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RESEARCH ARTICLE

ENDODONTIC ENIGMA: MANAGEMENT OF MANDIBULAR SECOND PREMOLAR WITH 3 ROOT CANALS

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ABSTRACT

In endodontic practice root canal morphology can be unpredictable and requires cautious assessment of canal anatomy. Mandibular premolars are often considered to be ENIGMA to dental clinicians. This is because of variations in root canal anatomy. Although most of the times mandibular premolars have one root with one canal morphology. Mandibular premolar can present a complex pulp anatomy. The present case shows the management of mandibular 2nd premolar with one root and 3 canals.

Key words:

Premolar, 3 Canals, Anatomic Variation.

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INTRODUCTION

In routine practice, endodontic treatment is needed for conditions such as trauma, severe pain due to attrition, pulp exposure due to caries, periapical infection etc. Lack of knowledge of root canal morphology is a consequential reason for failure in cleaning, shaping and obturation of the root canal system¹. The most important causes for endodontic failure are improper clinical assessment of canals, incomplete instrumentation followed by incorrect obturation of the root canal space. This may be due to preassumption of canals in a particular tooth. Vertucci's classification of root canal configurations was an eye opener for endodontists. Vertucci in his study reported that the second premolars had only one root canal at the apex in 97.5% of the teeth under study and two canals were only found in 2.5% of cases; the incidence of three root canals was extremely rare². In a study performed by Slowey, reported that mandibular premolars as the "endodontist's enigma", may present the utmost difficulty of all teeth to execute successful endodontic treatment³. A thorough knowledge of the basic root canal anatomy and its possible variations is essential for achieving successful nonsurgical endodontic treatment³. According to Inele, mandibular second premolars have

Intraoral periapical radiographs have always been considered the backbone to the diagnosis but they still have its own limitations. To achieve endodontic success, the entire root canal system must be assessed, debrided, disinfected, and obturated. This article represents a rare case of mandibular 2nd premolar with one root and 3 canals.

CASE REPORT

A 30 year old male patient with chief complaint of intermittent pain in lower left back tooth region of jaw reported to the Department of Conservative Dentistry and Endodontics. On clinical examination severe attrition of 35 was noted. There was no pain on percussion. Patient gave history of intermittent pain since 3 months. Intraoral radiograph showed wearing of enamel, dentin and exposure till pulp. As patient also wants missing tooth to be replaced, intentional root canal treatment of 35 was decided as treatment plan.

TREATMENT PLAN AND PROCEDURE: Before starting treatment Inferior alveolar nerve block was given (lignocaine with 2% adrenaline). Isolation of tooth was done using rubber dam. Endoaccess bur was used for access opening of tooth. DG 16 was used to locate the orifices of root canal. Firstly 2 orifices (mesial and distal) were located which is not common, so for confirmation of



Preoperative radiograph 35



Working length determination



Master Cone



On radiograph, one more root canal was observed. Then pulp chamber modification was done. On close examination of floor of pulp chamber additional orifice was located (lingual). The access cavity was then modified for easy access to all canal orifices using Endo Z bur. 8 number hand files were placed into these orifices and radiograph was taken to exclude the fear of perforation. The radiograph revealed 1 root with 3 canals. Working length was determined using apex locator and radiographs. Pulp tissue was removed, orifices were enlarged with orifice opener files. Cleaning and shaping was done using hand NiTi and rotary files. Hand filing was done till 20 k NiTi files. After that rotary pathfinder was used followed by preparation till 20 No 4% rotary file. The canals were irrigated in between with saline and 5.25% sodium hypochlorite solution. The canals were dried using paper points. The master cone gutta percha (20 No 4%) was placed and conformation was done using radiograph. The canals were obturated with gutta percha and sealmax as root sealing material. Excess gutta percha was removed and condensed. then the temporary dressing was placed. Patient was recalled after 7 days and final postobturation restoration was done.

DISCUSSION

Endodontic treatment in second mandibular premolar with a different morphology is a challenging task. The internal morphology must be identified precisely to achieve successful treatment⁴. Morphology of the root and root canals of mandibular second premolar is usually complex and variable. Mandibular second premolars with two root canals have been reported on several occasions, but the occurrence of three separate canals in one root is very rare⁶. The incidence of their having two or three canals was reported to vary from 0 to 34.3%. (Zillich & Dowasn, 1973; Vertucci, 1978; Yang et al, 1988)⁵. An incidence of 0.4% of mandibular second premolar with three root canals is also reported^{3,6}. Zillich and Dowson reported 11.7% occurrence of two canals and 0.4% of three root canals. There are extreme variations in root canal morphology of mandibular premolar teeth compared with the standard description of one root and one canal system and hence it poses an endodontic challenge to the clinician⁷. There have been reports of flare-ups in mandibular endodontically treated premolars with associated paresthesia of the inferior alveolar and mental nerves because of missed root canals⁷. Gulabivala et al. concluded that the broad and flat roots are much more likely to contain multiple canals and intercanal ramifications. In those cases, to obtain predictable results, high-quality preoperative intraoral radiographs should be available at different horizontal angulations and carefully evaluated to detect the presence of extra root canals². Inadequate debridement, incomplete obturation of the root canals were found to be the most common cause of root canal therapy failures (Grossman, 1972). If a canal is originally cleaned but incompletely filled in such cases tissue fluids from the adjacent area could cause chronic inflammatory response in the periradicular tissue (Seltzer et al, 1967)⁵. The following points from diagnostic information and techniques can be helpful in detecting additional root and canal(s). A second radiograph at an angle of 15-20 degrees from either mesial or distal from the horizontal long axis of the root is important to accurately diagnose the number of roots and canals in premolar teeth. On the parallel radiograph sudden narrowing of root canal system suggests canal system multiplicity⁶. By using x-rays from different angulations, efficient explorers, wider access openings, adequate illumination and if possible image magnification may help in detection of extra canals. Proper precautions should be taken during root canal therapy of these teeth and hence instrumentation of these canals was carried out using nickel titanium files, due to their flexibility and at the same time lesser risks of ledge formation and perforations⁶. Microscopes are widely used to explore the pulp chamber and identify the orifices with their better visualization. Also attention to color changes on the pulpal floor and wall during inspection is helpful in locating orifices. Also CBCT have been used in endodontics for the evaluation of different root canal anatomy⁸. Successful endodontic treatment can be achievable with accurate diagnosis & treatment planning, along with having the knowledge of root canal morphology and its frequent variations⁹.

So it is important to make every attempt to locate and treat all the root canals for a successful endodontic treatment⁸.

CONCLUSION

Before starting any endodontic procedure, variations in root canal morphology must be considered. An extra root canal may be detected by careful clinical and radiographic investigations. For successful root canal therapy thorough clinical inspection of the floor of the chamber, proper modification of the access opening, the position and angulation of the file in the canal is necessary. It is important to make every attempt to locate, clean and obturate all the root canals for a successful endodontic treatment.

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