



NON SURGICAL ENDOTHERAPY OF A MANDIBULAR SECOND PREMOLAR WITH ATYPICAL CANAL PATTERN

Dental Science

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ABSTRACT

Successful and predictable endodontic therapy depends on the complete cleaning and shaping of the entire root canal system followed by a three-dimensional obturation to create a fluid tight seal. To achieve 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. Mandibular premolars exhibit a high frequency of complex and variable root canal morphology and for this reason they are one of the most difficult teeth to treat endodontically. Clinicians undertaking treatment of such complex anatomy need to have patience as prolonged and multiple appointments are a certainty. This report presents an unusual case of a mandibular second premolar with atypical canal anatomy that was successfully treated with endodontic therapy.

KEYWORDS

Mandibular premolar, Atypical anatomy, Endotherapy

INTRODUCTION

The importance of an accurate diagnosis of the morphology of the root canal system is a prerequisite for successful root canal treatment and has been emphasized throughout the literature.¹

The hard tissue repository of the human dental pulp takes on numerous configurations and shapes.² A clear understanding of the anatomy of human teeth is an essential prerequisite to all dental procedures especially so in the case of root canal treatment which deals with management of the tooth's internal anatomy.³ A thorough knowledge of tooth morphology, careful interpretation of angled radiographs, proper access preparation and a detailed exploration of the interior of the tooth are essential prerequisites for a successful treatment outcome.² Magnification and illumination are aids that must be utilized to achieve this goal. A thorough understanding of the complexity of the root canal system is essential for understanding the principles and problems of shaping and cleaning, for determining the apical limits and dimensions of canal preparations, and for performing successful microsurgical procedures.²

CASE REPORT

A 24-year-old male patient reported to the department of Conservative Dentistry and Endodontics, Rajasthan Dental College and Hospital, Jaipur with the chief complaint of "pain in lower right back tooth."

Patient was referred from a local dentist as he was unable to give relief to patient even after treating mandibular molar of the same side and initiating endotherapy of mandibular second premolar. He was facing difficulty in negotiating the canals of mandibular second premolar.

On presentation to the endodontic specialist the tooth was tender on percussion. On the radiograph, most interesting finding was the unique pattern of the canal system i.e., a root canal could be seen with at least two branches (Fig. 1a). There was no evidence of periapical radiolucency. Patient's medical history was non-contributory.

It resembled the Sert and Bayirli's type XVII (1-3-1) canal system, that is, there was a single large canal orifice that divided into three canals and all the three root canals again joined in the apical one-third to form a single canal with a single apical foramen.

Based on the clinical and radiographic findings, it was diagnosed as tooth having irreversible pulpitis with apical periodontitis and decided to carry out multiple visit endodontic therapy with the tooth. The treatment plan was explained to the patient and after that his consent was taken for the treatment.

The tooth was anaesthetized using 2% lidocaine with 1:80 000 Adrenaline (Lignox A, Warren Indoco) solution by way of inferior alveolar nerve block of the right side. Subsequently, the tooth was isolated under rubber dam. Endodontic access cavity was modified with round diamond burs in a high speed airtor handpiece. After extirpation of the pulpal tissue, a working length determination radiograph was obtained for all the three root canals with K files (Dentsply, Maillefer) placed in the root canals (Fig. 1b)

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, the root canal system was obturated with cold lateral compaction of gutta percha cones using a zinc oxide based sealer (Fig. 1c and 1d) Interestingly, the patient's contralateral tooth, left mandibular premolar, also exhibited atypical canal patterns (Fig. 2a and 2d.)

DISCUSSION

A wide morphological divergence of the root canal system is known to exist. The varying number of root canals in different teeth, their anatomy and interconnections been studied and reported in several studies.⁴

Vertucci, Seelig, and Gillis showed that the second premolar had only one root canal at the apex in 97.5% of the teeth studied and two canals in only 2.5%, three root canals were scarce.⁵ The frequency of three root canals in mandibular second premolars according to other authors appeared to range from 0 to 0.4%, which confirms these findings as being scarce.⁶ There also appear to be racial differences. In a multiracial population it was found that the number of mandibular premolars with more than one root canal was significantly higher in Negroids (32.8%) than in Caucasians (13.7%).⁷ This finding was in agreement with the study of Amos⁸, who found mandibular premolars with two canals in 16% of Caucasians and in 21.6% of Negroids. The frequency of premolars with two and three root canals also appears to be higher in an Asian population where the incidence was found to be 34% for mandibular premolars with two separate canals and 2% for mandibular premolars with three root canals in a Chinese population.⁹ In addition a 13% incidence for two separate root canals in mandibular premolars was noted in a Japanese population. The anatomic make-up of the root canal system of a mandibular second premolar with three root canals, however, only becomes clear from reports on endodontic treatment.

The presence of root canal aberrations are frequently recognized

subsequent to root canal therapy when an additional or branching canal appears to be (partly) filled with root canal sealer. Limited intracanal visualization with the naked eye within the field of endodontics may be one of the reasons for endodontic failure. The use of the dental operating microscope and fiberoptic endoscope allows to better view canal morphology as well as canal preparations.¹⁰

The present case report describes root canal treatment in a mandibular second premolar of a patient, which was referred after initial root canal negotiation and midtreatment.

The variability of the root canal system represents a challenge to both endodontic diagnosis and treatment. The identification of the internal morphology as precisely as possible is the primary step in root canal treatment. The only way to detect root canal morphology and anatomy is the use of proper preoperative radiographs. To enhance interpretation and alter the X-ray interpretation is to vary either the vertical or the horizontal cone angulation.¹⁰ Moreover, the sudden change in radiographic density of the root canal space usually indicates an additional canal. If a radiograph shows a sudden narrowing of even a disappearing pulp space, the canal diverges at that point into two parts that may either remain separate or merge before reaching the apex. The observation of anatomical landmarks in the pulp chamber floor may also help to identify or to give an indication of supplementary root canals or root canal aberrations. Good illumination and magnification does make treatment easier. Initial mechanical preparation, may eliminate or alter anatomic landmarks, especially in referred cases

Although, there are new imaging techniques available, like cone beam computed tomography which are advantageous over conventional radiographic methods, we did not go for CBCT in present case as three canals were clearly visible on conventional radiograph only.

Figure legends:

fig. 1 a. preoperative radiograph. Note the atypical canal pattern

fig 1b. all canals negotiated and WL determined

fig 1c. master cone radiograph

fig 1d. post obturation radiograph.

Fig 2a. radiograph after coronal restoration

Fig. 2b radiograph of contralateral teeth. Note the same atypical canal pattern.

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