ENDODONTIC TREATMENT OF A MANDIBULAR SECOND PREMOLAR WITH VERTUCCI'S TYPE VIII CANAL CONFIGURATION: REPORT OF A CASE

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Abstract:

Location, thorough debridement and disinfection and three-dimensional obturation of all the canals in the root of a diseased tooth normally ensure success of the endodontic therapy. Presented is the case of nonsurgical endodontic therapy of mandibular second premolar with aberrant root canal morphology.

Keywords: Mandibular second premolar, aberrant root canal morphology, endodontic success.

Introduction:

Thorough knowledge of root canal system makes root canal treatment more predictable. Understanding the presence of atypical root canal morphology contributes to success and overall prognosis of the endodontically treated tooth.

The unusual root canal anatomy has been observed in each and every tooth in relation to the number of roots, root canals, isthmi and apical foramina. Mandibular first premolar has been reported to be enigma to endodontists¹ because of its variations in root canal system, so is being mandibular second premolar.

Literature reports that the incidence of one root canal system in mandibular first premolar varied from 69.3% to 86% and two canals varied from 14% to 25.5%. Vertucci and Zillich et al. reported the occurrence of three canals to be 0.5% and 0.4%, respectively.^{2,3,4,5}

Vertucci et al. reported that the mandibular second premolar is having an incidence of one root canal at the apex in 97.5% and two canals in 2.5% of the teeth

studied.⁶ While the incidence of three root canals reported to range from 0% to 0.4%.^{4,5}

Tzanetakis et al reported the incidence of two or more canals in the mandibular second premolar that ranged from 1.2 to 34%.⁷

Lin Z et al observed that 5.3% of mandibular second premolars examined had two canals with two foramen and 44% had two canals with one foramen and only 0.4-5% showed three canal and three foramen configuration.⁸

Usually, mandibular second premolar has two pulp horns, buccal higher than lingual and one canal. In spite of the scarce prevalence of more than one canal, the clinician should be aware of these variations and their clinical and radiographic anatomy.

The present article elaborates non-surgical root canal therapy for an unusual occurrence of three canals in second mandibular premolar.

Case Report:

An 18-year-old female patient with non-contributory medical history reported to the Department of

Conservative Dentistry and Endodontics, with the chief complaint of pain in the region of right lower posterior teeth since a month. The pain was intermittent in nature that intensified by thermal stimuli and on mastication. A careful clinical examination revealed carious mandibular right second premolar and first molar tooth. Both 45 and 46 were not mobile and periodontal probing was within physiological limits. Electric pulp testing and cold test revealed a lingering response for both, and both were tender on percussion.

Radiographic examination (Figure 1 a) revealed proximal radiolucencies approaching pulp with 45 and 46. Both had three roots, and periapical radiolucency. The teeth were diagnosed as symptomatic apical periodontitis.

Nonsurgical endodontic treatment was planned for both 45 and 46.

After the administration of the local anesthetic agent (2% lidocaine with 1: 100,000 epinephrine), under rubber dam isolation both 45 and 46 were accessed.

Three root canal orifices were found in 45. Two separate buccal orifices and one lingual were identified. The access cavity outline was modified into triangular shape to establish straight-line access.

Working length was established with the help of an apex locator (Root ZX, J. Morita Inc., USA) and confirmed by a radiograph (Figure 1 b). The canals were cleaned and shaped with hand K-files (Mani, Tochigi, Japan) and Neoendoflex file 0.04 rotary system (Neoendo, Orikam, India) in a crown down manner up to final canal size of 30 in lingual canal and 25 in mesiobuccal and distobuccal canals. The canals were irrigated with 3% sodium hypochlorite and 17% EDTA. The gutta-percha cone fit was checked in all the root canals using radiograph (Figure 1 c). After final rinse with chlorhexidine, canals were dried and obturated with gutta-percha and sealapex (Kerr, Romulus, MI) sealer using the lateral compaction method (Figure 1 d).

Root canal treatment of 46 was also completed simultaneously.

Figure 1 a: Diagnostic radiograph

Figure 1 b: Working length radiograph

Figure 1 c: Master cone radiograph

Figure 1 d: Obturation radiograph

Discussion:

Successful nonsurgical root canal therapy requires location, cleaning and shaping, obturating of all root canals in a tooth. Failure of any of this step may lead to pain, post-treatment disease and failure of endodontic treatment.

Exploration of all the canals present in the root canal system is the first and very important step to the long term clinical success of the root canal treatment. Hoen and Pink⁹ found a 42% incidence of missed roots or canals in their analysis of teeth requiring retreatment.

Preoperative radiographs taken at different angulations help in determination of the presence of additional canals. Radiographically, fast break appearance of root canal suggests division of the canal in two or more.¹¹ Dentin map analysis on the floor of the pulp chamber also helps in the location of all the root canals.¹²

Mandibular premolars are considered the most difficult teeth to treat endodontically due to wide variation in their external and internal anatomy. Also 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.¹⁰

Mandibular premolars are lingually inclined which tends to direct files buccally, making location of lingual canal more difficult. Therefore, the clinician needs to extend lingual wall of access cavity further lingually.¹³ Tactile sensitivity, preflaring of the root cervical portion and observation of the direction of instrument during its insertion in the root canal are of utmost importance.¹⁴

In this case, careful radiographic examination revealed the presence of three roots and three root canals.

Dental map was seen after access opening which helped in location of all the canals.

Great attention was paid to the direction of files which made further root canal procedure easier.

Biomechanical preparation was done in crown down manner to have better control over apical instrumentation, less zipping, decrease debris extrusion from apex and decreased post operative pain.

All the three canals were obturated with lateral condensation technique and coronal restoration, which prevents chances of endodontic failure.

Conclusion:

The clinician must have a thorough knowledge of the number, incidence, location and the variability of the canal systems for increasing the chances to find these additional canals. It is imperative for the clinician to be aware of these additional canals as overlooking them will result in failure.

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