

ENDODONTIC TREATMENT OF A MANDIBULAR SECOND PREMOLAR WITH TYPE IV VERTUCCI ROOT CANAL CONFIGURATION: A CASE REPORT

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ABSTRACT:

Present a case of mandibular second premolar with an atypical canal pattern. Thorough knowledge of both basic root and root canal morphology as well as, pulp chamber floor, and radiographs interpretation are essential for successful non surgical root canal treatment. Due to variable and complex root canal morphology of mandibular second premolars, they are one of the most difficult cases to treat endodontically. Vertucci in his series of studies conducted on extracted mandibular premolar teeth reported 2.5% incidence of a second canal¹. This article reports and discusses the successful treatment of mandibular second premolar with two canals.

Keywords: Anatomical variations, mandibular premolars, multiple roots, narrowing of canal space, anatomical landmarks.

INTRODUCTION:

Successful and predictable endodontic therapy depends on the complete cleaning and shaping of the entire root canal system to create a fluid tight seal. To create this, a thorough knowledge of the of the root canal morphology and pulp chamber anatomy is a prerequisite. The root canal morphology of teeth is often extremely complex and highly variable.^[2,3,4,] Factors contribute to the variations found in the root canal morphology of permanent teeth like ethnic

background, age, and gender of the population studied. The most difficult teeth to treat endodontically is mandibular second premolars which exhibit a high frequency of complex and variable root canal morphology.^[5,6,7] Over the years, numerous root canal patterns have been identified. In 1969, Weine *et al.*^[8] provided the first clinical classification of more than one canal system in a single root using the mesiobuccal root of maxillary first molar as the specimen type. Pineda

and Kuttler.^[9] and Vertucci.^[1] further developed a system for canal anatomy classification for teeth and classified them as Type I through Type V. This article reports an unusual case of a mandibular second premolar with Type IV root canal pattern that was successfully treated with endodontic therapy.

CASE DETAIL:

A 23-year-old female patient was referred our department of Conservative Dentistry and Endodontics (postgraduate department) with the chief complaint of pain in lower right back tooth. Patient's medical history was non-contributory. Clinical examination revealed a carious lesion on the mesio-occlusal surface of the crown of right mandibular second premolar. The tooth was tender on percussion & pre-operative radiograph of the tooth revealed a mesio-occlusal carious lesion with apical periodontitis. The most interesting radiographic finding was the pattern of the canal system. It resembled Vertucci's type IV canal system, that is, there was a large orifice that divided into two canals with separate apical foramen. Based on the clinical and radiographic findings, a diagnosis of irreversible pulpitis with apical periodontitis was made and it was decided to carry out multiple visit endodontic therapy with the tooth. The treatment plan was explained to the patient and after obtaining her consent, the tooth was anaesthetized

with 2% lidocaine (Lignox A, Warren Indoco) solution by way of inferior alveolar nerve block of the right side. Subsequently, the tooth was isolated with rubber dam. Endodontic access cavity was accessed with Endo Access burs (Dentsply, Maillefer) in a high speed airtorator handpiece. After extirpation of the pulpal tissue, a working length determination radiograph was obtained with K files (Dentsply, Maillefer) placed in the root canals. Following the working length determination, the root canals were prepared with a crown down technique with copious irrigation using 5% sodium hypochlorite solution. After completion of cleaning and shaping with Sx, S1, S2, F1 Protaper file (Dentsply, Maillefer), the root canal system was obturated with single gutta percha cones using a resin-based sealer (AH plus, Dentsply). A post-obturation radiograph was obtained and the coronal access cavity was restored with miracle GIC (GC).

DISCUSSION:

The morphology of mandibular premolars can be highly variable or complex and it is often a challenging work to carry out successful root canal treatment. Therefore, the necessary step in root canal therapy is the identification of internal morphology of canal system as precisely as possible.^[10] For successful retreatment, high-quality pre-operative radiographs should be obtained at different angulations and carefully evaluated to detect the presence of extra root

canal.^[11,12] The prevalence of two root canals in mandibular premolars have been reported to be 4.7% by Zaatar, et al.^[13] In such cases, angled radiographic view will reveal the true dimensions of the root canal. As we know radiographs are a two-dimensional representation of three-dimensional objects, at times it is difficult to clearly and completely determine the root canal configuration.^[10] In such cases, advanced imaging techniques like cone-beam computed tomography are very helpful. Using this technique, images can be obtained in almost any plane of section in the entire three dimensions. Even in the presence of such technology, the careful tactile exploration of the root canal system with hand files is imperative. In this case, although the root canal configuration was variable, it was clearly determined on the preoperative radiograph. After proper identification, biomechanical preparation of the root canals should be carried out followed by complete obturation of all the canals to achieve a predictable long-term endodontic prognosis.^[10]

CONCLUSION:

The clinician should be skilled enough to identify the presence of unusual numbers of roots and their morphology. Knowledge of root canal anatomy and its variations, proper radiographic interpretation, close clinical inspection of the floor of the chamber and proper access opening

are essential for a successful treatment outcome.

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FIGURES:



Figure 1: Pre-operative IOPA

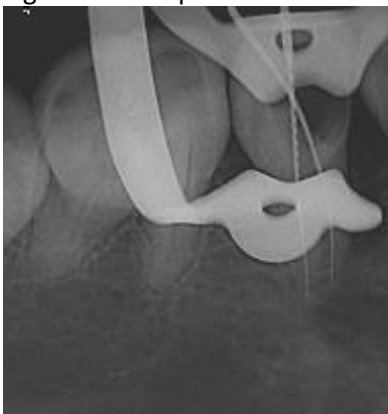


Figure 2: Working length IOPA



Figure 3: Master cone IOPA



Figure 4: Post-operative IOPA