Endodontic Retreatment Due to Periapical Lesion from an Untreated Second Mesiobuccal Canal: Clinical Case Report

Hamilton Antônio Silva Andrade Júnior, and Maria de Lourdes Vieira Frujeri*

Instituto Euro Americano de Educação Ciência e Tecnologia - UNIEURO

Abstract: *Objective:* To report the endodontic retreatment of tooth 26 with an extensive periapical lesion, assessing the clinical and radiographic evolution. Case report: A 36-year-old male patient, with a history of endodontic treatment of tooth 26 performed approximately six years earlier, presented discomfort in the maxillary molar region. Radiographic and cone-beam computed tomography (CBCT) examinations revealed an extensive periapical lesion and the presence of a second untreated mesiobuccal canal (MB2). Retreatment was performed on the palatal (P), distobuccal (DB), and mesiobuccal (MB) canals, in addition to treatment of MB2, using calcium hydroxide–based intracanal medication and obturation by the lateral condensation technique. During follow-up, evidence of complete lesion regression and bone repair was observed. Conclusions: Endodontic retreatment with the technique used proved effective in promoting regression of the extensive periapical lesion, representing a conservative alternative to periradicular surgery. The high capability of CBCT in elucidating situations involving complex anatomical variations was also evident, highlighting its relevance as a valuable tool in the management of such cases.

Keywords: Second mesiobuccal root canal (MB2), Molar, Endodontics, Root canal anatomy, Root canal therapy, Apical periodontitis.

INTRODUCTION

One of the key pillars for successful endodontic treatment is a thorough understanding of the internal anatomy of teeth and their anatomical variations [1-3]. Being aware of the specific characteristics of each case before initiating treatment is a crucial factor in the success and prognosis of endodontic therapy [1, 4].

Maxillary molars have been identified as the teeth exhibiting the greatest number of anatomical variations and, consequently, posing the most challenges in the treatment of the root canal system [5-7]. Among these variations, the location of the second mesiobuccal root canal (MB2) has proven to be a significant challenge for dentists due to its anatomical characteristics. [8].

The use of imaging examinations, such as cone-beam computed tomography (CBCT), has become an important tool for locating the MB2 and facilitating its subsequent endodontic treatment [9]. This is particularly relevant because the MB2 is reported in the literature as the least frequently located root canal in endodontic treatments [8-11], although it may be present in over 90% of cases [12, 13]. Additionally, the presence of periapical lesions has been directly associated with failures in therapy involving this root canal [8, 10, 11].

*Address correspondence to this author at the Instituto Euro Americano de Educação Ciência e Tecnologia (UNIEURO), Endereço institucional: Av. das Nações, Trecho 0, Conjunto 5, Plano Piloto, Brasília-DF, CEP 70.200-001.: Brasília-DF, Brazil;
E-mail: frujeri@terra.com.br;
Tel: (+55(61) 4020-7525); +55 (61) 3354-3682

CASE REPORT

A 36-year-old male patient attended the dental office, reporting mild discomfort in the left facial bone region, corresponding to the periapical area of the maxillary molars. He reported having recent radiographic examinations: a panoramic radiograph (Figure **B**.**1**) and a periapical radiograph of tooth 26 (Figure **B**.**2**), a tooth that, according to the patient, had undergone endodontic treatment approximately six years prior.

The radiographic examinations revealed a well-defined circumferential periapical lesion with a radiopaque halo and a radiolucent interior. However, the images did not allow for a more precise assessment of the potential causative factors or the exact dimensions of the lesion. Given that this tooth has a high probability of anatomical variations and the need for a better visualization of the lesion's location and dimensions, the patient was referred for cone-beam computed tomography (CBCT) to obtain more precise three-dimensional images of the region.

After the CBCT examination and availability of the DICOM file, the images were analyzed using the eVol DX Viewer® software (CDT Software, São José dos Campos, SP, Brazil), which confirmed one of the suspicions. Tooth 26 was found to have three roots and four canals. Of these, only the palatal (P), first mesiobuccal (MB1), and distobuccal (DB) canals had received endodontic treatment. One of the four canals, the second mesiobuccal canal (MB2), had been overlooked during the previous endodontic treatment and remained untreated (Figure **B**.**3**).

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The CBCT examination also allowed confirmation of the lesion's location, which was observed at the periapex of the mesiobuccal root, indicating that the cause of the lesion could indeed be related to the untreated MB2 canal.

Regarding its dimensions, the lesion was found to be extensive, measuring up to 7.63 × 6.99 mm in the sagittal plane (Figure **B**.**4A**), 8.48 × 6.36 mm in the coronal plane (Figure **B**.**4B**), and 7.20 × 8.31 mm in the axial plane (Figure **B**.**4C**). Although a histopathological examination was not performed to confirm the lesion's type, the radiographic characteristics suggest that it could be either a cystic or granulomatous lesion, with definitive differentiation only possible through the aforementioned histopathological analysis.

Regarding the therapeutic procedure, the previously obturated canals, palatal (P), first mesiobuccal (MB1), and distobuccal (DB), were initially subjected to gutta-percha removal, followed by chemomechanical preparation (CMP) of both the retreated canals and the previously untreated MB2 canal, which was located with the aid of CBCT.

During the CMP, the presence of purulent exudate draining through the mesiobuccal canals was noted. Rotary files were used, along with irrigation using 2.5% sodium hypochlorite® (Asfer Indústria Química, São Caetano do Sul, SP, Brazil) and Trisodium EDTA® (Biodinâmica Química e Farmacêutica LTDA, PR, Brazil). Calcium hydroxide P.A.® (Biodinâmica Química e Farmacêutica LTDA, PR, Brazil) in an oily vehicle was applied as the intracanal medication (ICM) for 60 days.

After this period, the patient returned for coronal reopening, and the ICM was replaced with a fresh application of the same medicament to maintain its biochemical properties, as purulent exudate drainage persisted, though in regression.

The patient retained the ICM for an additional 30 days, and this procedure was repeated once more for the same duration, totaling 120 days with the ICM and its renewals. Subsequently, the medicament was removed, and no further purulent exudate was observed in the mesiobuccal canals. At this stage, the canals were obturated using gutta-percha cones and MTA-Fillapex® cement (Angelus, PR, Brazil), followed by definitive restoration of the crown with composite resin.

Ninety days following root canal obturation, a periapical radiograph was taken for follow-up, revealing a reduction in the lesion as well as radiographic features suggestive of bone neoformation, such as diffuse radiopaque spots in the affected area, indicating a positive prognosis. Definitive confirmation, however, would require further follow-up over the subsequent months.

After 524 days (17 months) post-obturation, the patient underwent a new CBCT examination for a more precise evaluation of lesion regression. The images were analyzed using the previously mentioned software, which suggested complete lesion regression with bone repair at an advanced stage (Figures **B**.**5** and **B**.**6**).

During the ongoing follow-up, 792 days (26 months) after root canal obturation, a new radiographic examination was performed using a periapical radiograph of tooth 26 (Figure **B**.**7**). This examination showed no signs of treatment failure, indicating that the surrounding bone was healthy and within normal limits. In other words, the imaging evaluations conducted during the follow-up period point to a satisfactory outcome of the therapy employed and, at this stage, rule out the need for more invasive procedures, such as periapical surgery, should the lesion persist after retreatment.

DISCUSSION

The success and prognosis of endodontic therapy are directly linked to a thorough understanding of root canal anatomy and its variations, from endodontic access to obturation [1, 2]. Therefore, the first step a dentist should take when performing endodontic treatment is to carefully evaluate the tooth's anatomy. The clinician should carefully analyze radiographic images from multiple angles before initiating the access procedure [1].

The primary objective of endodontic treatment is the complete shaping and cleaning of all pulp spaces, followed by their thorough obturation with an inert filling material. The presence of an untreated canal may represent a significant cause of failure in endodontic therapy. This may occur when clinicians are unable to locate or identify the presence of such canals [5].

A study conducted in Brazil by Silva *et al*. (2021) [14], evaluating patients from eight Brazilian states, reported a high prevalence of MB2 in maxillary molars: up to 88.5% in first molars and up to 83.4% in second molars.

Al Mheiri *et al*. (2020) [15], when evaluating the prevalence of MB2 in a population from the United Arab Emirates, found that 80.1% of the assessed individuals presented MB2 in maxillary molars. This

result is close to that reported by Shen *et al*. (2021) [16], who observed a prevalence of MB2 in 76.4% of their sample population, all of whom were native Chinese.

Hasheminia *et al.* (2025) [17], evaluating the presence of MB2 in maxillary first and second molars in an Iranian population, reported a prevalence of 60% for first molars and 33% for second molars.

The failure to identify or locate root canals has been consistently associated with the presence of periapical lesions in endodontically treated maxillary molars [8, 15, 18, 19]. Teeth with untreated canals were associated with periapical pathology in 82% of cases, and the root with the highest percentage of missed canals was the mesiobuccal root of the maxillary first molar (62.8%), which was associated with periapical lesions in 75.2% of cases [10].

Carrion *et al*. (2022) [20] observed significant associations between the presence of the MB2 canal, the quality of root canal obturation, and the occurrence of apical periodontitis. They concluded that apical periodontitis was detected in more than half of the CBCT images analyzed in their study, and that MB2 canals were the most frequently missed or inadequately obturated.

Considering the high prevalence of the MB2 canal reported in the literature, CBCT represents an almost indispensable tool for the prevention and management of apical periodontitis. This imaging modality allows for the identification of complex anatomical configurations and can be employed either prior to endodontic treatment or in cases where apical periodontitis is already established, such as those resulting from the failure to locate the MB2 canal in previously treated teeth. By elucidating treatment-sensitive conditions in great detail, CBCT substantially enhances the likelihood of successful endodontic therapy through a more precise and effective therapeutic approach.

CONCLUSION

The findings from the reported clinical case highlight the potential for successful treatment of an extensive periapical lesion (with characteristics of a cyst or granuloma) using minimally invasive endodontic techniques. The case demonstrated the capacity to achieve complete lesion regression and promote repair of the affected bone tissue, suggesting this approach as a viable alternative to more invasive therapies, such as periapical surgery. Furthermore, it became evident that the use of CBCT has the potential to elucidate and assist in the management of cases involving anatomical complexities, thereby increasing the likelihood of therapeutic success.

CONSENT

Written informed consent was obtained for the publication of this clinical case report.

ETHICAL APPROVAL

This clinical case report is part of a research project previously approved by the Ethics Committee (CAAE: 84660024.5.0000.5056).

CONFLICT OF INTEREST STATEMENT

The Author(s) declare(s) that there are no relevant financial or non-financial competing interests to report.

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Appendix A – Legend

- **P** – Palatal canal
- **MB** – Mesiobuccal canal
- **MB1** – First mesiobuccal canal
- **MB2** – Second mesiobuccal canal
- **DB** – Distobuccal canal
- **MP** – Mesiopalatal canal (also referred to as MB2)
- **CBCT** – Cone-Beam Computed Tomography
- **CMP** – Chemo-Mechanical Preparation
- **ICM** – Intracanal Medicament

Appendix B – List of Figures

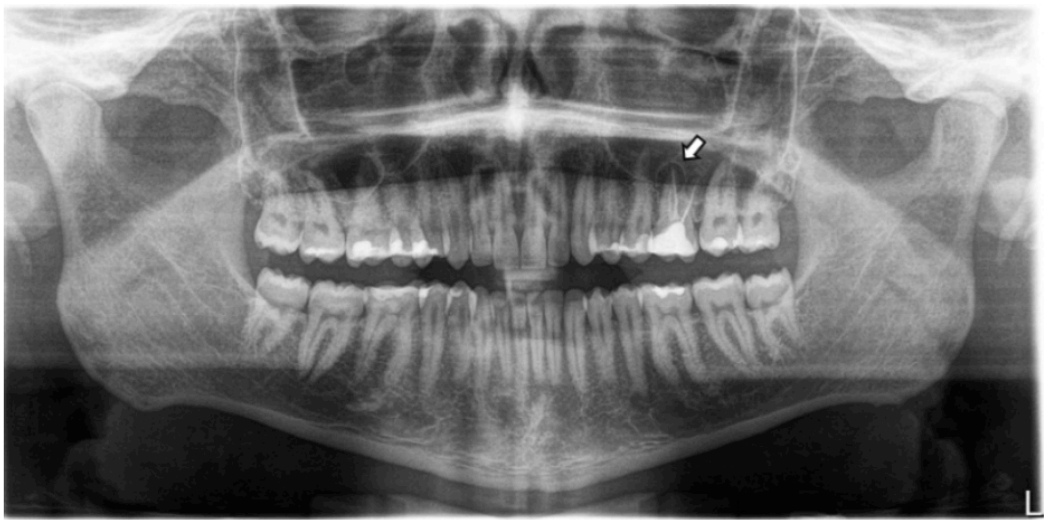

Figure B.1: Panoramic radiograph with a white arrow indicating a periapical lesion in tooth 26.
Source: Authors' own elaboration.

Figure B.2: Periapical radiograph with a white arrow indicating a periapical lesion in tooth 26.
Source: Authors' own elaboration.

Figure B.3: CBCT image in the axial plane indicating the second mesiobuccal canal (MB2) of tooth 26, which was previously untreated endodontically.
Source: Authors' own elaboration.

Figure B.4: CBCT images in different planes demonstrating the location and dimensions of the periapical lesion in tooth 26. (**A**) Sagittal plane showing a lesion measuring up to 7.63 × 6.99 mm in diameter; (**B**) Coronal plane showing a lesion measuring up to 8.48 × 6.46 mm; (**C**) Axial plane showing a periapical lesion in the mesiobuccal root measuring up to 8.31 × 7.20 mm.
Source: Authors' own elaboration.

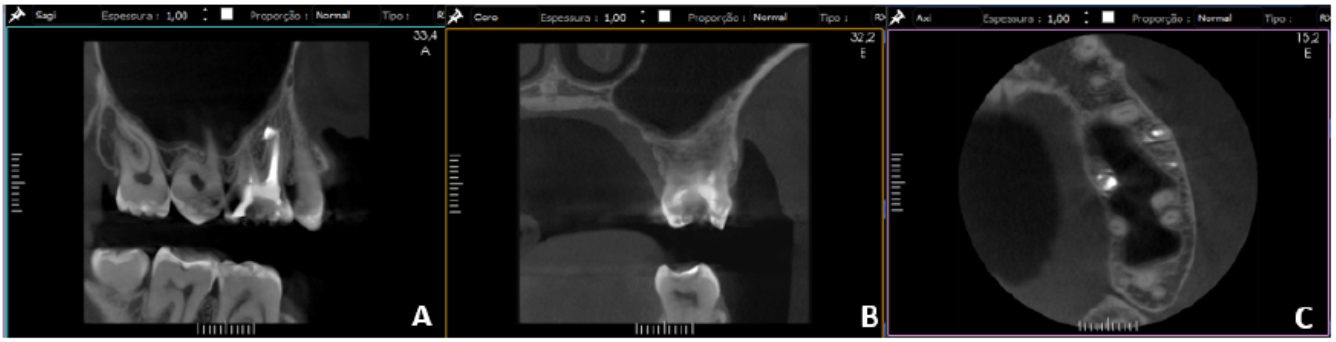

Figure B.5: CBCT images in the sagittal (**A**), coronal (**B**), and axial (**C**) planes, taken 524 days after obturation of the canals in tooth 26, suggesting the absence of the periapical lesion and near-complete bone tissue repair.
Source: Authors' own elaboration.

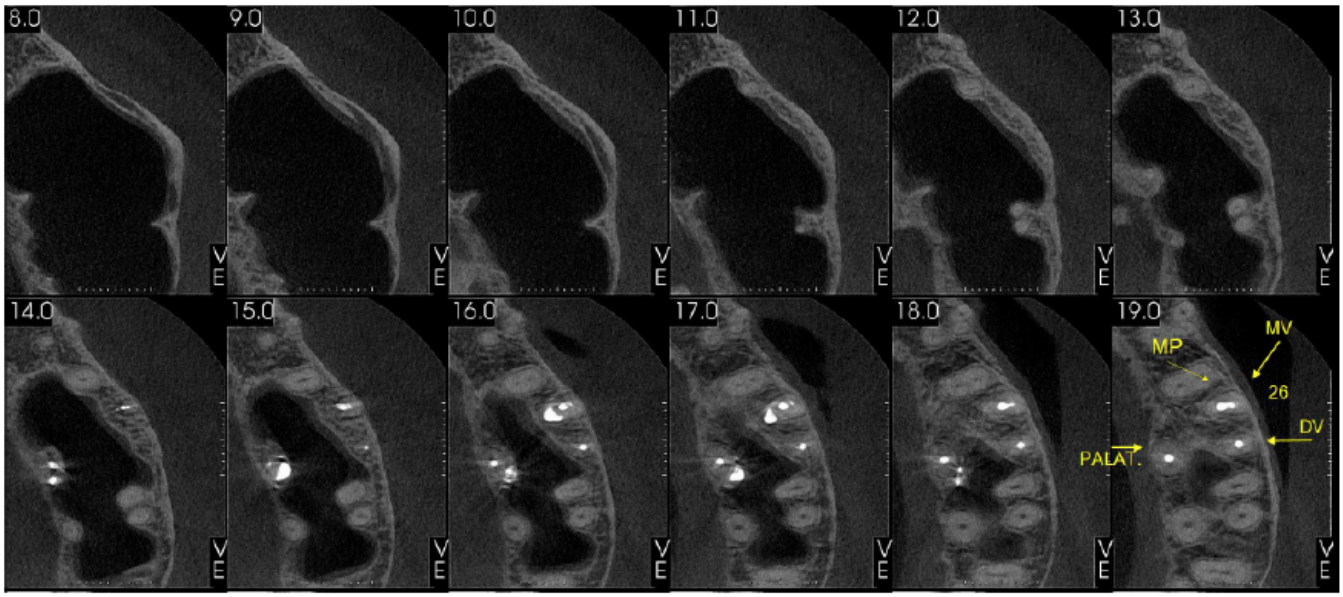

Figure B.6: Millimeter-slice CBCT images in the axial plane up to the maxillary sinus region, showing the obturated palatal (P), mesiobuccal (MB), mesiopalatal (MP, also referred to as MB2), and distobuccal (DB) canals, and suggesting the absence of a periapical lesion.
Source: Authors' own elaboration.

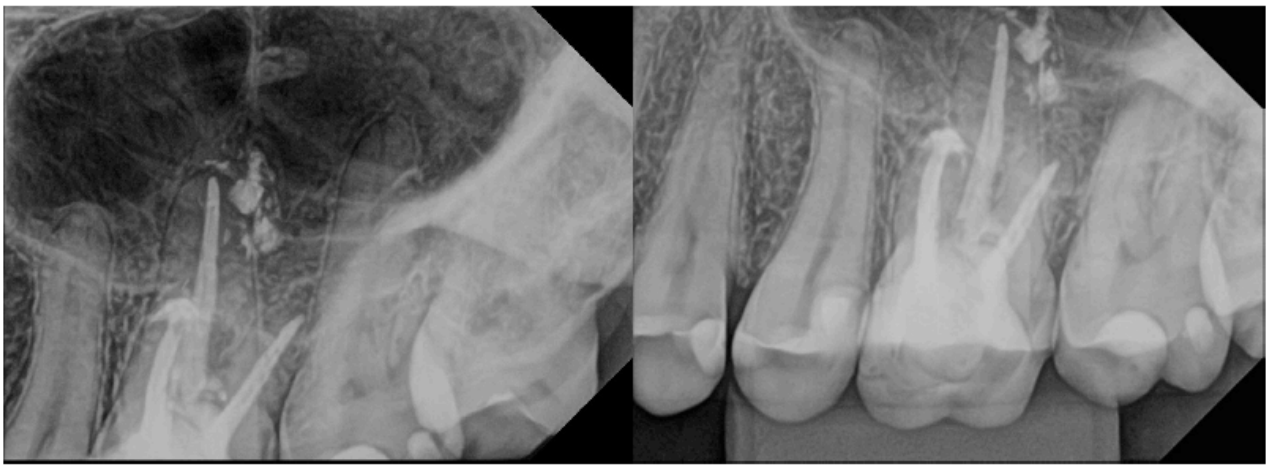

Figure B.7: Periapical radiographs of tooth 26 taken 792 days (26 months) after canal obturation, suggesting the absence of a periapical lesion or any abnormalities indicative of treatment failure.
Source: Authors' own elaboration.

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