Technical Scientific Profile

ENG

Bio-C® Temp

Bioceramic paste for intracanal dressing

angelus®

History

Angelus was founded in 1994 in Londrina, Brazil. Since then, innovation has been the key aspect to develop products and build businesses. The company has continuously invested in Research and Development, maintaining a close relationship with Universities and National and International Research Centers in different areas of knowledge.

Angelus has been present in more than 80 countries, in America, Europe, Africa, Asia and Oceania. Our Quality Management System is ISO 13485:2016 and MDSAP certified, which demonstrates our ongoing commitment to maintaining the highest quality assurance standards in the industry. With worldwide regulatory clearances, including US FDA, Health Canada, PMDA (Japan), COFEPRIS (Mexico) and Roszdravnadzor (Russia), Angelus has generated healthy smiles all around the world.

Back in 2001 Angelus launched the MTA ANGELUS, becoming the world's second company to place a bioceramic material on the market. Furthermore, it was the first company to launch a paste/paste bioceramic root canal sealer in 2010 (MTA-Fillapex).

From then on, the company has created a specific research line in order to increase the bioceramic products portfolio. Currently, new products have been launched and several projects are still under development for different areas of dentistry.

Contents

INTRODUCTION

Microorganisms and their endotoxins are mainly responsible for the pathogenesis of pulp and periapical infections. Consequently, one of the main objectives of endodontic treatment is to eliminate microorganisms and their endotoxins in the most extensive and effective way possible.

The use of mechanical preparation, followed by disinfection with chemical agents, is the method used to succeed in the elimination of microorganisms. However, when the infection is in the acute phase and the treatment cannot be performed in a single session, a delay dressing is used between the sessions and the BIO-C® TEMP is the material of choice.

Until recently the Calcium Hydroxide paste was the only option used in temporary disinfection procedures in endodontic treatment, however, this material has some limitations. It is a material of difficult application and intracanal removal and, as a major disadvantage, has a high solubility in water (1.2 gL-1) which causes rapid dissolution in the medium, resulting in limited clinical benefits.

BIO-C® TEMP has a great advantage over Calcium Hydroxide pastes because it presents low solubility and thus allows the product to be in contact with the canal walls for a long period of time. As a result, a high release of hydroxyl ions (OH-) is obtained in a continuous and gradual way with the increase of the pH of the fluid surrounding the application. The increase in pH plays an important role in preventing the proliferation of microorganisms through the processes of protein denaturation and destabilization of the plasma membrane.

In vitro studies performed with BIO-C® TEMP demonstrate the formation of an inhibition zone of the Enterococcus faecalis bacteria, demonstrating efficiency in bacterial growth inhibition. This activity contributes to the control of reinfections, ensuring a greater success in the endodontic treatment.

PRESENTATION

BIO-C® TEMP is a ready-to-use material, available in a syringe and applicator tips specially developed for the product.

The applicator tips are pre-curved with adequate length, which facilitates the application in areas of difficult access.

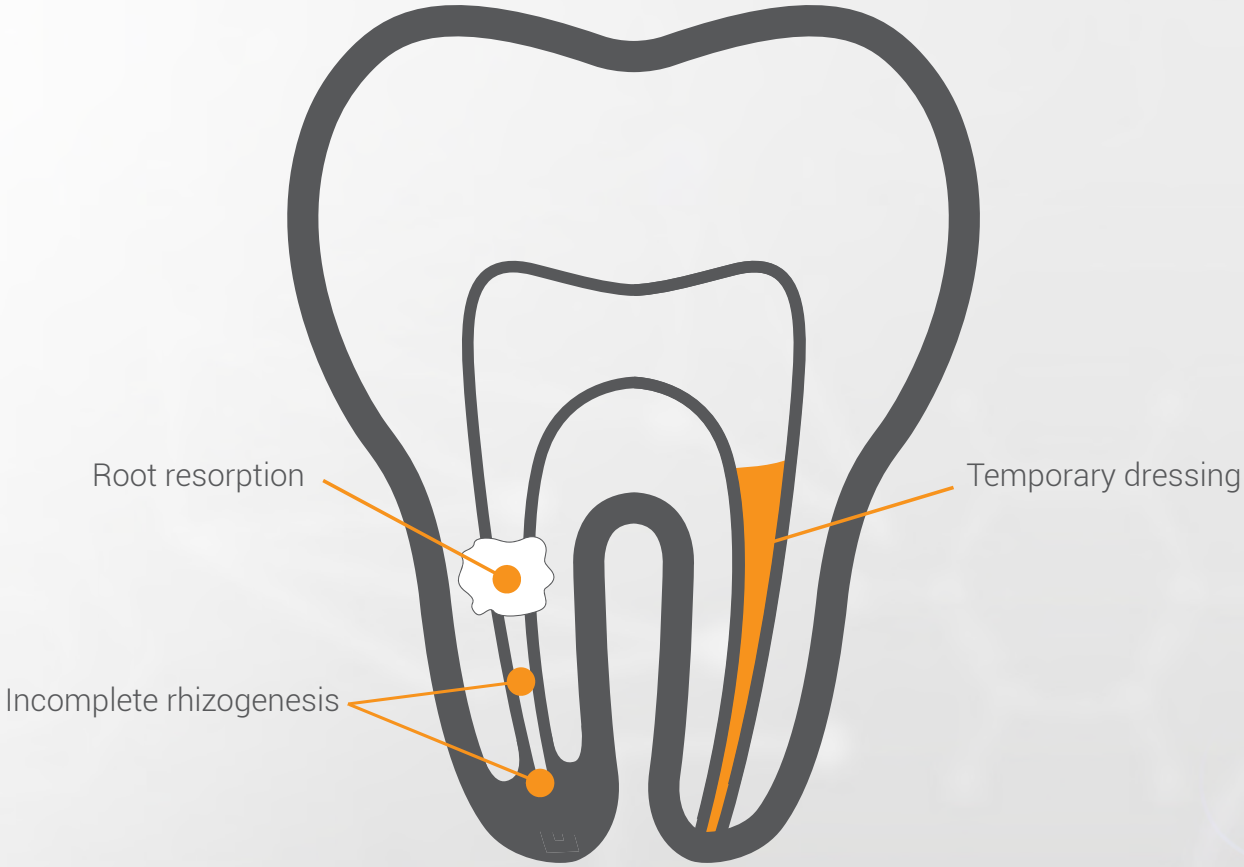
INDICATIONS

1. Intracanal dressing in endodontic treatment of teeth with pulp necrosis and retreatment.

2. Intracanal dressing in cases of perforations, external and internal resorptions, prior to the use of BIO-C® REPAIR, MTA REPAIR HP and MTA ANGELUS.

3. Intracanal medication for cases of incomplete rhizogenesis.

BIO-C® TEMP is recommended for the clinical situations described above, not only having an alkaline pH and being biocompatible, but also because it allows the cleaning and disinfection of root canal systems between the endodontic sessions in order to avoid becoming a habitat for microorganisms.



TECHNIQUES OF USE

1. Perform the biomechanical preparation of the conduit and, in cases of internal resorption, use curettes for the elimination of granulation tissue;
2. Dry the conduit with absorbent paper cones;
3. Dispense the initial portion of material from the tip of the syringe (1.0 mm);
4. Connect the applicator tip to the syringe;
5. Insert the tip of the syringe near the dental apex, slowly withdrawing in the coronary direction;

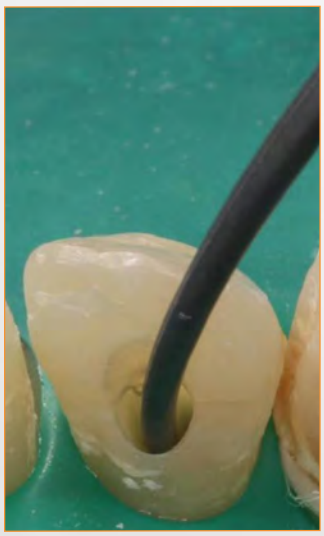
**For a better sealing; insert a suitable numbering manual file to obtain complete fill of the conduit.*

6. Remove excess paste from the pulp chamber; and seal the coronary opening;

Important: make the changes, if necessary, until the signs and symptoms normalize.

7. Removal of intracanal dressing should be performed using Sodium Hypochlorite associated with the use of a K-type file, with movement of the file against the walls of the root canal;
8. Then, irrigate with 17% EDTA solution and, if possible, activate EDTA with Ultrasonic Tip in 3 cycles of 10 seconds duration;
9. Seal the canal with a root canal sealer like the BIO-C® SEALER or MTA-FILLAPEX with gutta percha points;
10. Seal the coronary opening.

Initial X-Ray



BIO-C® TEMP application

X-Ray after BIO-C® TEMP application

Clinical case Dr. Maria Antonieta Veloso Carvalho de Oliveira

COMPOSITION/FORMULATION

COMPONENT	FUNCTION
Tricalcium Silicate (C_3S)	Active components Release of Calcium and Hydroxyl ions
Dicalcium Silicate (C_2S)	
Tricalcium Aluminate	
Calcium Oxide	
Base Resin	Plasticity
Calcium Tungstate	Radiopacity
Polyethylene Glycol	Dispersing agent
Titanium Oxide	Pigmentation

TECHNICAL DATA

pH	~12
Radiopacity	≥ 9 mm Al
Particle size	≤ 2 µm
Film thickness	~ 20 µm
Flow	~ 25 mm
Solubility	~ 1.0% (ISO6876 Adapted)

PHYSICAL-CHEMICAL CHARACTERISTICS

pH

The main components of BIO-C® TEMP are Calcium Silicates which, after being hydrated, produce Calcium Hydroxide that dissociates into Ca2+ and OH-. Rleased Hydroxyl ions (OH-) are responsible for a significant increase in the pH of the surrounding tissues, making the environment unsuitable for bacterial growth. In the comparative study below, we can conclude that the BIO-C® TEMP, in addition to having the highest pH values, maintained its basic capacity increased over the period.

Groups	1 day	2 days	3 days	7 days	14 days	21 days	28 days	30 days
BIO-C® Temp	9.34 (0.40)A	10.84 (0.94)A	11.42 (0.55)A	12.45 (0.12)A	12.89 (1.02)A	12.65 (0.58)A	12.82A (1.17)	13.11A (1.23)
Ultracal XS	8.54 (0.23)B	8.98 (0.44)B	9.35 (0.24)B	10.43 (0.21)B	10.54 (0.88)B	10.21 (0.93)B	10.15B (0.97)	10.28 (1.41)B
MetaPaste	9.69 (0.12)A	9.91 (1.12)C	10.12 (0.56)B	11.26 (0.16)B	11.65 (0.98)C	12.78 (1.01)A	11.55 (0.34)C	11.69 (0.32)C

USP-Ribeirão Preto

Release of Ca^{2+} ions

The release of Ca2+ ions is essential for the biological and chemical action of an intracanal dressing. BIO-C® TEMP presents a constant release of Ca2+ ions to the tissues, being biocompatible, not causing irritation and painful symptoms.

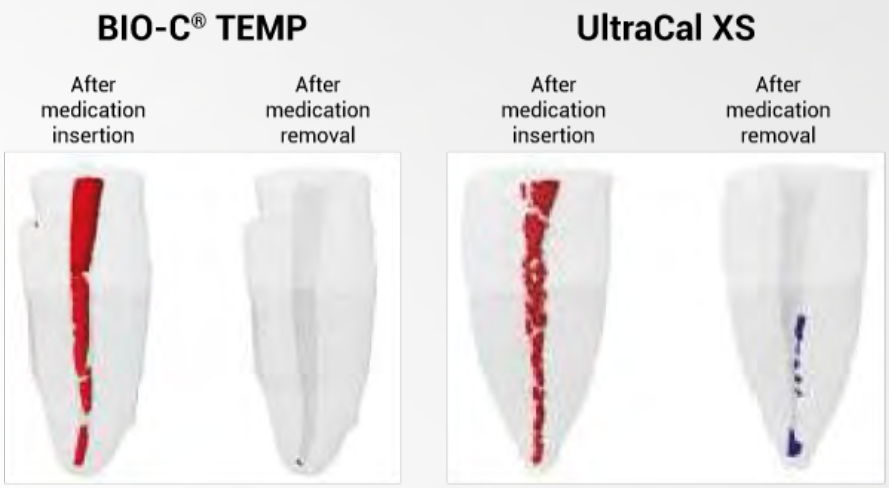
The table below shows the highest ionic release potential between day 1 and day 30 for the BIO-C® TEMP intracanal medication group, confirming this very important characteristic for an intracanal medication.

RELEASE OF CALCIUM IONS		
Groups	**1 day**	**30 days**
BIO-C® Temp	-124.4	-320.7
Ultracal XS	-235.1	-173.9
MetaPaste	-178.9	-305.6

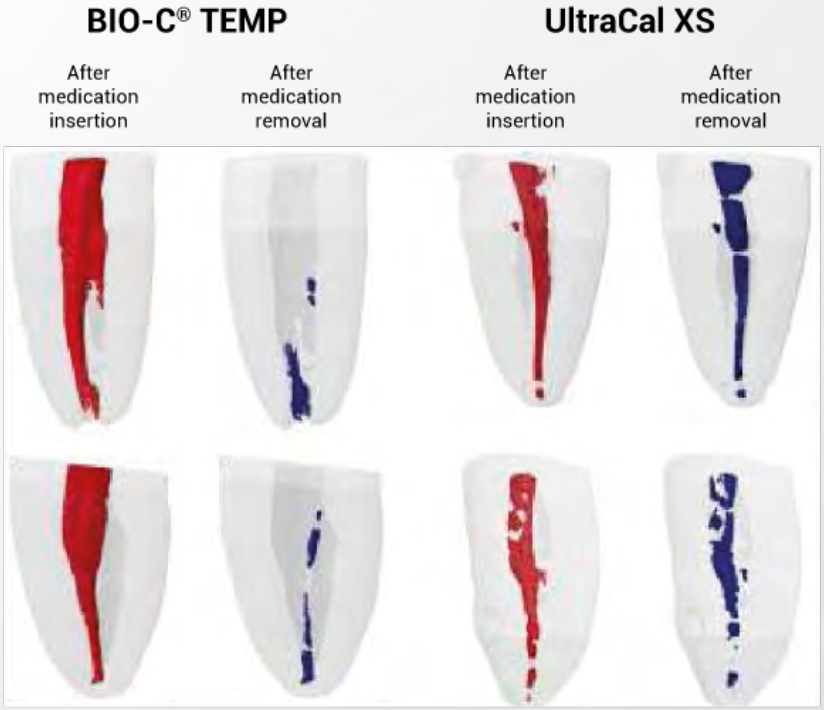
USP-Ribeirão Preto

Easy removal

BIO-C® TEMP was developed with a formulation that, in addition to not setting, is easy to remove. This characteristic can be observed through the study carried out at USP - Ribeirão Preto where it shows that BIO-C® TEMP is homogeneous and easy to remove.



Three-dimensional models in computed microtomography before, after 7 days of using intracanal medication based on bioceramic compounds – BIO-C® TEMP and UltraCal XS. **In red**: filling the root canal with intracanal medication. **In blue**: remnant of intracanal medication after removal with final instrument and conventional irrigation with sodium hypochlorite.

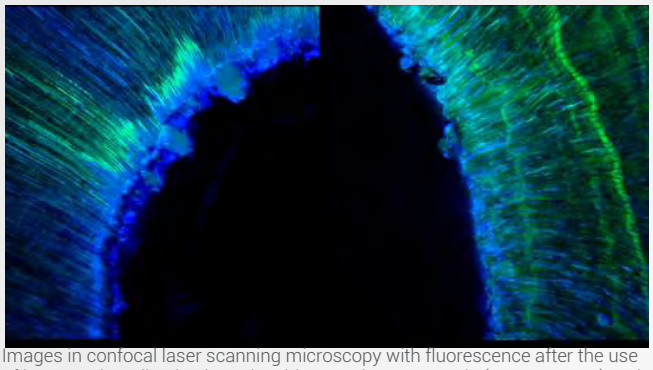


Three-dimensional models in computed microtomography before, after 14 days of using intracanal medication based on bioceramic compounds – BIO-C® TEMP and UltraCal XS. **In red**: filling the root canal with intracanal medication. **In blue**: remnant of intracanal medication after removal with final instrument and conventional irrigation with sodium hypochlorite.

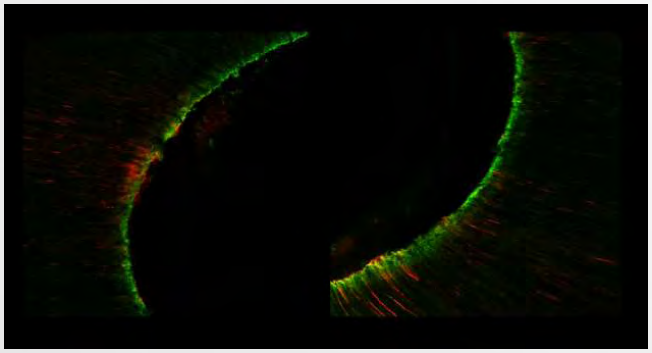
USP-Ribeirão Preto

Adhesive interface formed between root dentin and filling material.

The use of BIO-C® TEMP with BIO-C® SEALER as filling material provides greater penetration of the medication and sealer into the dentin tubules in a regular and homogeneous way, forming long tags and, therefore, a more hermetic and three-dimensional filling. However, with the use of traditional medication and an epoxy resin-based sealer, it is not possible to observe the formation of tags.



Images in confocal laser scanning microscopy with fluorescence after the use of intracanal medication based on bioceramic compounds (BIO-C® TEMP) and obturation with bioceramic cement (BIO-C® SEALER). In fluorescent green it is possible to observe the presence of intracanal medication remnant inside the dentinal tubules. In fluorescent blue, the penetration of filling cement into the dentinal tubules is observed, with the formation of longer and more uniform tags.



USP-Ribeirão Preto

Images in fluorescence laser scanning confocal microscopy with fluorescence after using calcium hydroxide-based intracanal medication (Ultracal XS) and sealing with epoxy resin-based sealer (AH Plus). In fluorescent green, it is possible to observe the presence of intracanal medication remnants homogeneously along the entire circumference of the canal, as well as the absence of penetration of the root canal sealer. In fluorescent red, there is little formation of tags, deformed and without continuity. Furthermore, it is possible to affirm that there is no formation of a layer resulting from the interaction of intracanal medication and root canal sealer.

Radiopacity

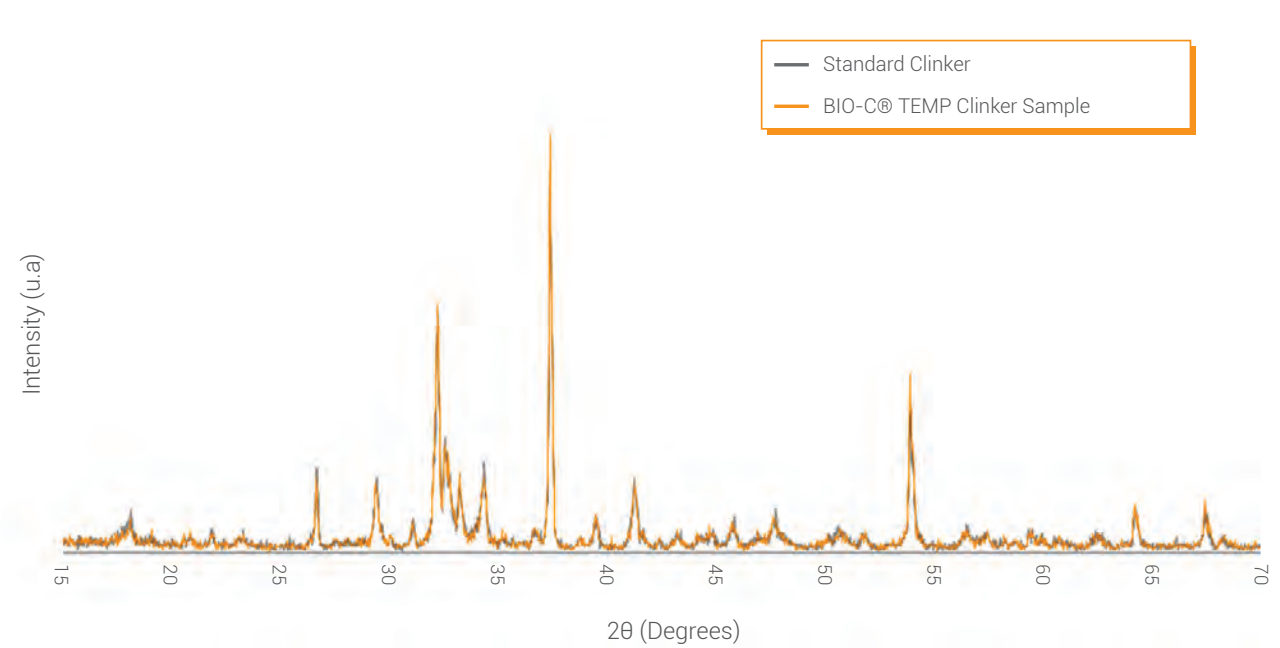
BIO-C® TEMP has radiopacity ≥ 9 mm of the Aluminum scale, ISO 6876: 2012.

The radiopacifier present in the product formula is Calcium Tungstate which, unlike other radiopacifier agents used in dentistry, does not promote tooth discoloration.

Clinical Case - Dra. Maria Antonieta Veloso Carvalho de Oliveira

Composition - X-ray diffraction

BIO-C® TEMP has the following crystalline structures in its composition: Calcium Silicates, Calcium Oxide and Tricalcium Aluminate. The presence of these crystalline structures is fundamental for the product to reach the ideal physical and biological properties.



Particle size

BIO-C® TEMP has micronized particle size < 2 µm, which results in improved physical and rheological properties of the product. The improvement of the physical properties is related to a better flow and penetration in the accessory canals and dentinal tubules. The improvement of the rheological properties is related to the greater reactivity of the product which favors a faster release of Ca^{2+} and OH^- ions.

Biocompatibility

According to ISO 10993-1, BIO-C® TEMP is classified as a "device with external communication of prolonged exposure", that is, for more than 24 hours and less than 30 days. Based on this classification, and in compliance with the standard, a biological assessment was conducted:

Citotoxicity (ISO 10993-5)

The cytotoxic potential of BIO-C® TEMP was determined in vitro using cells derived from Chinese hamster ovary (CHO-K1) (ATCC® CCL-61™). The cytotoxicity presented is due to the high pH of the material, around 12, intentionally developed to make the environment inhospitable to bacterial proliferation. In the presence of moisture, the formed Calcium Hydroxide raises the pH, making the environment alkaline. Alkaline pH has a destructive effect on protein structures and can promote enzymatic denaturation as well as cell membrane damage. However, it is known that the occurrence of chemical irritation by similar materials such as Calcium Hydroxide, does not cause irreversible tissue damage. In practice, the presence of a non-extensive inflammatory process in underlying pulpal and periapical tissues actually leads to stimulation of tissue repair.*

Irritation and skin reactivity (ISO 10993-10)

The tests were carried out in accordance with ISO 10993-10 conducted on oral mucosa of albino rats (Rattus norvegicus), of the Wistar lineage. The animals were observed before each application and 24, 48 and 72 hours after the last one, during 7 days of tests, evaluating systemic clinical alterations. Macroscopic and microscopic changes were not observed. The irritation index obtained from the histopathological analyzes was null. It is therefore concluded that under the conditions of the study, BIO-C® TEMP was classified as non-irritating to the oral mucosa of albino rats.

Skin sensitization (ISO 10993-10)

This study was carried out in Albino Swiss Mice, evaluating the adverse effects that occurred after exposure to the product in a 24-hour period. The material was applied intramuscularly and subcutaneously. There were no significant systemic effects related to signs of alterations in the respiratory, circulatory, lymphatic, excretory, digestive, nervous, reproductive systems, mucous membranes and motor body surface, demonstrating that BIO-C® TEMP is non-toxic.

**Yoshino, P.; Nishiyama, C.K.; Modena, K.C.S.; Santos, C.F.; Sipert, C.R., "In Vitro Cytotoxicity of White MTA, MTA-Fillapex® and Portland Cement on Human Periodontal Ligament Fibroblasts", Brazilian Dental Journal (2013) 24 (2): 111-116.*

Subacute toxicity (ISO 10993-11)

This test was performed according to ISO 10993-11 standard in rabbits via bone tissue implantation. Sub-acute toxicity of the material was evaluated based on systemic effects and monitoring of body weight, weekly, until the end of the test. After 30 days, the blood count, coagulogram and biochemistry analysis, as well as the histopathological analysis of the liver, spleen, kidney, lung, proximal lymph node, distal lymph node and implantation site (tibia), showed no macroscopic changes or clinical signs, proving the absence of systemic toxicity of the BIO-C® TEMP by the route used in this assay.

Mutagenicity (ISO 10993-11)

Mutagenicity detection was performed by the AMES Test using Salmonella typhimurium strains that have distinct mutations. The results, expressed as the mutagenicity ratio (RM) were negative, demonstrating that BIO-C® TEMP is not mutagenic.

Bone implant assay (ISO 10993-6)

The objective of this assay was to evaluate the biological safety of the BIO-C® TEMP analyzing the evolution of the local tissue response after its implantation. The test was performed on rabbits using bone implantation in accordance with ISO 10993-6. No macroscopic changes such as hematoma, necrosis, encapsulation and neovascularization were observed, as well as no significant local and systemic clinical signs, in addition, all animals gained body weight at the end of the test, demonstrating the biological safety of the product.

IMPORTANT:

BIO-C® TEMP was designed with the purpose of not harden and being easy to remove. Its formulation has a high concentration of free CaO, a low concentration of C_3S and C_2S and a long chain polymer. The low concentration of C_3S and C_2S causes the crystals formed by the hydration reaction to be separated due to the amount of material present and the interference of the polymer, making difficult the interlacing of these crystals and consequently the hardening of the product.

Clinical Studies

In the clinical studies carried out, it was possible to observe, in cases of incomplete rhizogenesis, restorative dentin formation after application of BIO-C® TEMP. The formation of repairing tissues was followed up by radiographs and clinical examination, which allowed the observation of a more rigid tissue in the apical region of the root.

Radiographic exam after 2 months of follow-up, showing the formation of repairing tissue bythe process of apexification. The yellow arrow indicates the apical root closure with repairing tissue. The blue arrow indicates the overflow of BIO-C® TEMP. No symptoms were reported in the clinical examination.

Images provided by Dr. Maria Antonieta Veloso Carvalho de Oliveira and team.

MECHANISM OF ACTION

The persistence of the periodontal lesion is directly related to the presence of bacteria in the root canal. The microbiota of infected root canals has several bacterial colonies, with a predominance of obligatory and facultative anaerobic microorganisms. The infection in root canals of pulp necrosis and periapical lesions is polymicrobial. Therefore, control of the local infectious process and maintenance of the healthy apical and periapical region is critical to successful endodontic treatment.*

The anatomical complexity of the root and canal system, such as isthmuses, ramifications, deltas, irregularities and dentinal tubules, makes access difficult and limits the efficiency of biomechanical processes. To increase the success rate in the fight against periapical infections, especially in pathological conditions of pulp lesions and chronic periapical lesions, the application of delay dressing is indicated.

BIO-C® TEMP contains Tricalcium Silicate (C_3S) and Dicalcium Silicate (C_2S) in addition to Calcium Oxide. When the product is applied and comes into contact with the tissue fluids, the hydration of these components occurs and, consequently, the formation of Calcium Hydroxide, according to the reactions below:

$$2(3CaO.SiO_2) + 6H_2O = 3CaO.2SiO_2.3H_2O + 3\ Ca(OH)_2$$

Tricalicium Silicate + Water = C-S-H + Calcium Hydroxide

$$2(2CaO.SiO_2) + 4H_2O = 3CaO.2SiO_2.3H_2O + Ca(OH)_2$$

Dicalcium Silicate + Water = C-S-H + Calcium Hydroxide

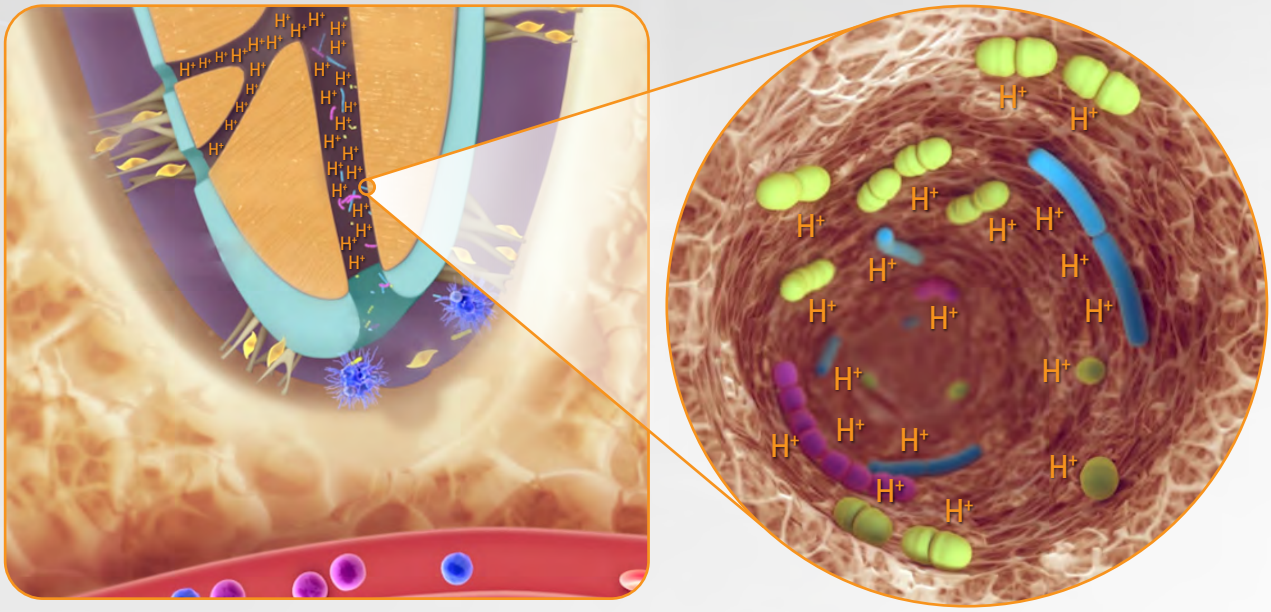
$$CaO + H_2O = Ca(OH)_2$$

Calcium Oxide + Water = Calcium Hydroxide

Calcium hydroxide is formed, rapidly undergoes dissociation and releases Ca^{2+} and OH^-, increasing the concentration of the hydroxyl ion (OH^-) on site. This condition leads to increased pH, neutralizing the acidic environment (caused by the presence of bacteria) and reduces the bacterial flora in the infected site, thus preventing their growth.

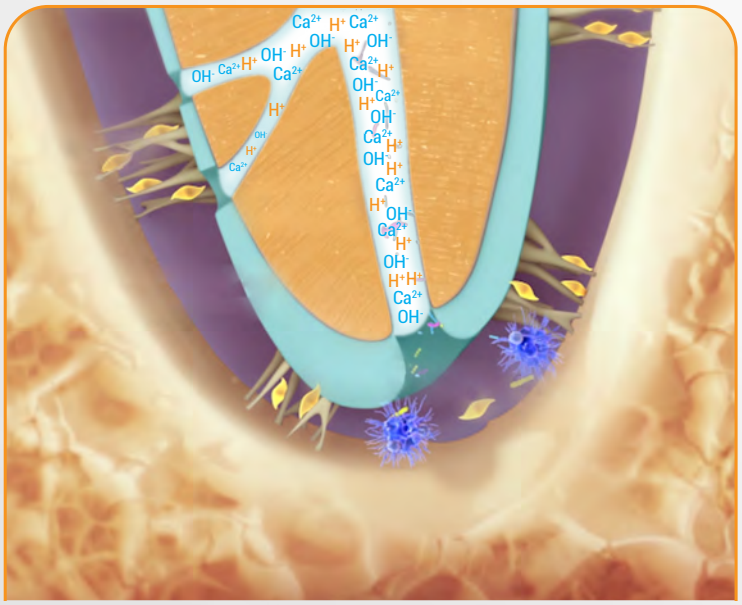
**Leonardo, M.R.; Hernandez, M.E.F.T.; Silva, L.A.B.; Tanomaru-Filho, M., "Effect of a Calcium Hydroxide-based root canal dressing on periapical repair in dogs: a histological study", Oral Surg Oral Med Oral Pathol Oral RadiolEndod. 2006; 102:680-685.*

Contaminated area and acidification of the environment caused by bacterial growth

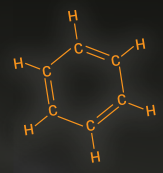


Acidic tissue environment (high concentration of H^+) due to the infectious process.

Representation of the release of Hydroxyl (OH^-) and Calcium (Ca^{2+}) ions of BIO-C® TEMP to the tissue fluid and consequent pH increase.



3 Reasons to use BIO-C® TEMP



1

Gradual release of Ca^{2+}

Periodic exchange is not required

2

Biocompatible

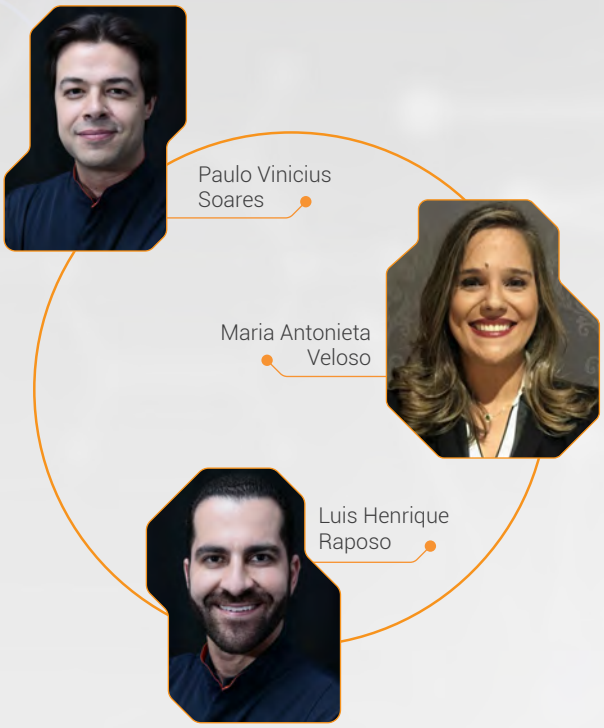
Absence of symptomatology

3

High alkalinity (pH ~12)

Unsuitable environment
for bacterial growth

TESTIMONIAL



"Bioceramics are ceramic materials used in medicine anddentistry due to their biocompatibility and the ability tocreate an ideal environment for healing.
The BIO-C® TEMP is the first intracanal bioceramic medication of Endodontics, indicated for cases of treatment and retreatment due to its high pH to its antibacterial, bacteriostatic, anti-inflammatory and mineralization- -inducing action. Since it is a bioactive product, BIO-C® TEMP interacts with the surrounding tissue, stimulating healing. The tissue system responds to the material as if it was a natural tissue. We use BIO-C® TEMP in the most diverse cases: pulpitis, pulp necrosis, periapical lesion, persistent fistula, inflammatory or purulent exudate, perforation, apexification, external and internal resorption. We recommend the BIO-C® TEMP not only for its actions, but also because it is a ready-to-use product, easy to insert into the root canal and with no painful symptomatology, even in cases where it has been extruded through the apical foramen".

Staff of the Faculty of Dentistry of the Federal University of Uberlândia (FOUFU)

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VIDEOS

Watch our videos by clicking on the players below.

BIO-C® TEMP
English

BIO-C® TEMP
High performance in fewer sessions!

CLINICAL CASES

Clinical Case 1

Endodontic tooth treatment with extensive periapical lesion using intracanal medication and bioceramic sealer

Maria Antonieta Veloso Carvalho de Oliveira[1], Nayara Rodrigues Nascimento Oliveira[2], Jessica Monteiro Mendes[3], Luís Henrique Araújo Raposo[4], Paulo Vinícius Soares[5]

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2 Specialist in Endodontics, Master's degree in Integrated Dental Clinic at the Faculty of Dentistry of the Federal University of Uberlândia (FOUFU).
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5 Professor of the Dentistry and Dental Materials Department, Faculty of Dentistry, Federal University of Uberlândia (FOUFU) - MG.

INTRODUCTION

During endodontic treatment, the dentist uses mechanical and chemical techniques that allow the elimination of microbiotic agents from the root canal. The intracanal medication is responsible for contributing to this disinfection process, since it reaches sites that files and irrigating agents could not, and because they remain longer than these in the root canal (Arruda et al., 2018). However, some studies have shown that, even after 1 week in the root canal, there is still bacterial permanence (Zandi et al., 2016), thus indicating the need for other types of medication.

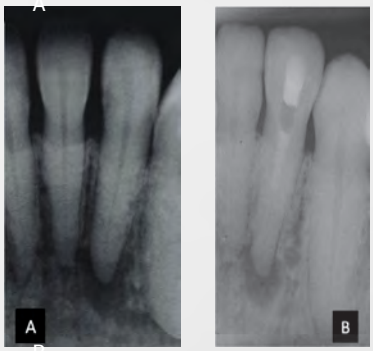
The overfilling of intracanal medication in cases of apical periodontitis with periapical lesion, is condemned by some authors because it can lead to bone necrosis and cytotoxicity of the cells present in the region, while others advocate it to favor periapical healing and to stimulate bone repair (Orucoglu et al., 2008).

The present clinical case aims to report endodontic treatment of a tooth with chronic apical periodontitis using intracanal bioceramic medication, which was accidentally leaked into the periapical lesion.

CASE REPORT

A 56-year-old female patient attended the Dental Outpatient Clinic of the Uberlândia Federal University Hospital (PSO-HC / UFU) after trauma to the anterior mandibular region. A semi-rigid restraint was performed in the region to stabilize the dental elements and, when the patient returned to the removal of the restraint, the presence of periodontal ligament thickening and apical bone resorption in tooth 32 were observed (Figure 1A). There was no complaint of pain, and clinically it presented a normal aspect, there was sensitivity to vertical percussion and no response to cold test (Endo-Ice, Maquira, Paraná, Brazil), thus presenting a final diagnosis of chronic apical periodontitis.

Figure 1- Initial radiographic appearance (A) and after insertion ofBIO-C® TEMP in the cervical and middle thirds (B)

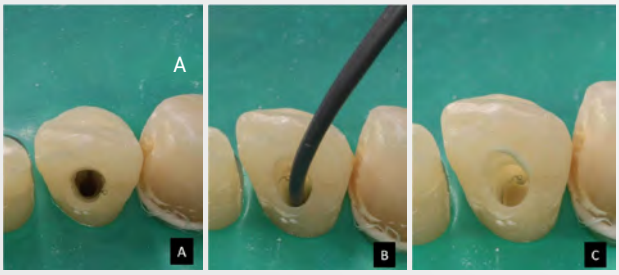


After anesthesia and absolute isolation, a coronary opening was performed with a #1014 diamond spherical drill (FAVA, Pirituba, SP, Brazil) and a multi laminated inactive tip drill (Endo Z, Angelus Indústria de Produtos Odontológicos S/A, Londrina, Brazil). The preparation of the cervical and middle third was performed with manual Headstroen #15, #20 and #25 files and Gates Glidden #2 and #3 drills (Maillefer, Dentsply, Tulsa, Oklahoma, USA) interspersed by abundant irrigation with Sodium Hypochlorite 2.5%. After drying the canal with absorbent paper points, intracanal bioceramic medication (BIO-C® TEMP, Angelus Indústria de Produtos Odontológicos S/A) was inserted with the the aid of the application tip up to the limit of the instrumentation performed (Figure 1B). The temporary sealing was done with cotton ball, cement (VilleVie, Joinville, Santa Catarina, Brazil) and provisional IRM restorer (Maillefer, Dentsply).

In the second session, the patient reported dental sensitivity only in the first 24 hours after the initial session. The medication was removed by

2.5% Sodium Hypochlorite irrigation and Kerr # 25 (Maillefer, Dentsply) file instrumentation. Followed by 17% EDTA (Biodinâmica, Ibiporã, Brazil) placed in the canals with the aid of a clinical clamp and shaken for 30 seconds by means of an ultrasonic coupled E1 Irrisonic (Helse Dental Tecnology, Santa Rosa de Viterbo - SP), Instrumentation up to the third apical was performed with Reciproc # 40 file (VDW, München, Germany) after obtaining the actual working length (CRT) through an electronic apical locator (RomiApex A15, Romidan, Giv'atShmu'el, Israel). The medication was again inserted into the canals with the aid of the applicator tip of the product itself 2.0 mm from the CRT and Kerr lime # 15 (Maillefer, Dentsply) was used up to the CRT. with the goal of aiding the arrival of medication throughout the channel, it eliminates the bubbles inside. Radiographic examination indicated an accidental extravasation of the medication into the lesion, probably due to the presence of resorption in the apical foramen (Figure 3A).

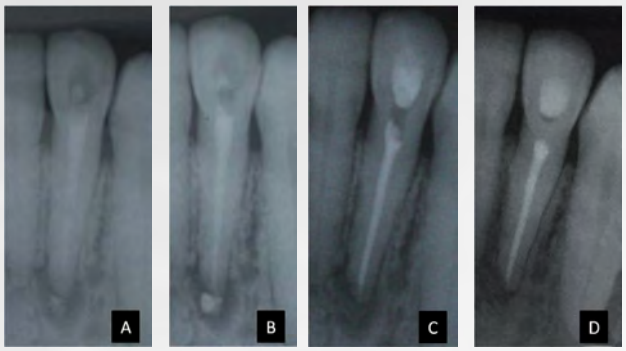
Figure 2 - Clinical aspect: before (A), during (B) and after placement of BIO-C® TEMP in the root canal (C)



After 15 days, the patient returned for session, with no pain reported and a new medication exchange was performed, with new accidental extravasation of the via foramen for the lesion (Figure 3B). After 30 days, the patient reported no pain in any day and the filling was made by the technique of lateral and vertical condensation with bioceramic cement (MTA-Fillapex, Angelus Indústria de Produtos Odontológicos S/A) and gutta percha points (Odous de Deus, Belo Horizonte, Minas Gerais, Brazil). In the final radiograph, it was observed that the medication leakage was totally absorbed by the body (Figure 3C).

In the follow-up visit 6 months after the filling, the patient did not report painful symptoms. Clinically, the restoration was well adapted and radiographically, the lesion had regressed (Figure 3D).

Figure 3 - Radiographic aspect: overflow of medication in the 2nd session (A), in the 3rd session (B), immediately after the filling (C) and 6 months after the filling (D)



CONCLUSION

The overfilling of intracanal bioceramic medication did not bring harm to the patient and was also shown to have aided in the process of periapical healing of the wound.

REFERENCES

1. Arruda MEF, Neves MAS, Diogenes A, et al. Infection Control in Teeth with Apical Periodontitis Using a Triple Antibiotic Solution or Calcium Hydroxide with Chlorhexidine: A Randomized Clinical Trial. J Endod2018;44:1474–1479.

2. Orocoglu H, Cobankara FK. Effect of Unintentionally Extruded Calcium Hydroxide Paste Including Barium Sulfate as a Radiopaquing Agent in Treatment of Teeth with Periapical Lesions: Report of a Case. J Endod2008;34:888 – 891.

3. Zandi H, Rodrigues RCV, Kristoffersen AK, et al. Antibacterial Effectiveness of 2 root canal irrigants in root-filled teeth with infection: a randomized clinical trial. J Endod, 2016;42:1307-1313.

Clinical Case 2

Dental apexification using bioceramic materials

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INTRODUCTION

Permanent teeth that are still in the process of rhizogenesis and require endodontic intervention are a therapeutic challenge: they have short roots, wide root canal, thin walls and open apex, being thus subject to fracture during the procedure or extrusion of material (Guerrero et al., 2018).

Traditionally, the treatment of these cases is made from multiple exchanges of medication (Calcium Hydroxide), in order to induce the formation of tissue in the apical portion, decreasing its diameter and thus enabling safer filling. However, in order to optimize clinical time, promote better apical closure and offer comfort to the patient, the making of an apical plug, in most cases using aggregated trioxide material (MTA), began to be used in cases of apexification (Agrafioti et al., 2017).

Bioceramic materials are present every day in the dental environment, due to having antibacterial properties, inducing biomineralization and cementogenesis in the apical region and presenting excellent results when used in humid environments (Abusrewil et al., 2018). Therefore, the objective of this clinical case is to report the treatment of tooth firing using intracanal medication and bioceramic reparative cement.

CASE REPORT

A 12-year-old female patient attended the Dental Hospital of the Federal University of Uberlândia (HO / UFU) with spontaneous, diffuse, intermittent, long-term pain. Exacerbated by chewing, cold and hot stimuli. The tooth 35 had a coronary opening performed in a private practice (6 months before), absence of response to the cold thermal test and sensitivity to vertical and horizontal percussion. Radiographically, it was observed an unsatisfactory coronary opening, periodontal ligament thickening, diffuse periapical lesion and presence of open apex (Figure 1A).

Figure 1 - Radiographic (A) and clinical aspects after removal of temporary restoration and refinement of the coronary opening (B)

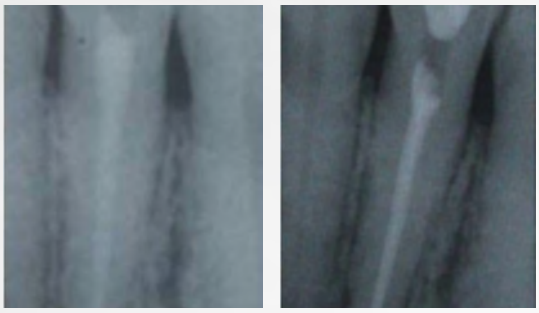
During the first session, the temporary material was removed by a diamond spherical bur # 1014 (FAVA, Pirituba, SP, Brazil) and refinement of the coronary opening was conducted with an inactive multi laminated bur tip (Endo Z, Angelus Indústria de Produtos Odontológicos S/A, Londrina, Brazil) (Figure 1B). It was followed by the instrumentation of the cervical and middle thirds with Headstron # 15, # 20 and # 25 files and Gates Glidden # 2 and # 3 burs (Maillefer, Dentsply, Tulsa, Oklahoma, USA), radiographic odontometry and apical instrumentation with Kerr files (Maillefer, Dentsply, Tulsa, Oklahoma, USA) up to file # 80. Between each study, intracanal irrigation was performed with 1% Sodium Hypochlorite and a final irrigation with saline solution. After drying the root canal, Calcium Hydroxide (Biodinâmica Química e Farmacêutica LTDA, Ibiporã, Paraná, Brazil) was used, associated with saline solution as intracanal medication. The temporary sealing was made with cotton ball, ready temporary cement (VilleVie, Joinville, Santa Catarina, Brazil) and provisional IRM restorer (Maillefer, Dentsply).

After one month, the patient returned for medication replacement and there was little change in the appearance of the periapical lesion. It was then decided to use the intracanal bioceramic medication (BIO-C® TEMP, Angelus Indústria de Produtos Odontológicos S/A) (Figure 2A). Its insertion was accomplished with the tip of the product positioned 2.0 mm short of the working length (CRT) and file with K15 file (Maillefer, Dentsply), in order to take the medication to the end of the CRT and remove any blisters. Two medication changes were performed, with a 2-month interval between both (Figure 2). During the removal of the medication in the second exchange, it was possible to feel the formation of mineralized tissue in the apical region with the aid of a file 35 in the region and regression of the periapical lesion.

Figure 2 - Intracanal bioceramic medication (A) and its radiographic aspect inside the root canal after the first (B) and second (C) replacement

Four months after starting treatment and 30 days after the last medication change, root canal filling was performed. The removal of the bioceramic medication was done in all the sessions through irrigation with 1% sodium hypochlorite and with the help of Kerr type files (Maillefer, Dentsply). EDTA (Biodinâmica Química e Farmacêutica Ltda) was also placed in the canals with the aid of a clinical clamp and shaken for 30 seconds by means of the E1 Irrisonic ultrasound tip (Helse Dental Tecnology, Santa Rosa de Viterbo - SP). After final irrigation and drying of the canal, a plug with bioceramic reparative cement (BIO-C® REPAIR - Angelus Indústria de Produtos Odontológicos S /A) was made in the last 2.0 mm apical root canal, inserted with condensers (Odous De Deus, Belo Horizonte, Minas Gerais, Brazil) (Figure 3).

Figure 3 - Bioceramic repair cement (A), appearance of the material (B) and its insertion into the root canal (C)

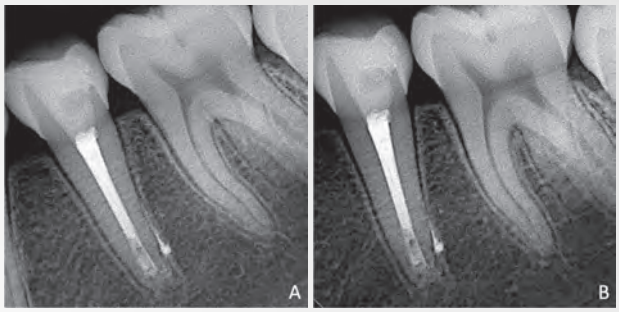


With the apical sealing well positioned, the filling, by the technique of vertical and lateral condensation, was performed with bioceramic filling cement (BIO-C® SEALER, Angelus Indústria de Produtos Odontológicos S/A), inserted into the root canal with its own tip positioned 3.0 mm below the plug, and gutta percha points (Odous de Deus, Belo Horizonte, Minas Gerais, Brazil) (Figure 4).

Figure 4 - Bioceramic sealing cement (A), cement insertion in the root canal (B) and gutta-percha points (C)

The patient did not report at any time the presence of painful symptoms during the months of treatment. In the preservation session, 6 months after root canal filling, the tooth did not present sensitivity to percussion tests radiographically, there was a regression of the periapical lesion and tissue formation in the apical region of the tooth (Figure 5).

Figure 5 - Radiographic aspect: after the sealing (A) and after 6 months of preservation (B)



CONCLUSION

The use of bioceramic materials in a case of apexification was effective in the process of recovery and neoformation of periapical tissues.

REFERENCES

1. Guerrero F, Mendoza A, Ribas D, Aspiazu K. Apexification: A systematic review. J Conserv Dent 2018;21(5):462-465.

2. Agrafioti A, Giannakoulas DG, Filippatos CG, Kontakiotis EG. Analysis of clinical studies related to apexification techniques. Eur J Paediatr Dent 2017;18(4):273-284.

3. Abusrewil SM, McLean W, Scott JA. The use of Bioceramics as root-end filling materials in periradicular surgery: A literature review. Saudi Dent J 2018;30:273–282.

Clinical Case 3

BIO-C® TEMP - Use of bioceramic Intracanal dressing in case of endodontic retreatment

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Intracanal medication is used extensively in the endodontist's clinical routine. For years, the gold standard for this procedure has been Calcium Hydroxide medication. Recently, Calcium Silicate-based products have been introduced as an alternative to this medication, as in cases of direct pulp capping.

A case report follows where Calcium Silicate based intracanal medication was used.

A 27-year-old male patient was referred for endodontic evaluation due to palpation discomfort in element 36. During anamnesis it was reported that the tooth had undergone endodontic treatment for two years and since then the tooth had an edema at a college entrance exam that disappeared and returned. At radiographic examination, we observed that the Previous treatment was unsatisfactory, confirming the diagnosis of chronic apical abscess.

After anesthesia and absolute isolation, root canal desaturation was performed with the rotary file system. For more effective disinfection, the irrigating substances (5.25% Sodium Hypochlorite and 17% EDTA) were activated ultrasonically (PUI). Based on the case history, we chose to perform it in two sessions, placing a Calcium Silicate- based medication (BIO-C® TEMP) and composite resin shielding between sessions. The patient was instructed to return within 15 days.

After this period there was a remission of signs and symptoms. BIO-C® TEMP was removed with saline solution associated with CUI (Continuous Ultrasound Irrigation) and a new irrigation with 5.25% Sodium Hypochlorite. For the root canal filling, the bioceramic based sealer (BIO-C® SEALER) was used.

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