledge of basic root canal morphology, as well as its variations, is essential in the treatment of such tooth. If all the canals had not been located, a successful result would not have been achieved in this case

Conclusion

It is essential to use all current diagnostic tools to identify and manage a complicated root canal system.

A thorough reading of angled radiographs, better entry planning, proper inspection of the pulp floor, and a thorough examination of the interior of the tooth ideally under magnification and CBCT are important factors for a good treatment result.

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