

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service Available Online at: www.ijdsir.com

Volume – 2, Issue – 2, March - April - 2019, Page No. : 271 - 275

Endodontic Retreatment of Mandibular First Premolar – An Enigma to Endodontist

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Type of Publication: Case Report

Conflicts of Interest: Nil

Abstract

Mandibular premolars exhibit an unusual anatomical variation at a high rate leading to difficulties in treating these teeth. Anatomic and internal morphology of a root canal system of mandibular premolars have earned the reputation for having aberrant anatomy. The occurrence of two root canals with two separate foramina in mandibular second premolars is rare. A wider knowledge on both clinical and radiographic anatomy especially cone beam computed tomography(CBCT) is absolutely essential for the success of endodontic treatment. These teeth may require skillful and special root canal shaping and obturating techniques. This case report presents an unusual case of a mandibular first premolar with atypical successfully canal pattern that was retreated endodontically.

Key words- mandibular premolar, retreatment, CBCT.

Introduction

Mandibular premolars exhibit a complex and variable root canal morphology and they are one of the most difficult teeth to treat endodontically, often considered as enigma to endodontist.[1] Inadequate removal of pulp tissue and microorganisms from the root canal system from unidentified extra root canals is the major cause of failure of root canal treatment in these teeth. Identification of extra root canals in mandibular premolars requires thorough knowledge of root canal morphology and proper interpretation of radiographs for successful root canal treatment. Vertucci [2] developed a system for root canal anatomy and classified them as Type I to Type VIII. Several reports have shown that the incidence of one root canal system in mandibular first premolar varied from 69.3% to 86% and two canals varied from 10% to 25.5%.[3-7] This article presents retreatment of an unusual case of a mandibular first premolar with Vertucci type IV (2-2) root canal configuration that was successfully managed endodontically by using diagnostic aids like cone beam computed tomography (CBCT), surgical operating microscopes, ultrasonics and modifying the access cavity. Finding such variations is unpredictable and the clinician must assume that any mandibular

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premolar could present with variation, so that any treatment complications related to unusual root canal anatomy can be avoided.

Case Report

A 30-year-old male patient reported with pain in lower right back tooth region of jaw. Patient gave history of pain one month back and had undergone dental treatment for the same. Patient was asymptomatic thereafter but in due course developed intermittent pain and since 1 week had noticed severe pain. The patient's medical history was unremarkable. Clinical examination revealed tenderness to percussion of 44. Preoperative radiograph of the tooth revealed root canal treated 44 with mild periapical rarefaction (Fig 1).



Fig. 1: Pre operative radiograph

CBCT (Carestream, Rochester, New York, USA) was taken to check and confirm the presence of additional canal or root. Axial section of coronal third of root revealed additional missed lingual root canal existing separately from buccal root canal (Fig 2).



Missed lingual root canal

Fig. 2: Cone beam CT image of coronal third section of root showing missed lingual root canal

The diagnosis of missed lingual root canal leading to symptomatic apical periodontitis was made and retreatment was explained to the patient. The tooth was anaesthetized with 2% lidocaine (Lignox A, Warren Indoco) solution and isolated under rubber dam. The access cavity was extended slightly lingually to gain a straight-line access to lingual orifice. The gutta percha in the buccal root canal was retrieved using H files (Mani, Japan) and floor of pulp chamber visualized under surgical operating microscope (Carl Zeiss Surgical, Obenkochen, Germany) (Fig 3). Scouting of the lingual root canal orifice was done using a DG 16 explorer and enlarged using ultrasonic BUC 1 tips (SybronEndo, Orange, California, USA) (Fig 4).



Fig 3: Floor of pulp chamber under magnification



Fig. 4: Scouting at the lingual side exposing the missed lingual orifice.

A Pre curved No 8 Size k file (Dentsply Maillefer, Ballaigues, Switzerland) was used in watch winding motion with minimal vertical pressure along with copious irrigation of 17% EDTA to reach till the apex. Working length was measured using an electronic apex locator (Root ZX II, J Morita, Tustin, California, USA) and

confirmed radiographically which showed buccal and lingual root canals existing in Vertucci type IV root canal configuration (Fig 5). Due to the high prevalence of lateral canals, intercanal communications and apical delta in mandibular premolars, ultrasonic agitation of sodium hypochlorite irrigantwas done to enhance tissue removal and tissue dissolution from uninstrumented parts of root canals.[8] In the next visit master cone radiograph was taken and the buccal and lingual root canals were filled with warm vertical condensation of guttapercha with AH Plus (Dentsply Maillefer Company, USA) as endodontic sealer and coronal access cavity was restored with composite (Fig 6). The follow up was made after 3 months and 6 months where the patient was asymptomatic without any tenderness (Fig 7).



Fig 5: WL determination



Fig. 6:Obturation radiograph



Fig. 7: 6 months follow up radiograph

Discussion

Adequate root canal therapy requires locating, cleaning, shaping, and obturating all root canals. Therefore, failure of any of these principles can lead to post treatment disease, pain, and/or complications of treated tooth.[9,10] Mandibular premolars with their complex root canal systems are considered the most difficult teeth to treat endodontically due to their wide variation of internal and external root morphology and also that the division of the roots and/or root canals in these teeth usually occurs in the middle and apical thirds which makes detection of these anatomical variations difficult.[11] Proper interpretation of conventional periapical radiographs taken in more than one angle is mandatory to detect any morphological variations of teeth.[12,13] Sometimes careful interpretation of the PDL space helps in finding extra roots or canals. In such cases where aberrant root anatomy is evident radiographically and there are chances of finding additional root canals the use of magnification and fiber optic illumination becomes very important in locating and treating these additional root canals. An optimum access cavity is absolutely necessary which was missing in our case treated earlier leading to missed root canal. Small size K files [14-16] are initially used as they get deviated buccally or lingually as the main canal divides at the mid root level and a tactile sense is

important with files precurved appropriately before negotiating the missed root canals. In addition, using advanced diagnostic radiographic techniques such as CBCT is very helpful to detect variations and presence of additional root canal.[17-20] Enhancing visualization by the means of DOM will aid in the proper examination of the floor of the pulp chamber, localizing canals orifices, and detecting these variations which could not be seen easily due to the limited access opening.[21-24] All cases were managed under DOM which enhanced the exploration of the floor of the pulp chamber and detection of canal orifices.

Conclusion

Coronal flaring and using pre bent hand files help in the location of the additional canals. The possibility of existence of two or more canals in the mandibular premolars should be considered while performing endodontic therapy. Radiographs taken at different angulations help to identify and treat extra roots and root canals. Straight line access cavity and magnification improves the visualisation of whole pulp chamber in identifying accurate division level of roots and helps in avoiding the perforation of bifurcation in search of extra canals.

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