

# Evaluation of regression of periradicular lesions submitted to endodontic treatment in a single session and filled with PBS CIMMO Hp and Endofill cement: Clinical case report

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*Abstract— Endodontic treatment has as main objective the cleaning and modeling of the root canal, thus removing the microorganisms that provide the infectious condition through chemical and mechanical preparation. The objective of this study is to present a case report on the evaluation of the regression of periradicular lesions submitted to endodontic treatment in a single session and filled with PBS CIMMO Hp and Endofill cement. It is a study with an applied research principle, a qualitative and quantitative approach, with an exploratory character, carried out on a 29-year-old female patient who had two uniradicular teeth (8 and 9) with periradicular injury caused by an infectious and asymptomatic process. Endodontic treatment in a single session was performed simultaneously on the two dental elements with ProDesign S rotating files, localization of the working length through foraminal locator and irrigation with 2.5% sodium hypochlorite and final irrigation with 17% EDTA. After complete chemical-mechanical preparation, dental element 9 was filled with endodontic cement endofill and dental element 8 was filled with bioceramic endodontic cement PBS CIMMO HP. Radiographic follow-up was performed for a period of 1, 2 and 8 months in order to observe the repair process of the lesions and the regression of the periradicular lesion and it was observed that the regression of the periradicular lesions submitted to endodontic treatment in a single and filled session with cement PBS CIMMO Hp and Endofill were similar in the two dental elements. Given the context, it is possible to conclude that the type of endodontic cement did not interfere in the regression time of the periapical lesion.*

**Keywords—** Periapical lesion. Endodontics. Cements.

## I. INTRODUCTION

Dental pulp is a loose connective tissue, consisting of cells, extracellular matrix, blood vessels and nerves (LOPES & SIQUEIRA., 2015). Pulp vascularization is provided by blood vessels that enter the pulp via the apical foramen or foraminae and then extend and branch in the coronary direction (Lopes & Siqueira., 2015).

Teeth with normal pulps generally do not show any spontaneous symptoms, the symptoms produced from the pulp test are mild, do not cause discomfort to the patient and result in a transient sensation that resolves in seconds. Radiologically, there may be varying degrees of pulp classification, with no evidence of resorption, caries or

mechanical exposure of the pulp. No endodontic treatment is indicated for these teeth (Hargreaves & Berman, 2017).

Pulp and periradicular pathologies are inflammatory in nature and of microbial etiology; caries and infection of the root canal system represent the main sources of persistent microbial aggression to the pulp and periradicular tissues, respectively (Lopes & Siqueira, 2015).

The pulp is generally unable to eliminate the aggressive bacteria, it defends itself temporarily and slows the spread of infection and tissue destruction, with the persistence of irritating agents the damage will spread throughout the pulp, the bacteria or their by-products, and irritating agents coming of the necrotic pulp, diffuse from the

canal in the periapical direction, causing inflammatory lesions. Thus, bacteria play an important role in the pathogenesis of pulp and periapical diseases (Bergenholtz, 2016). One of the main objectives of endodontic treatment is to minimize the amount of pathological microorganisms and debris in the root canal system (Anderson et al., 2018).

Control of the infection is carried out in the chemical-mechanical preparation. In the process, endodontic files are used to promote the mechanical removal of microorganisms, being able to eliminate a significant amount of microorganisms and to model the main root canal. During the chemical removal process, the use of an irrigating solution with antibacterial activity enhances intracanal disinfection, being able to reach areas of the conduit that were not touched by the instrumentalization (Torabinejad & White, 2016).

To be successful in endodontic treatment, it is necessary to seal the root canals, with gutta-percha and endodontic cement, there are cements of different compositions, which allow the sealing of the root canal system and prevent local recontamination, favoring the success of the treatment (Marques et al. 2011).

For successful treatment, filling materials play an extremely important role. When choosing cement, the physical and biological properties of the material must be kept in mind (VALERA et al., 2000)

After treatment, the apical sealing must be observed by depositing repaired mineralized or fibrous tissue. The induction of this repair is linked to the correct execution of the endodontic treatment phases as well as the origin of the obturator material that remains in close contact with apical connective tissue. and periapical, it is observed that some cements are irritating to apical and periapical tissues, which can hinder, prolong and even prevent repair. (LEONARDO., 2008)

There is a high number of endodontic cements in the market of different compositions, being oxide and zinc-eugenol (OZE), calcium hydroxide cements, resin cements, glass ionomer cements and silicone based (LOPES & SIQUEIRA. , 2015).

Bioceramic cements are gaining ground in endodontics, studies have sought to compare bioceramic endodontic cements with conventional endodontic cements and have shown considerable evidence classifying this material as the gold standard for various clinical procedures, have good sealing properties, being able to increase tooth

resistance, biocompatibility, high pH, no resorption, easy handling inside the root canals, low cytotoxicity, does not suffer contraction and is chemically stable (LIMA et al., 2017).

In this context, the objective of this study is to present a clinical case on the evaluation of the regression of periradicular lesions submitted to endodontic treatment filled with pbs cimmo hp and endofill cement.

#### Case report

Initially, anamnesis was performed, according to the form, intra and extra-oral clinical examination and periapical radiographic evaluation (use of radiographic positioner). The selection of the patient followed the following criteria:

The patient attended had two uniradicular dental elements, with pulp necrosis and periradicular bone rarefaction in the apical region, and asymptomatic for endodontic treatment. The two dental elements were performed in the same session.

## II. CLINICAL PROCEDURES

The service protocol made was as follows:

Initially, anamnesis, tactile inspection and periapical radiography of the dental element were performed, followed by anesthesia with Lidocaine 1: 200000 (Dentsply / Sirona Tulsa Oklahoma, USA). Subsequently, tooth prophylaxis was performed using a straight white AC brush (Microdont, Socorro - SP) and Herjos prophylaxis paste (Vigodent, Rio de Janeiro - RJ), caries removal with low rotation spherical drills (Dentsply / Sirona Tulsa Oklahoma, USA). And coronary opening with 1014 and 3082 drills (KG Sorensen, Barueri - SP).

The absolute isolation was done with a rubber sheet (Madeitex, São José dos Campos - SP), Ostby isolation arch (Prisma, São Paulo - SP) and various isolation clamps (KSK, Rio de Janeiro - RJ) disinfecting the operating field with 0.2% chlorhexidine (A Fórmula manipulation pharmacy, São Paulo-SP).

Initial exploration with K file # 10 or 15 (Dentsply / Sirona Tulsa Oklahoma, USA). It was made up to the apparent length of the tooth.

## III. INSTRUMENTATION TECHNIQUE

Made with the Prodesign S engine and rotary system (Easy, Belo Horizonte - Brazil), followed by the

preparation of the cervical third with files 30/10 Prodesign S (Easy, Belo Horizonte - Brazil) and 08/25 Prodesign S (Easy, Belo Horizonte - Brazil) crown - apex respecting the anatomy of the canal always maintaining a minimum distance of 5 mm from the apical limit on the radiography and in curved channels until the beginning of the curvature. Then, dentistry was performed with foraminal Root ZX locator (J Morita, Kyoto - Japan), obtaining the actual tooth length. A foraminal patency will be performed with the rotary file 25/01 Prodesign S (Easy, Belo Horizonte - Brazil) 1 mm beyond the actual length of the tooth, defined by an electronic foraminal locator. Patency check with file (10 or 15). Subsequently, a 06/25 file instrumented 1mm short of the actual length of the tooth.

Throughout the instrumentation, irrigation was performed with 2.5% sodium hypochlorite (Manipulation pharmacy - Formula and Action - São Paulo - SP), Luer Slip 10 mL plastic syringe (Advantive, NanchangJangxi - China) and disposable needle 25 x 0.55 (BD, Curitiba - PR). 30 mL of solution was used per experimental unit. The needle was inserted throughout the instrumentation process until it reached 2 mm below the working length.

The canals, at the end of the preparation, were dried with capillary tips (Ultradent Products, Inc, South Jordan, Utah, USA) coupled to a high-power sucker and with absorbent paper cones (Tanari, Manacapuru - AM).

The final irrigation was carried out with 3 mL of 17% EDTA (Pharmacy of manipulation - Formula and Action - São Paulo - SP). First, 1 mL of 17% EDTA was introduced, followed by ultrasonic vibration with a 25 IRRIS insert (VDW; Endo Ultrasonic Files, Endodontic Synergy, Munich, Germany) at a frequency of 30 kHz. The ultrasound insert will be connected to a piezoelectric ultrasound operating at 30 kHz (CVDent 1000; CVD Vale, São José dos Campos, SP, Brazil), set at power level 3, over a period of 20s. This process was repeated 2 more times. After this

process, irrigation was carried out with 5 mL of sodium hypochlorite (FarmáciaFórmula&Ação, São Paulo - SP). The canals were dried with capillary tips (Ultradent Products, Inc, South Jordan, Utah, USA) coupled to a high-powered sucker and with absorbent paper cones (Tanari, Manacapuru - AM).

After complete mechanical chemical preparation, different cements were used:

Table 1. Represents the endodontic cement used to fill each element.

Dental Elements	
8	PBS CIMMO HP Cement
9	EndofillCement

After handling the endodontic cements (Table - 1), the channels were filled, in a single session, by the Continuous Condensation Wave technique (Buchanan, 1994) which follows the principles of the Schilder technique (1967) using the Touch'n Heat equipment. For this purpose, accessory M and FM cones (Tanari, Manacapuru - AM) were selected. These were calibrated using a calibrating endodontic ruler (Dentsply / Maillefer, Ballaigues - Switzerland) and adjusted to the working length. The Thermoplasticizer of the Touch'n Heat device performed the cutting, plasticization and condensation of the gutta percha inside the channels, up to 11 mm, inside the root canal. This filling phase is called "Down Packing". Subsequently, thermoplasticized gutta percha was introduced to perform the "Back Fill"

Final restoration was performed in composite resin and final radiography was performed with a radiographic positioner (Indusbello, Londrina - PR). The dental elements were preserved at 1, 2 and 8 months, analyzing the regression of the pathology and symptoms (Figure - 1) and follow-up computed tomography after 8 months (Figure - 2).



Fig.1: Radiographic monitoring during the period of preservation of periapical lesions

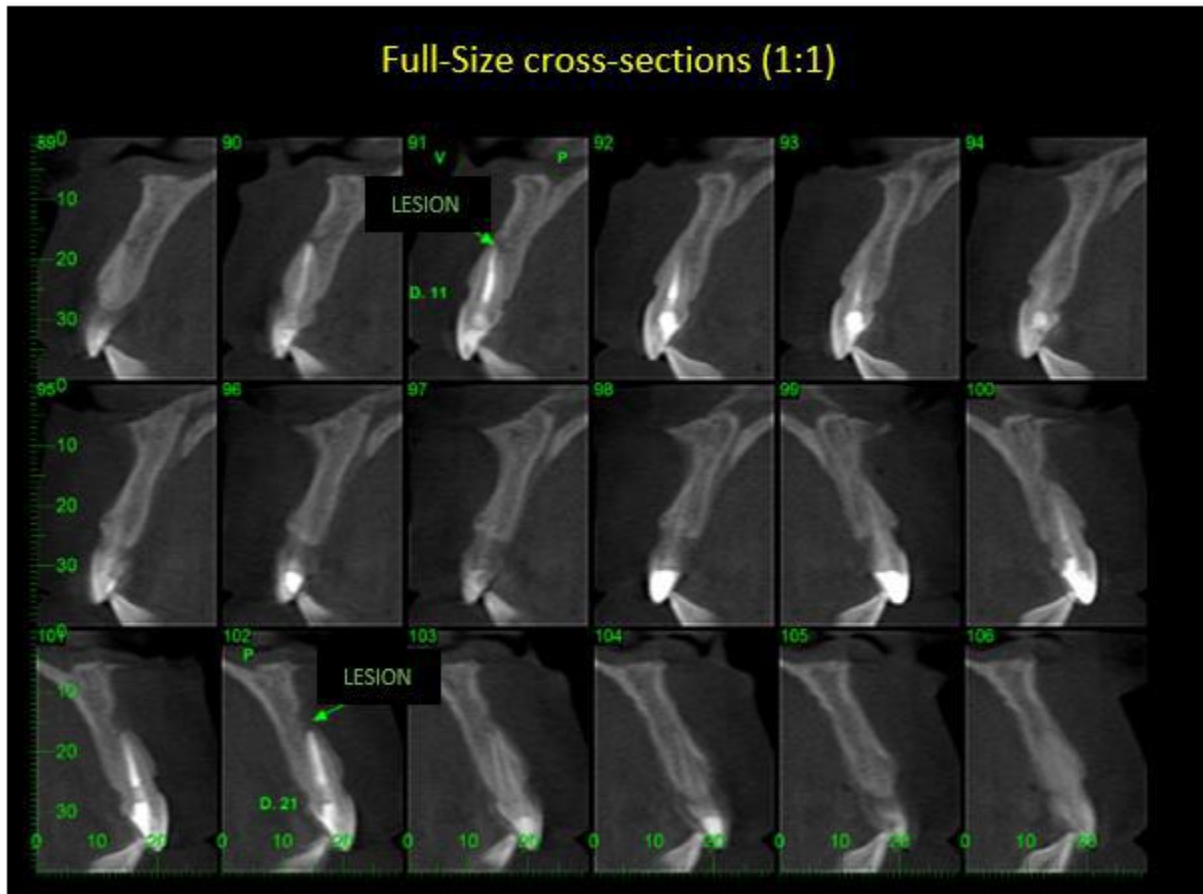


Fig.2: Proservation computed tomography after 8 months

Source: Own authorship

#### IV. DISCUSSION

The limitations of conventional techniques include not promoting root regeneration and repairing dental alveolar lesions. The proposed use of PBS HP CIMMO® (LOPES & SIQUEIRA., 2015) determines an innovative alternative to fill channels and provide root regeneration and, consequently, repair of dental alveolar lesions, corroborating with the recent proposals of regenerative dentistry. However, in this study there was no difference between regeneration of the periapical lesion between the endofill and PBS HP CIMMO®.

For the repair of periapical lesions after endodontic treatment to occur, it undergoes a regeneration process in which the altered periapical tissues are replaced by native tissues to restore the original function and architecture. Repair is a process by which altered tissues are not completely restored to their original structures. Histological

examination of most tissue cuts in animal and human studies reveals that the healing of periapical lesions after endodontic treatment occurs more through repair than regeneration of periapical tissues, the extent of the repair is proportional to the degree and extent of the lesion tissue and the nature of tissue destruction. The bone that has been reabsorbed is replaced by newly formed bone; the reabsorbed cement and dentin are repaired by cellular cement. The periodontal ligament, which is the first tissue affected, is the last to be restored to its normal architecture. (TORABINEJAD & E. WALTON., 2010).

Studies have been carried out with the purpose of testing the properties of several endodontic cements, Soares & César (2001) evaluated the quality of periapical repair, after endodontic treatment of thirty (30) teeth with chronic periapical lesion, in a single session, filled with cement based on zinc oxide and eugenol, which were re-

evaluated clinically and radiographically on a quarterly basis and, at the end of 12 months, 13 (46.4%) were fully repaired and 13 (46.4%) partially repaired and 2 (7 , 2%) had no repair. In this study, it was observed that periapical repair was similar in both dental elements, regardless of the type of endodontic cement.

It is known that the biocompatibility of zinc oxide cements is not favorable, which can lead to tissue damage, this is attributed to the presence of eugenol, considering these factors, the proportion of powder and liquid of the cement is important in its biocompatibility, as well as the more fluid the mixture is, the more intense the inflammation when compared to a thicker mixture. (Leonardo & Leonardo., 2017).

Garrido et al (2006) studied in vivo and evaluated the biocompatibility of endodontic cement endofill, selaer 26, ah plus and cop endo, a better pattern of apical tissue tolerance was found in cope endo and AH plus cements when compared to sealer 26 and endofill. In this study, regression of the periapical lesion was observed in both clinical cases.

Perassi et al (2008) performed a morphological study of the tissue response to four endodontic cements, the cements were implanted in polyethylene tubes in the dorsal subcutaneous tissue of male *Mus musculus albinus* mice. The evaluations were carried out in two experimental periods: 7 and 50 days. After these periods, the animals were killed, the tissue fragments surgically removed and processed using routine histological techniques, the Endofill cements caused moderate inflammatory infiltrate at 7 days, and discreet at 50 days, in the Endofill cement and there was persistence of mild infiltrate. inflammatory with the presence of a thin fibrous capsule and a thin band of amorphous tissue.

Although Endofill contains eugenol, which gives it cytotoxicity, it has a good tolerance for apical and periapical tissues, in the present study it was observed that this characteristic was not able to cause an inappropriate behavior to tissue repair of the element, thus presenting a satisfactory result. regarding the repair of the periapical lesion and the success of endodontic treatment.

As seen radiographically, in figure 1, although with variable sizes, in the period of 2 months of follow-up, there is a rapid tissue repair of elements 8 and 9, but there was no significant difference between the element repair, Sjögren et al., ( 1997) says that probably the repair seems to be more simplified in the most distant sites of the root apex, thus occurring rapid deposition by involving only bone and

vascular tissue. It is observed that at 8 months of repair, regeneration became different for elements 8 and 9, becoming slower, according to Sjögren et al., (1997) this fact may be due to the process of restructuring the periodontal ligament or the presence of foreign factors such as the filling material, dentin shavings and remaining infection in the apical and peri-apex region. However, it was possible to observe in the 8-month preservation computed tomography (Figure 2) that the regression of the periapical lesion in the elements was similar in both elements. Thus, it is necessary to use more precise complementary exams to evaluate the regression of periapicopathies related to the dental element.

There are several factors that lead to endodontic success or failure, which can be microbial and non-microbial. In order to achieve success, one must pay attention to biomechanical preparation, antiseptic effectiveness, absence of pain, edema, normal periapical bone structure, presence of perfect coronary sealing, correct choice of filling material, correct sealing of root canal systems., overfilling and overextensioning the filling materials towards the peripexix, leading to both physical and chemical aggressions. The fact that is most associated with failure are overfilled canals, teeth with pre-existing periapical lesions and teeth that have not been properly restored after endodontic treatment (PEREIRA JUNIOR, et al., 2010)

Immura (2000) in a study that sought to observe the success factors in endodontics when analyzing 2,000 clinical cases, regarding the periradicular clinical-radiographic state found that 94.6% of treatment success occurred in cases where teeth periapical was normal before endodontic treatment and 84.4% for teeth that had a chronic lesion.

Benatti (2010) evaluated periapical repair in endodontic treatments in which there was leakage of endodontic cement filling Endométhasone, it was observed that in the 7 patients who returned for follow-up, 6 cases had endodontic success, with lesion regression or periapical repair. In the study of these records and the patients who returned, it was noted that there was a reabsorption of the obturator cement in the periapical region in all cases, concluding then that the presence of leakage of obturator cement does not interfere with the failure of endodontic treatment, but rather a technique well executed with adequate restoration of the dental element.

Obtained by various chemical processes, the use of bi ceramics in filling cement has recently been made possible, bioceramics are biocompatible, similar to the

biological process of hydroxyapatite formation and the ability to induce a regenerative response in the human body (LIMA et al., 2017).

Bioceramic cement arrived on the market with the objective of being a biocompatible material to tissues, presenting low cytotoxicity, easy to handle, providing an increase in root resistance, besides not undergoing contraction and being chemically stable, they are easily manipulated, and applied without major complications, working both in repair and in sealing with great efficiency, Merlo (2018) concludes that bioceramic materials have good working properties, with biocompatibility, adequate sealing, short and adjusted setting time, alkaline pH, good ion release ability. calcium and antibacterial activity.

Cardoso & Albuquerque (2019) describe in a clinical case report and treatment of a primary endodontic lesion with periodontal involvement of tooth 46, which had the bio-ceramic cement Bio C Sealer as the filling material of choice, radiographic follow-up was performed after 4 months. treatment and showed significant repair of the periapical region.

Mendes (2019) in a study that sought to evaluate cytotoxicity, bioactivity and cell migration in stem cell culture and bioceramic endodontic cements concludes that of all the materials studied showed cell viability and bioactivity. Sealer Plus BC and MTA Fillapex cements, based on silicate, promoted better cell migration, compared to resin cements based on AH Plus and Sealer Plus which did not achieve wound closure in the study. Sealer Plus BC obtained satisfactory results in viability, cell migration and bioactivity tests.

In this study, it is observed that although all the characteristics of bioceramic cements stand out in relation to those based on zinc oxide and eugenol, it was not a decisive factor for the repair of the lesion of the filled element with the pbs cimmo hp to occur in a more effective when compared to endofill.

## V. CONCLUSION

It was possible to conclude, in this case report, that the type of endodontic cement did not interfere in the regression time of the periapical lesion.

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