



NONSURGICAL MANAGEMENT OF ENDODONTIC IATROGENY USING MTA PLUG: A CASE REPORT

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ABSTRACT

Endodontic treatment confronting previous iatrogeny in teeth with incomplete root formation and apical periodontitis is presented as a challenge to the Endodontists. The sanitization and peri-radicular repair can be achieved by the assist of auxiliary materials to biomechanical treatment procedures. MTA is cogitated as a choice for these cases due to its composition, physicochemical, mechanical and biological properties. In this case report, the patient presented tooth 11 with incomplete root formation and peri-radicular radiolucent lesion accompanied by the presence of an inverted gutta-percha cone in an attempt to filling the root canal. Endodontic treatment was accomplished by removal of the previous gutta-percha. After determining the working length, biomechanical preparation was achieved up until #80 K-file. Sequentially application of calcium hydroxide, as intracanal medication, was performed. Six monthly exchanges of intracanal dressing were completed. Apex was sealed with MTA bonded with saline through #4 Paiva condenser, creating an apical plug. The tooth was temporarily sealed, and patient returned after a week to perform the root canal filling with gutta-percha associated to Sealapex. The final radiography shows apical tissue repair with no peri-radicular lesions and clinical signs of successful treatment. This case report highlights the tissue repair and lack of local infection, absence of sensitivity pain or edema. These findings indicated that these approaches could be elect to presence of necrotic lesions achieving tissue repair.

KEYWORDS: Endodontics, Iatrogeny, Mineral trioxide aggregate, Rizogenesis.

<http://dx.doi.org/10.19177/jrd.v7e6201987-90>

INTRODUCTION

Diagnosis in endodontics should be based on evidences obtained through anamnesis, clinical examination and radiographic analysis^{1,2}. The interpretation of these

findings provide necessary information for the correct treatment planning^{2,3}. Nonetheless, the Endodontist may confront a series of unwanted and unexpected events and challenges, such iatrogeny, which could affect prognosis⁴. Thus, the presence of iatrogenic errors

from previous root canal treatment procedures generates relevance in the endodontic retreatment planning^{4,5}.

Among the cases of iatrogeny, the occurrence of overfilling should be highlighted^{6,7}. It may be caused by extravasation of a soft consistency fill

substance such as paste or cements, or a solid consistency substance such as gutta-percha^{5,8}. This extravasation generates inflammatory reactions that can even cause harmful effects and alter the adjacent tissue leading to peri-radicular lesions^{1,8}. This develops in response to the microbial presence and its by-products that infiltrate the peri-radicular tissues and activate host immune reaction⁹.

In cases where the indication of endodontic retreatment in immature teeth is recommended, in addition to the manifestation of peri-radicular lesions, occurs incomplete root formation, the presenting microbial contamination, of mixed etiology, Inhibits apexification due to the characteristics of the medium¹⁰. Thus, in these cases, the goal of endodontic therapy is to create an artificial barrier or induce mineralized tissue formation to ensue apical closure¹¹.

Endodontic intervention on immature permanent teeth with incomplete root formation presents limitations related to the amplitude of root canal lumen, thickness of root walls and incomplete apex formation¹¹. The use of calcium hydroxide as an intracanal dressing is a commonly used method to aid root canal sanitization and tissue repair, despite their disadvantages such as high solubility, need long-term treatment and risk of tooth fracture¹⁰. Those characteristics makes calcium hydroxide the most appropriate intracanal medicament for teeth with peri-radicular lesions, as it removes microorganisms and promotes repair by controlling the inflammatory action, neutralizing osteoclasts acid products, inducing cellular differentiation and neutralization of exotoxins^{10,12}.

The mineral trioxide aggregate (MTA) developed by Torabinejad¹³, in 1993, was presented to the market as a cement for retrofillings, and later came, to be used in the repair of root perforations, pulp capping and as apical plug in the treatment of incomplete root formation¹⁴. This compound displays a combination of biological, mechanical and physicochemical properties, such as biocompatibility, better adaptation in the root walls, lower microleakage and bacterial infiltration, despite that, long setting time and high cost^{14,15}. Several studies evaluated its indication in the biological barrier formation when applied as an apical plug demonstrating its viability^{14,16}. The present case report describes a maxillary central incisor endodontic retreatment with incomplete root formation and peri-radicular lesion.

CASE REPORT

A 10-year-old male patient with no systemic alterations, sought treatment at the clinic of the Faculty of Dentistry, University of Cuiaba complaining about color alteration in the right maxillary central incisor without painful symptomatology. At clinical examination, it was observed tooth color alteration, unsatisfactory restoration and absence of response to pulp vitality test. Periodontal probing depth and mobility was within normal limits. Through periapical radiographic examination (Figure 1), it was possible to observe previous endodontic treatment accompanied by the presence of an overfilling inverted placed gutta-percha cone, in an attempt to filling the root canal. Presence of an asymptomatic peri-radicular lesion, with open root canal



Figure 1. Initial periapical radiographic examination showing previous endodontic treatment.

apex, indicating the need for endodontic treatment.

Under local anaesthesia and rubber dam isolation, an access cavity was prepared. Barbed broach (Dentsply Maillefer, Ballaigues, Switzerland) was used to remove the gutta-percha cone from previous endodontic treatment. Sequentially, #15 K-file (Dentsply Maillefer, Ballaigues, Switzerland) performed penetration and verification of others obstruction in the path of the root canal. Preflaring was accomplished with #20.06 LA Axxess (SybronEndo, Sybron Dental Specialties, USA). Working length was determined using an electronic apex locator Root ZX (J Morita Corp, Tokyo, Japan). and a periapical radiograph was taken for confirmation.

Biomechanical preparation was achieved up until #80 K-file (Dentsply Maillefer, Ballaigues, Switzerland). Each exchange instrument was preceded with sodium hypochlorite 1% (Biodinâmica, Ibipora, Brazil.) irrigation and 17% EDTA (Odahcam Dentsply, Petrópolis, Brazil). After biomechanical preparation, calcium hydroxide paste (Biodinâmica, Ibipora,



Figure 2. Intraoperative dressing with calcium hydroxide in addition of Iodoform after six monthly exchanges.



Figure 3. Final radiography presenting peri-radicular tissue repair.

Brazil) associated with distilled water was inserted in root canals using #40 Lentulo (Mani Inc., Tochigi-Ken, Japan). Six monthly exchanges of intracanal dressing were performed. The last exchange of calcium hydroxide was carried out with the addition of Iodoform (Biodinamica Inc, Ibiçara, Brazil) in order to generate radiopacity in the intracanal material. (Figure 2). After these procedures, the apical portion was filled with gray MTA-Angelus (Angelus, Londrina, Brazil) bonded with distilled water through #4 Paiva condenser installing, thus, an apical plug. The tooth was temporarily sealed with glass ionomer cement (GC Fuji IX Extra; GC Co., Tokyo, Japan) and patient returned after a week to perform the root canal filling with gutta-percha associated to AH Plus (Dentsply, Konstanz, Germany), and scheduled for composite coronal restoration (Figure 3).

Aspects of normal tissue staining, and radiographic appearance of normality were observed characterizing tissue repair.

DISCUSSION

The literature shows that various aspects are responsible for the suggestion of endodontic retreatments⁷. These consist of poor sanitization, untreated canals, periodontal disease, presence of peri-radicular lesion, broken instruments, root fractures, perforations, overfilling or underfilling⁷. This case report faced a series of complications. Among them, previous iatrogeny, incomplete root formation and peri-radicular lesion.

During endodontic treatment, it is likely that the dentist will defy undesirable complications leading to decreases of success rate^{7,8}. A significant portion of these complications is formed by the dentist's own iatrogeny offering subsequent difficulties^{7,8}. Haji-Hassani⁴ et al. identified least errors through the procedures of cavity access and instrumentation comparing to filling, which had the most frequent errors including void and overfilling. Several factors are related to overfilling. Such as,

excessive cement in the root canal, unprecise working length, absence of X-ray assesses, overinstrumentation, insufficient apical preparation and operator's lack of skill^{4,5}.

Del Fabbro¹⁷ et al. explains that in root canal therapy failure, peri-radicular lesions can be retreated with or without surgery. Root canal retreatment is a non-surgical procedure that involves removal of previous gutta-percha, followed by cleaning, shaping and filling of the root canal system⁹. Root-end resection is a surgical procedure that involves exposure of the peri-radicular lesion by osteotomy, surgical removal of the lesion, sectioning of part of the root-end tip, disinfection and retrograde filling of the apical portion of the remaining root canal¹⁷. Several aspects must be considered before taking this decision. Among this, the experience of practitioner, the risk of complications, technical viability and cost, patient accessibility, prognosis, morphological evaluation, type of peri-radicular lesion and clinical aspects were significant on this judgement¹⁷. This case report decided by the non-surgical approach regarding the treatment of the peri-radicular lesion. Although treatment approaches for cope with large lesions range from non-surgical endodontic therapy with or without endodontic surgery, elimination or microbial minimization of the root canal system using mechanical preparation and chemical irrigation can lead to successful treatment⁹.

Calcium hydroxide was applied as intracanal dressing and the MTA was chosen for the apical sealing. This choice was based on their characteristics as biocompatibility, antibacterial action, prevent granulation tissue invagination, promote cell

adhesion without damage to vital tissue and induce peri-radicular healing process^{10,15,16}. Even with the formation of biological barrier promoted by MTA application, apexification was not achieved in this case. The type of peri-radicular lesion or the morphology of the unformed apex could explain this. However, neither hypotheses may be confirmed by this case report. The use of iodine was indicated by its radiopacity in front of the need for mapping, by the r-ray, intracanal material during the last exchange of medication. The possibility of color change of the dental element was disregarded. Even though, the tooth would have received indications for prosthetic treatment because of its previous color alteration. The main limitation of this study can be considered by the lack of post-operative control. The absence of radiographic control was due to discontinuation of the treatment by the patient for personal reasons.

This case report highlighted tissue repair and lack of local infection, absence of sensitivity pain or edema. These findings indicated that this technique and materials applied could be elect to presence of necrotic lesions achieving tissue repair, apical barrier formation.

ACKNOWLEDGEMENTS

The authors would like to thank the Doctoring Program in Integrated Dentistry Science. University of Cuiabá – UNIC.

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