

## Special Article - Periodontitis

# Endodontic Treatment on Dilacerated Maxillary Canine with a Mesial Curvature and Apical Periodontitis

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**Abstract**

**Introduction:** The three-dimensional obturation of the root canal system is one of the prerequisites for a successful endodontic treatment whereas there are a high percentage of endodontic treatment failures due to incomplete or poor sealing.

**Objective:** To compare the periapical healing teeth with pulp necrosis and apical periodontitis asymptomatic. Materials and Methods: Twenty single-rooted teeth with apical radiographic lesion were assigned to MTA-Fillapex and Sealapex, all treatments were performed on single session ProTaper with rotary instruments and filled with single cone technique. The radiographic monitoring was performed at 1, 3 and 6 months, and by densitometric analysis periapical healing was evaluated. Data were statistically analyzed using Wilcoxon and Mann Whitney U 0.05 significance level.

**Results:** There were no significant differences between the two endodontic sealers ( $p>0.05$ ). When comparing the values obtained a significant difference for MTA-Fillapex ( $p<0.05$ ) with a standard deviation of 19.23 it was observed.

**Conclusion:** MTA-Fillapex and Sealapex sealants were equally effective, which allow periapical healing teeth with apical periodontitis in endodontically single session.

**Keywords:** Apical Periodontitis; Single Visit; Endodontics

## Introduction

The role of the endodontic sealer is essential, not only to fill the irregularities of the root canal and the spaces between the gutta-percha and the canal wall, but also the sealer is considered a critical factor in the repair process of the periapical tissues [1]. Currently there are sealers of various compositions with different properties that aim to improve the root canal obturation, as well the success of the endodontic treatment.

Since 1993 when it was introduced in endodontics by Lee, Monsef and Torabinejad (1993) the Mineral Trioxide Aggregate (MTA) have been subject of great interest for its excellent physical, chemical and biological properties [2]. The former indications were perforation repair and retrograde filling material [3-5] and later additional applications were proposed, such as direct pulp capping [6], apexification [7], root canal obturation in primary teeth [8], pulpotomy [9] and repair of root resorptions [10]. Studies were conducted with the purpose of using the MTA as filling material for root canal system, however, the difficulties to properly fill in the entire root canal [11,12]. Showed that additional components were needed to obtain a hermetic endodontic filling with this material.

Sealapex is an endodontic sealer containing calcium hydroxide, widely used in endodontics that presents adequate flow and viscosity, as well as excellent biocompatibility [12]. The root canal sealer MTA-Fillapex was introduced in 2010, in order to be used for root canal obturation with gutta-percha. This cement contains 13.2% of MTA, natural resins [13], pigments and silica nanoparticles [14,15] and

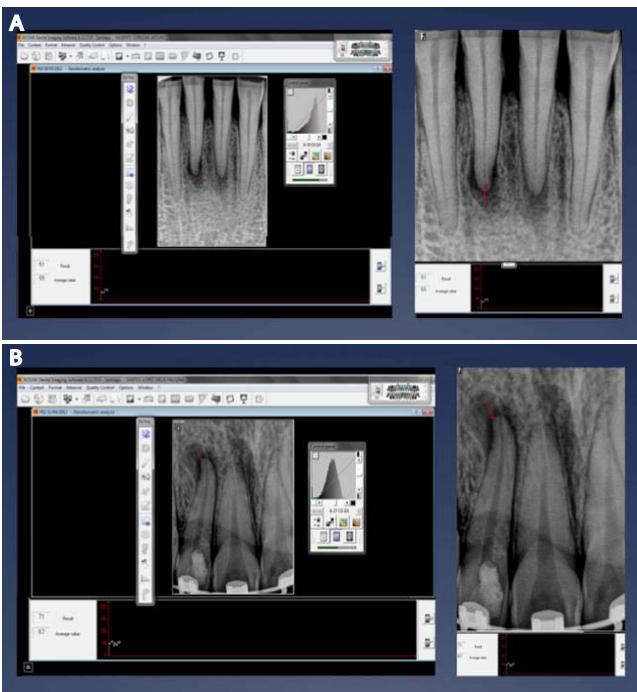
bismuth oxide is added for radiopacity; it presents an alkaline pH with calcium release to stimulate tissue mineralization [16], working time of 35 minutes, setting time of 130 minutes, adequate radiopacity, low solubility and easy manipulation [17].

The aim of this study was to compare the periapical healing obtained in teeth that presented necrotic pulp with apical periodontitis, six months after single-visit endodontic treatment obturated with gutta-percha associated to MTA-Fillapex or Sealapex.

## Materials and Methods

Twenty adult patients with no relevant medical history participated of this study at the department of dentistry at the Specialty Military Hospital of Guadalajara, Jalisco, México. An informed written consent form was obtained from each patient, in accordance with approval by the Institutional Review and Ethical Board. Twenty single-rooted teeth with mature apices presenting clinical pulp necrosis and radiographic presence of an apical lesion (diameter 5-15mm range) and no presence of sinus tract were included. The teeth were randomly assigned to either MTA-Fillapex or Sealapex group. All the digital radiographs were taken using Kodak 5100 (RVG) (Kodak, USA), using a Kerr collimator (Kerr Corporation, Orange, CA, USA).

All the teeth were endodontically treated in a single-visit, under rubber dam isolation. The endodontic access was performed using a #4 carbide and a Endo-Z (Dentsply Maillefer, Ballaigues, Switzerland) burr and the working length was determined by using a apex locator Root ZX II (J Morita, Tokyo, Japan) with K files #15 (Dentsply



**Figure 1:** Densitometric analysis of all the radiographic digital images with MTA-Fillapex (A) and Sealapex (B) sealers, by using the final point of a 3mm straight line from the apex as the reference.



**Figure 2:** The radiographic follow-up was performed at 1, 3 and 6 months after the endodontic treatment with MTA-Fillapex (A) and Sealapex (B) sealers.

Maillefer, Ballaigues, Switzerland). Root canal preparation was performed with rotary instrument arion using ProTaper instruments F3 (Dentsply Maillefer, Ballaigues, Switzerland) with copious irrigation with 2, 5% sodium hypochlorite. Foraminal cleaning was made with K file #15 (Dentsply Maillefer, Ballaigues, Switzerland), and final irrigation with REDTA (Roths International Ltd., Chicago, IL, USA).

The root canals were dried with sterilized paper points and obturated with ProTaper gutta-percha cones by single cone technique. The endodontic sealers were prepared according to manufacturer's instructions. Ten teeth were filled using endodontic sealer MTA-Fillapex (Angelus, Londrina, PR, Brazil) and the other ten, with Sealapex (Sybron Endo, Orange, CA, USA).

After the obturations were completed, the teeth were restored with glass-ionomer photopolymerizable cement Vitrebond Plus (3M, St. Paul, MN, USA). It was performed the densitometric analysis of all the radiographic digital images, by using the final point of a 3mm straight line from the apex as the reference to compare the grayscale values obtained (Figure 1A and 1B). The radiographic follow-up was performed at 1, 3 and 6 months after the endodontic treatment (Figure 2A and 2B). Data were statistically analyzed (U Mann Whitney test) with the significance level set at 0.05.

## Results

There was no significant difference between the two types of endodontic sealers ( $p>0.05$ ). Comparing the initial and the final (6 months) values, it was not observed a significant difference only for the MTA-Fillapex means ( $p>0.05$ ).

## Discussion

The dental literature presents little information regarding the quality, success rate and post-operative complications in single versus multiple visit endodontic treatments<sup>6</sup>. Furthermore, no clinical researches have already been conducted to evaluate the MTA-Fillapex, nevertheless it has proved to present favorable physicochemical and adequate biological properties [18,19].

The success rate for the root canal treatments performed in teeth with apical periodontitis is about 10 -15% less than for pulp vital teeth and, even in controlled studies with adequate preparation and filling, the success rate is about 80-90%, because the remaining microorganisms inside the root canal system interfere in the apical healing [20]. To become visible in a radiograph, a periapical lesion must have affected the cortical bone and the alterations in the radiolucency might be considered the progression or the healing of the apical lesion; however, in conventional radiographs, it is required about 30% of alteration in the osseous density to become visible by the human eye [21].

The study of bone alterations with the digital radiography allows the quantitative and qualitative analysis of the osseous density, by the intensity of the pixels in the image. This is a very simple method but very effective to determine the differences in the radiolucency because they are expressed in a value of the grayscale [22]. In the present study, the densitometric analysis was performed by digital radiographies, because it is a very reliable and effective method to evaluate the progression of the apical periodontitis over time, presenting adequate accuracy and sensitivity to detect the alterations in the apical bone [23].

An ideal endodontic sealer should be non-toxic, biocompatible, radiopaque, dimensional stable even in presence of humidity and present good apical sealing, preventing the penetration of microorganisms and their products inside the canal [24]. The both tested sealers present adequate physicochemical and biological properties, including antibacterial activity against *Enterococcus faecalis* due to their high pH [25]. Furthermore, MTA-Fillapex and Sealapex presented a greater solubility than AH Plus, which might be correlated to their higher antibiofilm activity [26]. According to the present results, both sealers presented a good clinical performance, and corroborated previous findings about their biocompatibility: a toxic material would lead to an inflammatory reaction and hold back the apical healing [27].

In this study, it was observed apical extrusion of sealer in some of the teeth, which is an expected event in teeth with apical periodontitis, due to the pathological alterations in the morphology of the apical foramen. However, the direct contact of the sealers with the apical tissues did not caused any postoperative complication nor interfered with the healing. The toxicity of an endodontic sealer is related to its components, and a MTA-based root canal sealer ideally should present the biologic properties of MTA with a suitable flow ability and manipulation [21].

MTA-Fillapex presents resinous components and MTA, a previous study performed in Chinese hamster fibroblasts, it was observed a low cytotoxicity, which was similar to AH Plus, and both sealers presented cell viability rates lower than White MTA [28]. On the other hand, the subcutaneous tissue response to implants of endodontic sealers have shown and initial inflammatory reaction to MTA-Fillapex with later normal tissue healing [29]. Likewise, our findings have shown a comparable performance for the MTA-Fillapex and Sealapex obturations after 6 months, because the apical healing occurred in both groups and the densitometry values were not statistically different for the tested sealers.

The clinical findings of the present research support the single-visit endodontic treatment of teeth with apical periodontitis using as filling, gutta-percha associated to either Sealapex or MTA-Fillapex, provided the patient presents biologic and clinical conditions and the tooth it is not draining or symptomatic. This is particularly suitable in cases of crown fractures with aesthetic involvement, and for physically compromised patients in order to avoid multiple sessions or repeated antibiotic prophylaxis and even for those who require sedation or ambulatory treatment. The both tested sealers present adequate properties, including antibacterial activity due to their high pH [30].

## Conclusion

MTA-Fillapex and Sealapex sealers were similarly effective allowing the periapical healing of the teeth with apical periodontitis endodontically treated in a single-visit.

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