

DIAGNOSIS AND ENDODONTIC TREATMENT IN A MANDIBULAR FIRST PREMOLAR WITH TWO CANALS: CASE REPORT

DIAGNÓSTICO E TRATAMENTO ENDODÔNTICO EM PRIMEIRO PRÉ-MOLAR INFERIOR COM DOIS CONDUTOS RADICULARES: RELATO DE CASO

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ABSTRACT

Objective: The objective of this article was to describe the diagnosis and the endodontic treatment of a mandibular first premolar with two root canals. **Case report:** A 67-year-old female patient presented to the dental clinic referring pain in the right mandibular first premolar. The patient reported induced pain and the sensation of "grown tooth". Clinical examination revealed a marked degree of dental abrasion associated with a slight swelling in the periapical region and positive percussion and cold tests. The radiographic examination revealed an apical radiolucency.

A pulpal diagnosis of necrotic pulp and chronic periradicular periodontitis were made. After access cavity, the canals were prepared using K-files, Gates-Glidden drills and 2.5% sodium hypochlorite. Gutta-percha cones and AH-Plus sealer were used during obturation with the lateral condensation technique. **Conclusion:** After a period of 23 months of follow-up, clinical and radiographic examinations revealed total regression of the lesion.

KEYWORDS: Endodontics. Morphological variations. Mandibular first premolar. Two root canals.

INTRODUCTION

The variability of the root canal system of mandibular first premolars represents a continuous challenge in endodontics¹. Its morphology, which may be composed of multiple foramina, deltas, fins, isthmus, additional canals, or even different shapes, can compromise the cleaning and shaping procedures if not properly identified and treated². Untreated additional canals and roots are among the main causes of failure in endodontics³.

Although the incidence of variations in the root canal system can occur in every tooth, it has shown to be superior in mandibular first premolars^{4,5}. In 1973, Zillich and Dowson⁶ reported the presence of a second canal in 23.1% of the mandibular first premolars, whereas 12.1% of the mandibular second premolars presented modifications. Vertucci⁷ (1978), described that only 2.3% of the premolars have two roots with two canals. However, in mandibular first premolars this variation occurs in 25% of cases. Likewise, for Baisden *et al.*⁸ (1992), while 76% of mandibular first premolars have a single root canal, 24% have two or more. Yet, Cleghorn *et al.*⁹ (2007), in a literature review including 16 studies and a total of 4.733 teeth, concluded that only 75.8% of mandibular first premolars had a single root canal. They also indicated that genetic and racial influences may result in variability within a population.

These unique anatomical features for this group of teeth have also been described in different racial groups. Trope *et al.*¹⁰, (1986) through a radiographic study, found that Afro-descendants had a higher incidence (32.8%) of two root canals in mandibular first premolars when compared to the white population (13.7%). In addition, Sert and Bayirli¹¹ (2004) showed that barely 62% of the

mandibular first premolars presented a single canal in the Turkish population. In the Chinese population, only 54% of the mandibular first premolars presented a single canal, while 22% of the canals contained two canals and the other 24% were C-shaped or circumferential canals¹².

The high incidence of multiple canals in the mandibular first premolar may explain the high failure rates of endodontic treatment in this group of teeth. In 1995, a study from the University of Washington found that mandibular first premolar showed the highest failure rates (11.45%) among all evaluated teeth for endodontic treatment¹³. The most likely reason for this conclusion is the occurrence of numerous variations in the morphology of the root canal system of these teeth⁹. Because of this large variability, mandibular first premolar teeth are considered one of the most difficult teeth to treat³.

The objective of this case report was to describe the root canal treatment of a mandibular first premolar with two root canals after a postoperative follow-up of 23 months.

CASE REPORT

Patient D.G.N., 67-year-old, female, presented to the Dental School of the Federal University of Santa Maria (UFSM) referring pain in the right mandibular first premolar and seeking full prosthetic rehabilitation. The patient reported induced pain and the sensation of "grown tooth" and declared no other problems with her health.

Clinical examination revealed a marked degree of dental abrasion associated with sensitivity to percussion and slight

swelling in the periapical region. The radiographic examination revealed an apical radiolucency suggestive of chronic periapical abscess (Figure 1A). In addition, the presence of a second root canal was suspected due to a sudden change in the radiographic density in the root canal space. After the pulp vitality test (Endo Ice, Maquira, Maringá, PR, Brazil) a pulpal diagnosis of necrotic pulp and chronic periradicular periodontitis were made.

The treatment planning was done with patient's consent and included non-surgical endodontic treatment of the root canal systems. First, the patient received local anesthesia (2% lidocaine with 1: 100.000 epinephrine - Alphacaine, DFL, Rio de Janeiro, RJ, Brazil). Then, the tooth was isolated with rubber dam and the access cavity prepared using a round diamond bur #1014 (Kg Sorensen, Barueri, SP, Brazil) mounted in a water-cooled high-speed handpiece. When the pulp chamber was reached, a safe-end tapered bur (Endo-Z; Dentsply/Maillefer, Ballaigues, Switzerland) was used to remove the roof and the lateral walls. The right divergence of the cavity walls was given by the correct position of the bur parallel to the long axis of the tooth. Neutralization was performed with K-files (15-40) (Dentsply/Maillefer, Ballaigues, Switzerland) and 2.5% sodium hypochlorite (Asfer, São Caetano do Sul, SP, Brazil).

The presence of two canals was confirmed during the x-ray measurement (Figure 1B). The step-back technique using K-files and Gates-Glidden drills #3, #2 (Dentsply/Maillefer, Ballaigues, Switzerland) was chosen to prepare the root canals.

Sodium hypochlorite (2.5%) was used for irrigation during all the steps. Due to the presence of a chronic periapical abscess, calcium hydroxide was applied as intracanal medication (Callen®, SSWhite, Rio de Janeiro, RJ, Brazil) and the cavity was sealed with a temporary restorative material (Coltosol® - Vigodent, Rio de Janeiro, RJ, Brazil).

Two weeks later, the intracanal medication was removed using K-files and sodium hypochlorite (2.5%). The canals were dried with sterile absorbent paper points and 17% EDTA (Bio-dinâmica, Ibiporã, PR, Brazil) was applied to remove the smear layer.

The main gutta-percha (Dentsply/Maillefer, Ballaigues, Switzerland) cones were selected through the visual, tactile and radiographic methods (Figure 1C). The root canals were then filled with the lateral condensation technique through the association of gutta-percha cones and endodontic sealer (AH Plus, Dentsply/Maillefer, Ballaigues, Switzerland). After performing the final radiography (Figure 1D), the tooth was sealed with a temporary restorative material (VidroFil-R, DFL, Rio de Janeiro, RJ, Brazil), and the patient was referred to perform the final restoration in the operative dentistry clinic.

The patient returned for the postoperative control after a period of 23 months. Clinical and radiographic examinations were performed and total regression of the lesion was observed (Figure 1E).

DISCUSSION

The endodontic treatment of mandibular first premolar may be hampered by many circumstances. The number of roots, number and direction of the canals, and different configurations of the pulp cavity are between the most prevalent in the dental routine¹⁴.

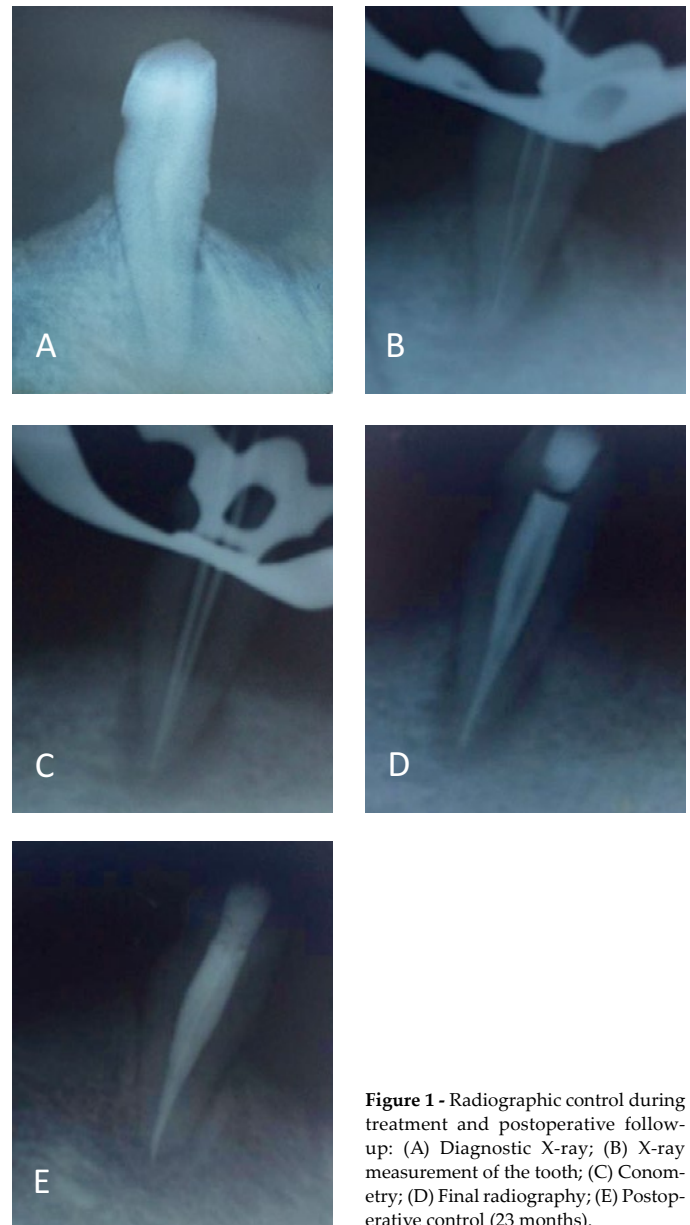


Figure 1 - Radiographic control during treatment and postoperative follow-up: (A) Diagnostic X-ray; (B) X-ray measurement of the tooth; (C) Conometry; (D) Final radiography; (E) Postoperative control (23 months).

Understanding the internal and external anatomy of each tooth is a crucial factor for the proper debridement and disinfection of the entire root canal system¹⁵. Anatomical features directly affect the success of the therapy and determine the parameters under which the endodontic treatment will be carried out. An insufficient knowledge of anatomical features leads to a high presence of microorganisms in the root canal, deficient fillings, and apical percolation¹⁶. Furthermore, the prognosis in endodontics is directly related to the presence of bacteria and necrotic debris in the root canal system during the filling procedure¹⁷. The persistence of irritants may result in a persistent periapical inflammation, leading to failure¹⁸.

In addition of being associated with the understanding of anatomy and its variations, the success of an endodontic treatment also depends on careful interpretation of diagnostic X-rays, correct preparation of the access cavity, and detailed tactile examination^{19,20}. Knowing how to identify radiographic characteristics that suggest the existence of extra canals is essential to the

clinical practice. For Slowey³ (1979), two radiographs should be available for the diagnosis and preoperative evaluation of any premolar. The first radiograph should be performed with the X-ray beam perpendicular to the tooth, while the second should be positioned in a horizontal angle of 20 degrees from the mesial or distal surface of the tooth. This variation of the horizontal angle enhances the identification of overlapping canals²¹.

Between the indications of the presence of extra canals are the discontinuity of the normal canal space⁷ and apical radiolucency in the lateral wall of the root²². Some authors suggest that the disappearance or sudden narrowing of the canal space indicates the division of the canal root system into two or more branches, which may remain separate or merge up to the apex^{19,23}. Furthermore, the presence of a radiolucent line mesial or distal to the main canal is also an indicative of the presence of additional canals³.

The eccentric direction of an instrument after entering the root canal is considered another indication⁵. Fact that can become visible during the x-ray measurement. According to Al-Fouzan²⁴ (2001), an extra canal should be sought when the pulp chamber does not appear normally aligned or when it seems to have a modified configuration as a triangular or elongated shape towards the mesial or distal wall. Moreover, inconsistent readings on the apex locators, the presence of a fistula tracing to a lateral wall, or the feeling of having the instrument stuck in the lateral wall during the instrumentation of a place that had already been shaped can reveal the presence of additional canals²².

In this case report the presence of two root canals was considered during the diagnostic radiography and mechanical neutralization. However, it could only be confirmed during the x-ray measurement. Although the planning of this case was based on clinical and radiological evaluation of the tooth, an adequate knowledge of anatomy was essential to the correct identification of an unusual anatomy and proper intervention. After a significant postoperative period, the main objective seems to have been reached. It was possible to restore the patient's health.

CONCLUSION

Knowledge and understanding of the anatomy are key factors for success in endodontics. The search for conditions outside the normal is the duty of professional and should take place at all stages of treatment. The inability to recognize anatomical complexities generate disadvantages for both the clinician and the patient. Clinical and radiographic characteristics should determine parameters for proper planning, execution, and postoperative follow-up.

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RESUMO

Objetivo: O objetivo deste artigo foi descrever o diagnóstico e tratamento endodôntico de um primeiro pré-molar inferior com dois canais radiculares. Relato de caso: Paciente de 67 anos de idade apresentou-se à clínica odontológica referindo dor no primeiro pré-molar inferior. A paciente relatava dor espontânea e sensação de “dente crescido”. O exame clínico revelou um grau acentuado de abrasão dentária associada a ligeiro inchaço na região periapical e respostas positivas aos testes de percussão e frio. O exame radiográfico revelou a presença de uma radiolucência apical. Foi realizado o diagnóstico de polpa necrótica e

periodontite perirradicular crônica. Após a realização da cavidade de acesso, os canais foram preparados utilizando limas tipo K, brocas Gates-Glidden e hipoclorito de sódio a 2,5%. Cones de guta-percha e cimento obturador AH-Plus foram utilizados na obturação com a técnica de condensação lateral. Conclusão: Após um período de 23 meses de acompanhamento, os exames clínicos e radiográficos revelaram regressão total da lesão.

PALAVRAS-CHAVE: Endodontia. Variações morfológicas. Primeiro pré-molar inferior. Dois condutos radiculares.

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