

Case report

Root canal treatment of a maxillary central incisor with two root canals: A case report



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ABSTRACT

The aim of the present study is to report a clinical case of a root canal treatment of a maxillary central incisor with two root canals. The clinical examination showed a discrete increase in the crown width of tooth 11, which responded negatively to ice sensitivity, percussion and palpation tests. The tomographic examination of tooth 11 revealed the presence of two root canals and bone rarefaction in the periapical region, thus suggesting a possible pulp necrosis and asymptomatic apical periodontitis. Local anesthesia and proper isolation were performed, followed by coronal access to the pulp chamber with the aid of an operating microscope. The working length was established at 21 mm in the distal portion and 20 mm in the mesial portion of the tooth. The root canals were mechanically prepared with the Wave One[®] system and obturated using the hybrid thermo-mechanical technique and AH Plus[®] sealer. The patient remained asymptomatic during the 12-month follow-up period, which suggests that the therapeutic protocol was adequate and the treatment was successful. (Rev Port Estomatol Med Dent Cir Maxilofac. 2019;60(3):145-149)

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Tratamento endodôntico de incisivo central superior com dois canais radiculares: caso clínico

R E S U M O

Palavras-chave:

Tomografia computadorizada
Cavidade pulpar
Endodontia
Incisivo
Tratamento endodôntico

O objetivo do presente estudo foi relatar um caso clínico de tratamento do canal radicular de um incisivo central superior com dois canais radiculares. O exame clínico evidenciou uma discreta variação no aumento da largura da coroa do dente 11 e apresentou respostas negativas nos testes de sensibilidade pulpar ao frio, percussão e palpação. O exame tomográfico do dente 11 revelou a presença de dois canais radiculares e rarefação óssea na região periapical, sugerindo o diagnóstico de uma possível necrose pulpar e periodontite apical assintomática. Anestesia local e isolamento absoluto foram realizados, seguido de acesso coronário à câmara pulpar com auxílio de microscópio cirúrgico. O comprimento de trabalho foi estabelecido em 21 mm na porção distal e 20 mm na porção mesial do dente. Os canais radiculares foram mecanicamente preparados com o sistema Wave One® e obturados usando a técnica termomecânica híbrida com o cimento AH Plus®. A paciente permaneceu assintomática durante os 12 meses de monitorização, sugerindo que o protocolo terapêutico foi adequado e o tratamento bem sucedido. (Rev Port Estomatol Med Dent Cir Maxilofac. 2019;60(3):145-149)

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Introduction

Knowing the anatomical variations of the root canal systems may influence the outcome of endodontic treatment. It is common knowledge to dentists that maxillary central incisors have a single root canal in the majority of the cases.¹ However, the presence of multiple root canals has also been reported, and the prevalence of a second root canal may be as high as 2%.²

Due to their low prevalence, additional root canals in maxillary central incisors may be overlooked by clinicians, particularly when the diagnostic steps are neglected or when non-specific complementary examinations, such as conventional two-dimensional radiographic imaging techniques, are not performed.^{3,4}

In order to overcome these limitations, computed tomography, more precisely cone-beam tomography, may be used as an effective instrument for identifying dental anatomical variations, as it ensures three-dimensional precision for locating roots and root canals.³⁻⁵

The aim of this study is to report the root canal therapy of a maxillary central incisor with two root canals, while emphasizing the clinical techniques available to approach these cases.

Case report

This present case reports the treatment of a 35-year-old female patient who sought the outpatient clinic with the chief complaint of a swelling in the gum area above the maxillary incisors. After anamnesis, the oral mucosa was clinically examined, and no alterations were observed in the palatal and buccal faces of the reported region. The patient presented no

symptoms in the region. Subsequently, all maxillary anterior teeth were examined by inspection, pulp sensitivity, palpation, percussion and radiographic tests.

The clinical examination showed a discrete increase in the crown width of tooth 11 and color change in the crown of tooth 12 (Figure 1).

A cold spray (Endo-Frost; Coltene- Whaledent, Langenau, Germany) was applied on the vestibular surfaces of the tooth for 5 s with the aid of a cotton swab to assess tooth vitality. Both teeth responded negatively to the ice sensitivity, percussion and palpation tests.

The initial radiographic examination revealed an image that suggested the presence of two root canals in tooth 11, in addition to periapical bone rarefaction (Figure 2).

Computed tomography was performed using the i-CAT cone-beam 3D Dental Imaging System (Imaging Sciences International, Hatfield, PA, USA) to study morphology and plan the endodontic treatment, with the following specifications:



Figure 1. Initial clinical photo



Figure 2. Initial periapical radiograph

X-ray source with a 120-kVp valve voltage, a 3 to 7-mA valve current, and a 0.5-mm focal point. The protocol Mand 6 cm, 40 sec, 0.2 voxel, MaxRes was used for image acquisition. The examination showed the presence of two independent root canals: one in the mesial portion and the other one in the distal portion of the root of tooth 11 (Figure 3).

A diagnosis of pulp necrosis with asymptomatic apical periodontitis was established for both teeth. Local anesthesia by infiltration using 1.8 mL of 2% lidocaine with 1:100,000 epi-



Figure 3. Cone-beam computed tomography, axial section

nephrine was performed for each tooth. A rubber dam was placed, followed by access opening to the pulp chamber using round diamond burs #1015 (KG-Sorensen, Barueri, SP, Brazil) and a high-speed Endo-Z stainless steel bur (Dentsply/Maillefer, Switzerland) under cooling. An operating microscope (DF Vasconcelos, Valencia, RJ, Brazil) was used during the access. The wear was extended to the mesial portion, thus facilitating the access to the second root canal of tooth 11. After the access to both teeth was completed, the diagnosis of pulp necrosis was visually confirmed.

The glide path was established with # 15 K-type files (Dentsply/Maillefer, Switzerland) and the cervical third was prepared using size 2, 3 and 4 Gates Glidden burs (Dentsply/Maillefer, Switzerland). The working length was established at 21 mm in the distal portion and 20 mm in the mesial portion with the aid of an electronic apex locator (Novapex®, Forum Technologies, Israel).

The distal and mesial root canals were then prepared using the WaveOne® Primary and Large files (Dentsply/Maillefer, Switzerland), respectively. The chemical solutions used during the preparation of the root canals were 2.5% sodium hypochlorite and 17% EDTA before obturation. Final irrigation was done with sodium hypochlorite.

The root canals were dried with WaveOne® absorbent paper points (Dentsply/Maillefer, Switzerland) and obturated with WaveOne gutta-percha points using the hybrid thermo-mechanic technique with the size 50 McSpadden ther-

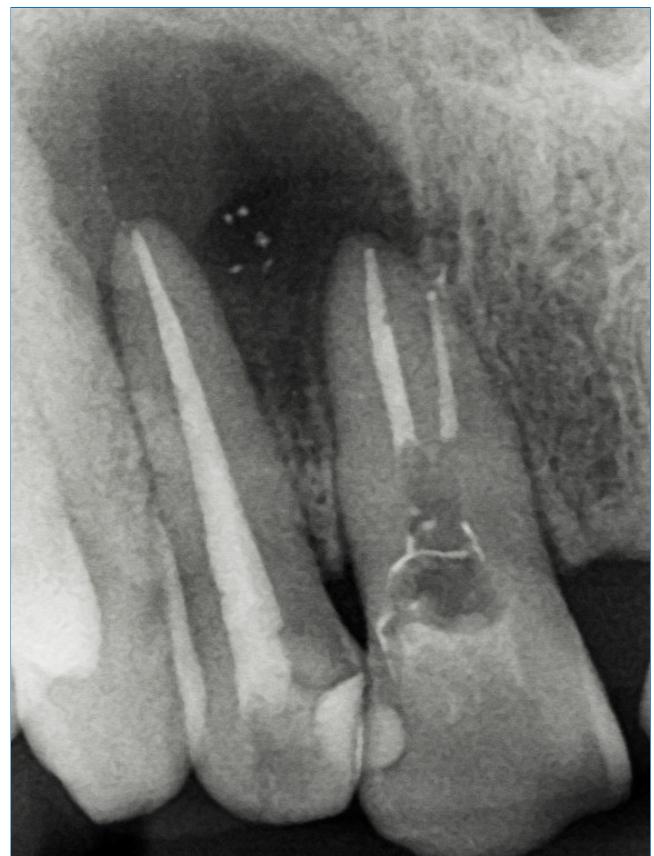


Figure 4. Final periapical radiograph

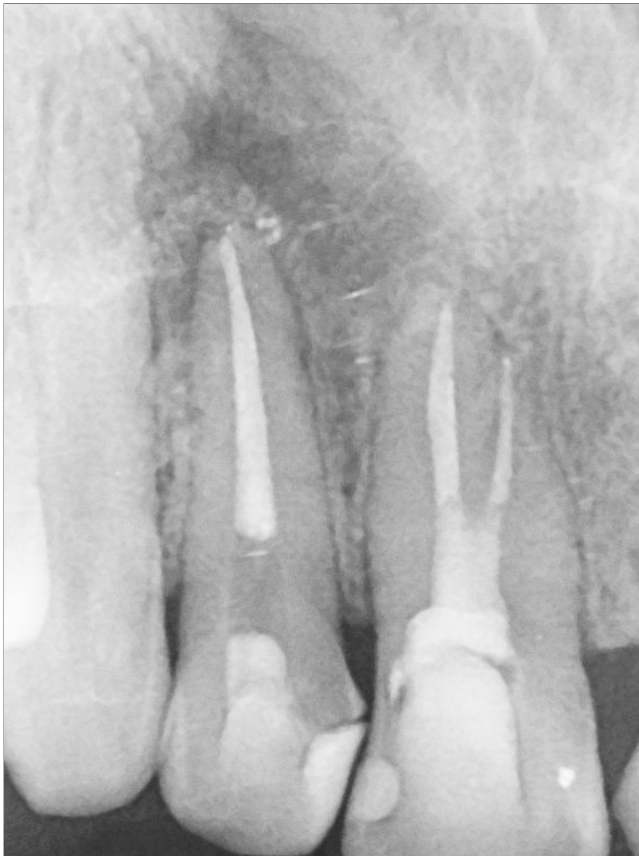


Figure 5. 12-month follow-up

mo-compacto associated with the AH Plus® Sealer (Dentsply/Maillefer, Switzerland).

After obturation, the cavity was cleaned and restored with a temporary restoration using glass ionomer cement, and a final periapical radiograph was obtained.

Clinical and radiographic follow-up were performed 6 and 12 months after the procedures. The tooth remained asymptomatic, and a final coronal rehabilitation was performed (Figures 4 e 5).

Discussion and conclusions

Studies on the complexity of dental anatomy have shown that root canals present different internal anatomical variations due to the natural physiological process of formation.^{1,2} In 1984, Vertucci¹ reported that incisors usually have a single root and a single canal. However, the presence of extra canals has been found in double⁶ and triple central incisors,⁷ and even in quadruple lateral incisors.⁸

These variations in the root canals of the maxillary central incisors may occur unilaterally, similar to the one found in the present report, or bilaterally.⁴ These variations apply both to permanent dentition⁹ and deciduous dentition.¹⁰ The extra root canals can be found simultaneously in central and lateral incisors.¹¹

Unexpected morphological variations make endodontic treatment a challenge for clinicians, who must be aware of all possible anatomical configurations of the tooth as well as the different diagnostic features that lead to successful endodontic treatment.¹²⁻¹⁴

Radiographic examinations are an essential component in endodontic treatment. They are used for diagnosis, planning and to evaluate the success rate of treatments. The amount of information obtained by two-dimensional periapical radiographs is limited, since it may be affected by geometric distortions and overlap of anatomical structures.^{1,4,9,15} The use of CT scans has been encouraged to diagnose cases of multiple root canals.^{3,16} In the present report, this resource ensured treatment safety as it indicated the location of the root canals. However, when computed tomography is not available, radiographic images at different angulations can be an option.^{4,10}

Using magnification might also be an advantage when dealing with severe anatomic deviations.^{6-8,17,18} In order to carry out the root canal treatment of the presented case, an operating microscope was used, at 16x and 25x magnification. This device also contributed to the success of the technical procedure, by preventing excessive wear of the dentin area and improving visibility to locate the root canals.

In this case report, the possible etiology for pulp necrosis and apical periodontitis in the teeth may have been an old traumatic event reported by the patient.

The therapeutic protocol using tomographic examinations and magnification enabled the correct identification of the anatomical variation and, consequently, treatment safety, which ultimately lead to a favorable treatment outcome.

Acknowledgment

The authors thank the patient for granting permission for publishing this case.

Ethical disclosures

Protection of human and animal subjects. The authors declare that no experiments were performed on humans or animals for this study

Confidentiality of data. The authors declare that they have followed the protocols of their work center on the publication of patient data.

Right to privacy and informed consent. The authors have obtained the written informed consent of the patients or subjects mentioned in the article. The corresponding author is in possession of this document.

Conflict of interest

The authors have no conflicts of interest to declare.

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