

Bio-C[®] Sealer

Premixed bioceramic root canal sealer



History

Angelus was founded in 1994 in Londrina, Brazil. Since then, innovation has been the key aspect to developing products and building 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 health smiles all around the world.

Back in 2001 Angelus launched 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 innumerous projects are still under development for different areas of dentistry.

Contents

INTRODUCTION	5
PRESENTATION	5
INDICATIONS	6
TECHNIQUES OF USE	7
Root canal filling of permanent teeth	7
Internal resorption treatment	8
COMPOSITION/FORMULATION	9
TECHNICAL DATA	9
PHYSICAL AND CHEMICAL CHARACTERISTICS	10
Setting reaction	10
Radiopacity	11
Solubility	11
X-ray diffraction	12
Particle size	12
Chemical adhesion to dentin	13
Biocompatibility	14
MECHANISM OF ACTION	15
3 REASONS TO USE BIO-C® SEALER	16
CLINICAL CASES	17
BIBLIOGRAPHY	24

INTRODUCTION

BIO-C® SEALER is a premixed bioceramic endodontic cement.

In addition to the benefits of its bioceramic formulation such as stimulating tissue regeneration, bactericidal action and inhibiting bacterial infiltration, it presents a great advantage over traditional filling cements, **not requiring mixing**. Its ready-to-use presentation makes it easy to apply to the canal, simplifying the procedure with great time saving.

PRESENTATION



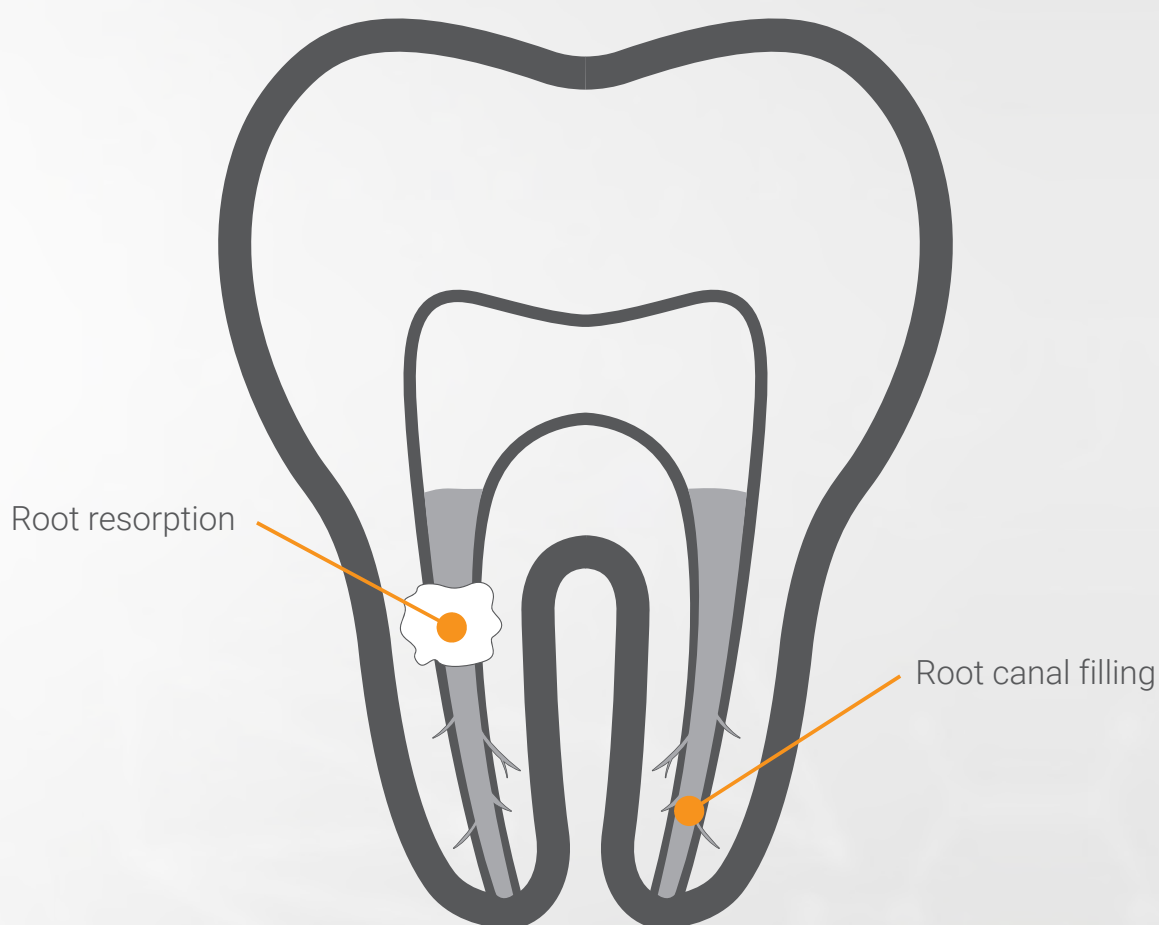
BIO-C® SEALER syringe has been specially developed to properly store materials with bioceramic characteristics, not allowing the material to come in contact with environment's humidity. The amount in each syringe is also an important feature, minimizing the risk of hardening the material in the syringe during subsequent uses.

Applicator tips allow taking the material to the most apical region of the canal, and they can be autoclaved before use.

INDICATION

The use of BIO-C® SEALER in filling procedures has shown excellent results. In addition to the physical seal provided by the expansion of the cement, it promotes a biological seal by the formation of an intermediate layer of mineralization.

In cases of non-communicating internal resorptions, the high pH of BIO-C® SEALER neutralizes the acidity of the medium, preventing the resorption to progress.



TECHNIQUES OF USE

A. Root canal filling of permanent teeth

Traditional Technique - Lateral Compression

1. Anesthetize, install rubber dam insulation and do biomechanical preparation of the canal;
2. Dry the canal with paper tips only without causing excessive drying;
3. Position the applicator tip and fill the canal with BIO-C® SEALER;
4. Insert the main gutta percha cone and later the accessory gutta percha cones;
5. X-ray to verify the correct filling of the canal;
6. Cut the cone at the desired height with heated instruments followed by vertical compaction;
7. Remove excess material from the canal walls with water, perform coronary sealing and restoration.

Single Cone Technique or Hydraulic Compression

1. Anesthetize, install rubber dam insulation and do biomechanical preparation of the canal;
2. Dry the canal with paper tips only without causing excessive drying;
3. Position the applicator tip and fill the canal with BIO-C® SEALER;
4. Insert the selected gutta percha cone;
5. X-ray to verify the correct filling of the canal;
6. Cut the cone at the desired height with heated instruments followed by vertical compaction;
7. Remove excess material from the canal walls with water, perform coronary sealing and restoration.

B. Internal resorption treatment

1. Anesthetize and install rubber dam insulation;
2. Remove granulation tissue from the resorption area with sharp curettes;
3. Neutralize the medium with BIO-C® -TEMP;
4. Remove the BIO-C® -TEMP in the next session;
5. Dry the canal with paper tips only without causing excessive drying;
6. Insert BIO-C® SEALER with the applicator tip into the entire canal, prioritizing the resorption site;
7. Fill the canal according to the selected technique;
8. Cut the cones on top of the resorption with heated instruments. Perform vertical compaction for better cement flow at the resorption site;
9. X-ray to verify the correct filling of the resorption site and the canal;
10. Fill the rest of the canal with gutta percha;
11. Perform coronary sealing with glass ionomer or other material of your choice
12. X-ray and follow for at least two years.

COMPOSITION/FORMULATION

COMPONENT	FUNCTION
Tricalcium Silicate (C ₃ S)	Mechanical resistance over time Calcium ions release
Dicalcium Silicate (C ₂ S)	Mechanical resistance over time Calcium ions release
Tricalcium Aluminate	Initial setting
Calcium Oxide	Calcium ions release
Zirconium Oxide	Radiopacity
Silicon Dioxide	Rheology agent
Polyethylene Glycol	Dispersing agent
Iron Oxide	Pigmentation

TECHNICAL DATA

% Calcium silicates	25 – 40%
Setting Time	≤ 240 minutes
Radiopacity	≥ 7.0 mm Al
pH	≈ 12
Flowability	23.46 mm
Particle Size	< 2 µm
Film Thickness	21 µm
Solubility	2.86%
Compressive Strength	9.724 ± 2.484 MPa

PHYSICAL-CHEMICAL CHARACTERISTICS

Setting reaction

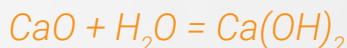
The setting time of BIO-C® SEALER will depend on the presence of moisture at the site it has been applied to the tooth structure. Water molecules present in the medium come in contact progressively with the particles of BIO-C® SEALER, causing hydration, setting of the cement and release of the active ions. These chemical reactions involve the hydration of Calcium Silicate compounds to produce a hydrated Calcium Silicate (C-S-H) gel, responsible for setting and formation of calcium hydroxide, according to the following equations:



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



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



Calcium Oxide + Water = Calcium Hydroxide

The formed Calcium Hydroxide dissociates rapidly into ions Ca^{2+} and OH^- , increasing the pH of the medium, and consequently, making the environment inhospitable for bacterial growth. On the other hand, the Calcium ions will react with the CO_2 present in the bloodstream, forming Calcium Carbonate. An extracellular matrix rich in fibronectin is secreted when in contact with these products, triggering the formation of a hard tissue. Histologically, the stimulation for the deposition of this tissue is observed through Calcite granulations, around which there is great condensation of fibronectin, which provides cell adhesion and differentiation.

The setting process is attributed to the Hydrated Calcium Silicate gel crystals that bind and bypass the aggregates (radiopacifier) giving the product mechanical strength. The setting time is related to the humidity availability in the medium and will occur around 240 minutes*.

*Tests were performed according to ISO 6876:2012.

Radiopacity

The product presents radiopacity ≥ 7 mm in the Aluminum, in accordance with ISO Standard 6876:2012.

The radiopacifier present in the product formula is Zirconium Oxide which, unlike other radiopacifiers used in Dentistry, does not promote tooth staining.



Image courtesy of Dr. Vicente Rocha.

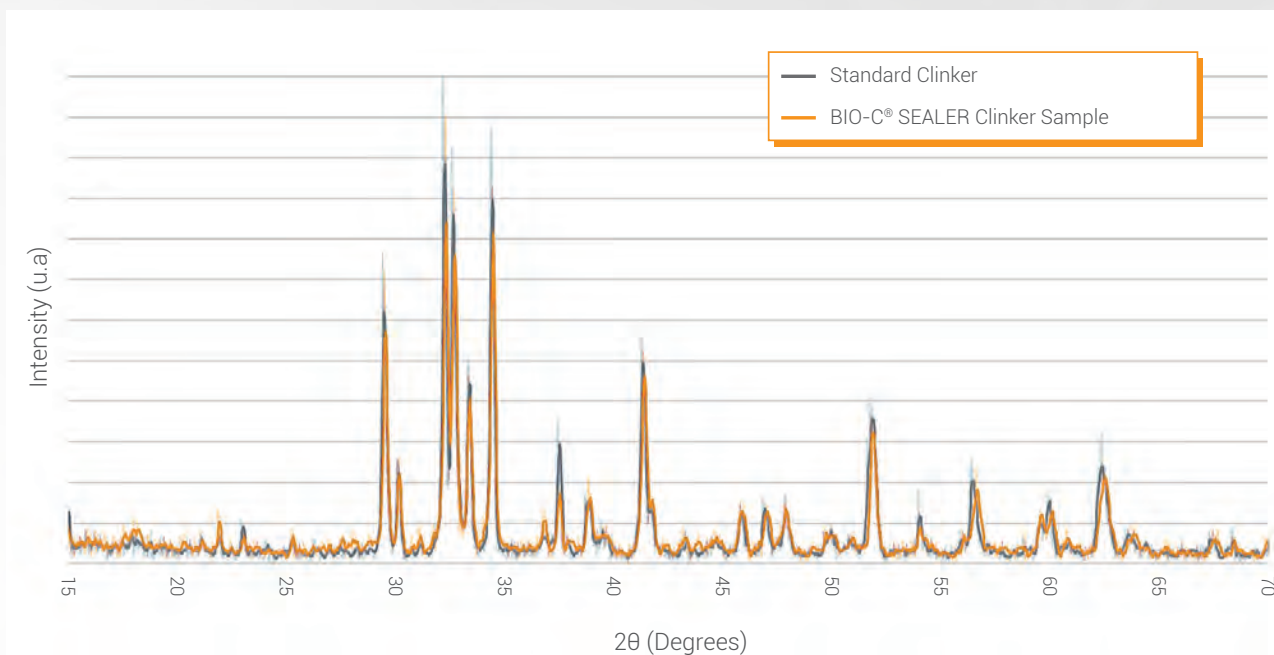
Solubility

The solubility of BIO-C® SEALER, according to the tests carried out by ISO Standard 6876:2012, presented results between 0.5 to 2.5% of solubility.

BIO-C® SEALER showed low solubility in accordance with ISO 6876:2012, ensuring adequate sealing of the filling material to the canal walls.

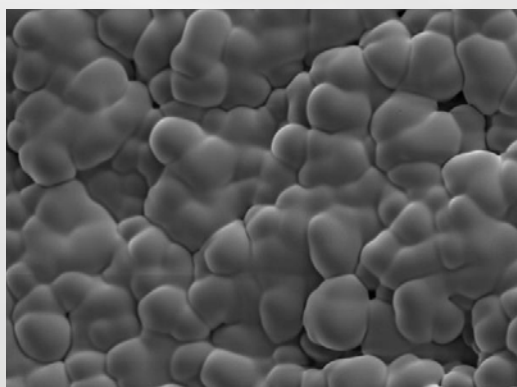
X-ray diffraction

These trials confirm the presence of Calcium Silicates, Calcium Oxide and Tricalcium Aluminate in the composition of BIO-C® SEALER. The presence of these crystalline structures is fundamental for the product to reach the ideal physical and biological properties.



Particle size

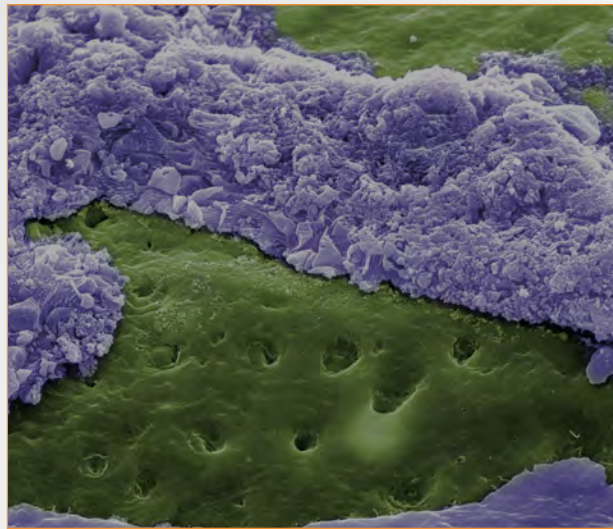
BIO-C® SEALER has a particle size of $< 2 \mu\text{m}$. Micronization improves rheological properties of the product, favoring the flow and penetration of the filling material into dentinal tubules. The reduced particle size makes the product more reactive, which favors the faster release of Ca^{2+} ions and OH^- ions associated with the healing process of endodontic lesions.



SEM FEG (5000X): Image obtained by secondary electron capture. (Siqueira, C.P)

Chemical adhesion to dentin

The contact of BIO-C® SEALER with moisture and tissue fluids releases active ions that interact with the organic and inorganic matrix of the dentin, promoting the formation of an intermediate area, called the Mineral Infiltration Zone (MIZ). This area of mineral infiltration in the dentin provides an excellent biological seal, minimizing possibilities of bacterial infiltration, that would lead to recontamination and endodontic failure.



BIO-C® SEALER adhered to dentin.

Biocompatibility

The BIO-C® SEALER is a bioceramic endodontic cement composed of Calcium Silicates classified as “device with long-term external communication”, that is, for more than 30 days (ISO Standard 7405). Based on this classification, and in compliance with the standards, cytotoxicity, skin irritation and sensitization tests were performed.

Cytotoxicity (ISO 10993-5)

The study of the cytotoxic potential of BIO-C® SEALER was performed *in vitro* using V-79 fibroblasts cell line. Cell viability was determined by the incorporation of MTT. The cytotoxicity presented is due to the high pH of the material, around 12, intentionally developed to render the environment inhospitable to bacterial proliferation.

In the presence of moisture, the formed Calcium Hydroxide raises the pH making the alkaline medium. Alkaline pH has a destructive effect on protein structures and can promote enzymatic denaturation as well as damage to the cell membrane.

However, the occurrence of chemical irritation by similar materials, such as Calcium Hydroxide, does not cause irreversible damages to the tissues. In practice, the presence of a non-extensive inflammatory process in underlying pulp and periapical tissues actually, leads to stimulation of tissue repair*.

Oral mucosa irritation (ISO 10993-10)

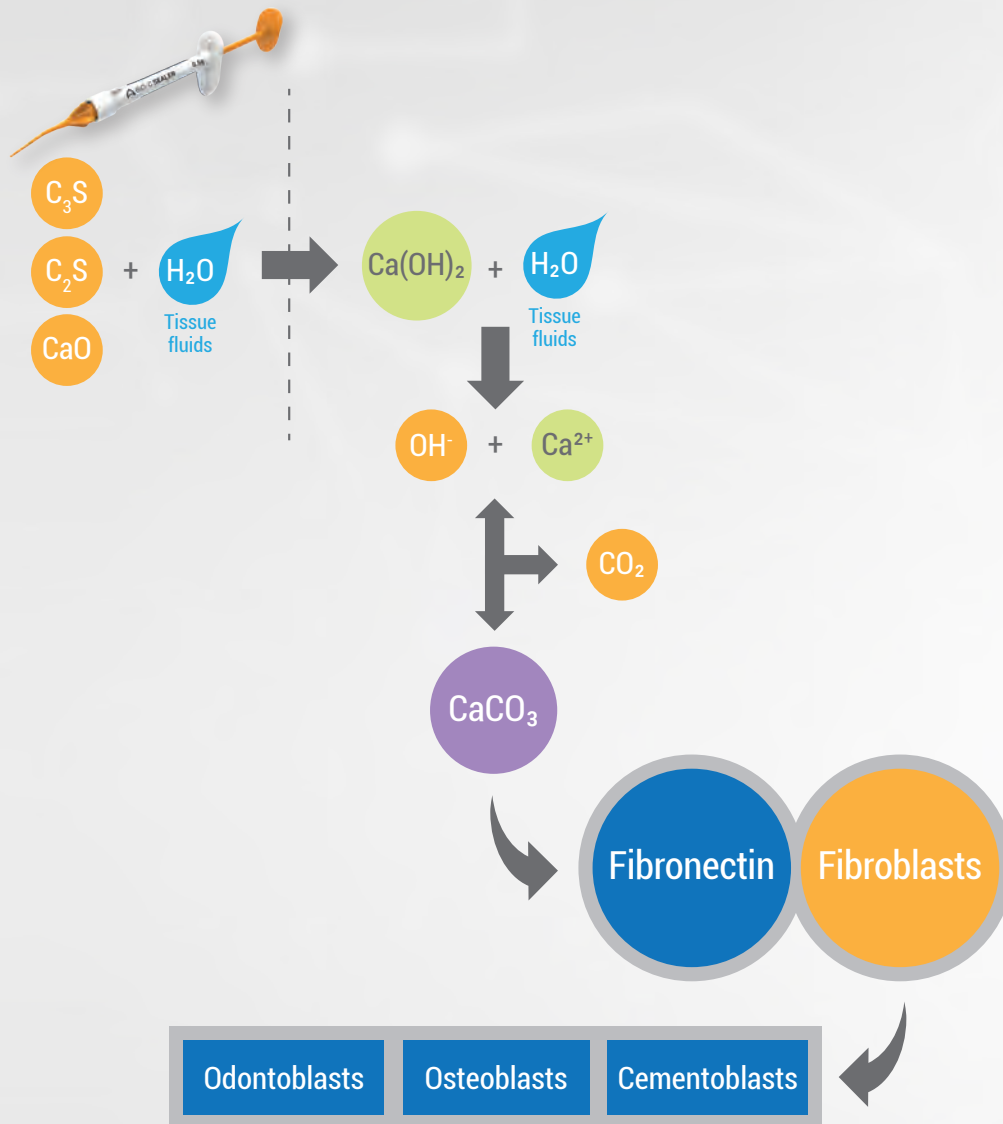
The possible irritant effects of BIO-C® SEALER were evaluated according to ISO 10993-10. Studies were conducted on oral mucosa of Syrian Hamsters. No macroscopic or microscopic changes were observed. The index of irritation obtained from the histopathological analyzes was null. It was therefore concluded that, under the study conditions, BIO-C® SEALER was classified as non-irritant to the oral mucosa of hamsters.

Skin sensitization (ISO 10993-10)

Cutaneous sensitization studies were conducted in CBA / J lineage mice according to ISO 10993-10, which determined that a sensitizing material induced lymphocyte proliferation in the lymph node near the site of application. Lymphocyte proliferation was assessed, by determining the incorporation of bromodeoxyuridine (BrdU) into the DNA of lymph node cells. According to the results obtained by the ELISA method, the stimulation index was 1.55. It is therefore concluded that BIO-C® SEALER is classified as a non-sensitizing material.

*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..

MECHANISM OF ACTION



The mechanisms of action of BIO-C® SEALER are closely associated with contact with tissue moisture and fluids. After the Calcium Oxide, present in the formulation of BIO-C® SEALER, comes into contact with the water present in the dentin tubules, Calcium Hydroxide is formed. Calcium Hydroxide also interacts with the fluids, dissociating in Calcium ion and Hydroxyl. The Hydroxyl ions are responsible for the pH increase, promoting bactericidal action of the product. The released Ca^{2+} ions react with CO_2 from the bloodstream, forming Calcium Carbonate (Calcite). An extracellular matrix rich in fibronectin is secreted as a result of the alkaline pH and attracted by Calcite, triggering the formation of hard tissue. Histologically, stimulation occurs to the deposition of this hard tissue, through granulations of Calcite, around which there is great condensation of fibronectin, which provides cell adhesion and differentiation.

3

Reasons to use BIO-C[®] SEALER

1

Premixed

No mixing required
Apply directly to canal

2

Resin-free

Easy to clean

3

High release of calcium ions

Stimulates tissue regeneration

Endodontic Success!

CLINICAL CASES



Immediate P.O.



10 months P.O.

Dental Surgeon	Warley Tavares, DDS, MSc, PhD
Start of treatment	04/2017
Patient's gender	Male
Age of patient	45 years-old
Initial diagnosis	Chronic Apical Periodontitis.
Used protocol	Instrumentation with NiTi, Sodium hypochlorite 2.5%, medication with Calcium Hydroxide for 10 days. Filling with gutta percha and BIO-C® SEALER.
Follow-up date	02/2018



Immediate P.O.



3 months P.O.

Dental Surgeon	Warley Tavares, DDS, MSc, PhD
Start of treatment	12/2017
Patient's gender	Male
Age of patient	45 years-old
Initial diagnosis	Reabsorption, Necrosis, Chronic Apical Periodontitis.
Used protocol	Instrumentation with NiTi, Sodium hypochlorite 2.5%, medication with Calcium Hydroxide for 10 days. Filling with gutta percha and BIO-C® SEALER.
Follow-up date	03/2018



Immediate P.O.



9 months P.O.

Dental Surgeon	Warley Tavares, DDS, MSc, pHD
Start of treatment	03/2018
Patient's gender	Female
Age of patient	65 years-old
Initial diagnosis	Asymptomatic Primary Apical Periodontitis.
Used protocol	Chemical-Mechanical Preparation, Final cleaning systems, antimicrobial Photodynamic Therapy (aPDT) and Intracanal.
Follow-up date	12/2018



Initial



2 months P.O.

Dental Surgeon	Patricia Ferrari, DDS, MSc, pHD
Start of treatment	07/2018
Patient's gender	Female
Age of patient	44 years-old
Initial diagnosis	Asymptomatic Apical Periodontitis.
Used protocol	Chemical-Mechanical Preparation, Final cleaning systems, antimicrobial Photodynamic Therapy (aPDT) and Intracanal.
Follow-up date	10/2018


Initial

4 months P.O.

Dental Surgeon	Patricia Ferrari, DDS, MSc, pHD
Start of treatment	06/2018
Patient's gender	Female
Age of patient	62 years-old
Initial diagnosis	Acute Periapical Abscess.
Used protocol	Chemical-Mechanical Preparation, Final cleaning systems, antimicrobial Photodynamic Therapy (aPDT) and Intracanal Medication.
Follow-up date	11/2018


Initial

Immediate P.O.

Dental Surgeon	Vicente Rocha, DDS
Patient's gender	Female
Age of patient	40 years-old
Initial diagnosis	Acute pulpitis.
Diferential	Case with extremely adapted and esthetic crown where the least possible preparation was requested, where the dentist reports that how the BIO-C SEALER syringe facilitated insertion.



Initial



Immediate P.O.

Dental Surgeon	Vicente Rocha, DDS
Start of treatment	04/2018
Patient's gender	Male
Age of patient	79 years-old
Initial diagnosis	Acute abscess
Used protocol	Drainage, intracanal medication and filling with BIO-C SEALER.
Follow-up date	11/2019

The use of BIO-C SEALER and BIO-C REPAIR bioceramic-based sealers in periapical surgery: a case report

Clauber Romagnoli; Douglas G N Cortez; Renato Interliche

ABSTRACT

This case report aims to present a clinical case in which periapical surgery with root-end filling was performed where it was concluded with the use of new bioceramic-based sealers. It was verified the facility in the use of these materials as well as a fast bone repair in a short period. It can be concluded that, if the results are maintained in the long term, these sealers may be the first choice for this clinical procedures.

INTRODUCTION

The failures in endodontic treatments are not uncommon and most of them results from an imperfect root canal decontamination during the first treatment. Some endodontic failures cannot be performed by retreatment. As an example, we have the cases of true cysts, extraradicular bacterial biofilm and fractures not detected during the initial treatment. In these clinical situations, complementation by root-end surgery is the treatment of choice.

Another situation where we can use the root-end surgery to reestablish periapical health is when the tooth in question was recently rehabilitated and, for reasons such as adequate aesthetics and financial, the choice is not made to remove the prosthesis for retreatment. In these cases, surgery is more useful and quick in resolving the situation.

Currently, what is proposed for a surgical modality such as this is the removal of the periapical lesion, a root-end resection followed by a root-end treatment and filling.

For the last step (root-end filling), several materials have already been used over the past few decades. Since silver amalgam, zinc oxide eugenol based sealer to the current bioceramics-based sealers. Such bioceramic-based sealers are derived from MTA and have improved properties when compared to it.

In addition to the excellent biological properties, these new sealers much better facility during it is use. They are already ready-for-use, can be used in humidity environment and are easy to handle.

Thus, the aim of this case report is to present a clinical case of a root-end surgery in the maxillary canine using the association of Bio-C Sealer and Bio-C Repair.

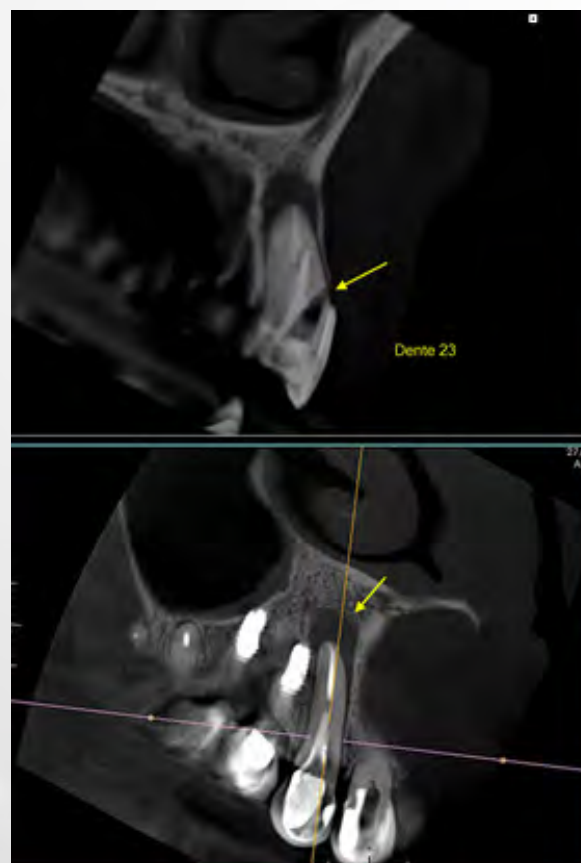
CASE REPORT

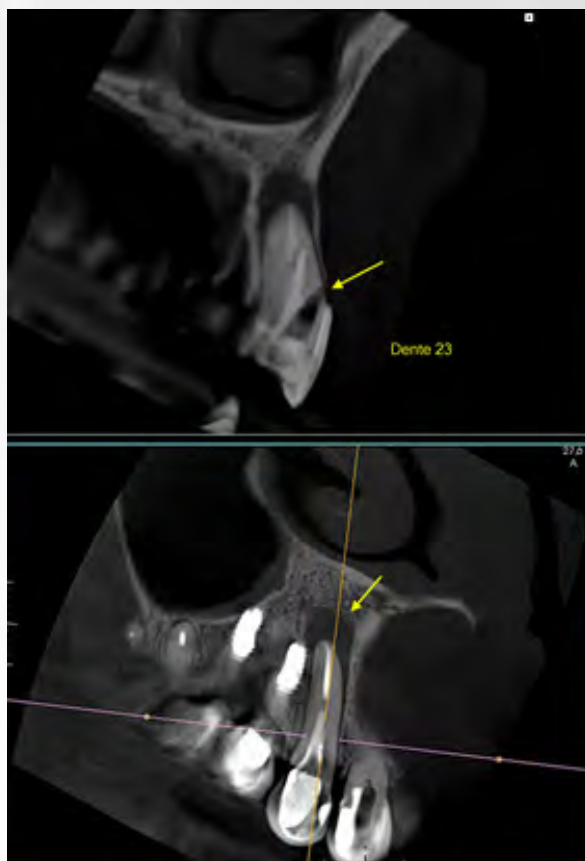
The patient G. L., XXX years old, without any

systemic health problems, was referred to the private office for the clinical evaluation and management of tooth 23, which showed by a periapical radiograph an evident periapical lesion and possible perforation in the buccal face resulting from an attempt to access and remove the root canal post.

After clinical and radiographic examination, a cone beam computed tomography was performed to better diagnosis and to establish the treatment plan of the involved tooth (Figure 1).

Figure 1





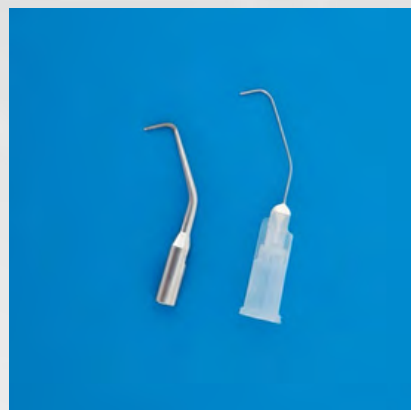
By observing the perforation and deviation of the previously installed root canal post, it was suggested to perform a root-end surgery to remove the periapical lesion, followed by a root-end resection, treatment and filling. Concomitantly, the root canal perforation was restored on the buccal surface with photoactivated composite resin.

After local anesthesia (xxxxxx), an intrasulcular gingival incision was made between teeth 24, 23 and 22, followed by a relaxing incision in the distal-buccal region of tooth 24. The triangular flap was raised and the lesion was located.

The lesion was removed with curettes and the root apex was sectioned using an ultrasonic tip (Blade Sonic – Helse Ultrassonic, Santa Rosa do Viterbo, Brazil). The root-end treatment also was made using an ultrasonic tip (E1 – Helse Ultrassonic, Santa Rosa do Viterbo, Brazil) with a depth equal to the active part of the tip.

After the root-end treatment, a sufficient amount of Bio-C Sealer was inserted into the cavity in order to completely fill the preparation made. This was achieved with a previously curved irrigation needle following the angles of the ultrasonic tip (Figure 2).

Figure 2 - Irrigation needle previously prepared for surgery



With the cavity filled with more flowable root canal sealer (Bio-C Sealer), a more dense cement stopper, Bio-C Repair, was accommodated, using a surgical presser (Figure 3).

Figure 3 - Ultrasonic tip for root-end treatment and Bio-C Repair cement at the tip of the surgical presser



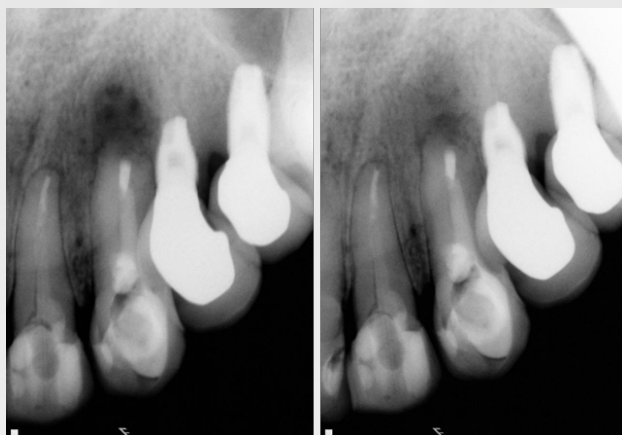
After the complete filling of the cavity is observed, the material excess is removed by washing the cavity with saline solution (Figure 4).

Figure 4 - Periapical radiograph during the root-end surgery verifying the complete root-end filling



After the clot formation, interrupted sutures were installed and the patient was medicated with antibiotics and anti-inflammatories for 5 days. Chlorhexidine mouthwashes were also recommended. The sutures were removed after 10 days. The radiographic follow-up were performed after 30 and 90 days (Figures 5 and 6).

Figure 5 and 6 - Periapical radiographic follow-up after 30 and 90 days, showing a fast regression of the periapical lesion and a bone repair



DISCUSSION

The current endodontics has a high success rate due to the great advances that have occurred in all treatment steps, as well as the new materials, techniques and equipment available. Even so, there are still cases where there is no desired success, requiring re-intervention procedures.

The first choice for unsuccessful cases is non-surgical retreatment, but there are situations where we cannot rule out the use of surgery to complement the initial treatment and/or retreatment. In this case report, we were able to observe the fast regression of the periapical lesion resulting from its surgical elimination associated with a material that has an osteogenic potential (bioceramic-based sealers) (Giacomino et al., 2019). However, future periodic follow-ups will still be performed for long-term confirmation of the surgical success.

As for the physicochemical characteristics of these materials, we can expect excellent properties, since they are derived from MTA and this has already been extensively researched and its effectiveness is proven for cases like the one presented.

The ease of use of these cements should be emphasized. Ready-to-use materials facilitate and speed up care, making the operator spend less time with his patient in the chair. This noticeably improves service.

Another strength of ready-to-use materials is independence in preparation, that is, they do not allow errors to occur during preparation by the operator. Powder/liquid ratios, mixing time or preparation do not exist in these types of dental materials. With this, it eliminates the possibility of errors or misuse of the dental material.

We cannot evaluate the issue of postoperative pain produced by these materials in isolation, given that in situations such as in this clinical case, we routinely prescribe medications for pain control and this can certainly mask an extrapolation of the material's effect on this issue.

Finally, the results show that bioceramics promote excellent results. Again, it is quite evident a higher speed of recovery in the cases treated with this family of materials.

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- LIMA, NFF et al. Cimentos biocerâmicos em endodontia: revisão de literatura. *Revista da Faculdade de Odontologia-UPF*, v. 22, n. 2, 2017.
- SANTOS, J. L. Cimentos Biocerâmicos: breve revisão bibliográfica e apresentação de casos clínicos. 38 f. Monografia para título de especialista em Endodontia - Universidade Norte do Paraná, Londrina, 2018.

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SIQUEIRA, P.C. Caracterização de elementos químicos de cimentos biocerâmicos. Tese de doutorado UFG - Goiania, 2017

Abstract

Conclusion: The chemical composition of the cements evaluated was similar, having as main difference the radiopacifying agent. The surfaces of the cements showed uniform pattern distribution of the particles.

BERNARDES, R.A.; Ready-to-use bioceramic materials in apical resorption: A clinical case. Roots, v.1 2018

Abstract

Conclusion: Both products showed the ability and efficiency to be used in repair of resorptions and filling root canals, respectively. - CLINICAL CASE

CASTRO, L.G.S.D.; CIRURGIA PARENDODÔNTICA COM UTILIZAÇÃO DE CIMENTO BIOCERÂMICO – RELATO DE CASO CLÍNICO. Monografia apresentada ao Instituto de Pós-Graduação – THUM – Curso: ESPECIALIZAÇÃO EM ENDODONTIA, para obtenção do título de Especialista em ENDODONTIA. JOINVILLE, 2019

Abstract

The bioceramic cements facilitate the repair of the periapical tissue, sealing perfectly if well applicated on the prepared cavity and has easy manipulation and insertion to the desired area. CLINICAL CASE

LOPEZ-GARCIA, S.; ET AL . Biological Effects of New Hydraulic Materials on Human Periodontal Ligament Stem Cells. J. Clin. Med. 2019, 8, 1216; doi:10.3390/jcm8081216

Abstract

Bio-C Repair displayed higher cell viability, cell adhesion and migration rates than Bio-C Sealer.

ZORDAN-BRONZEL, C.L.; ET AL. Evaluation of Physicochemical Properties of a New Calcium Silicate–based Sealer, Bio-C Sealer. JOE Volume -, Number -, - 2019

Abstract

Bio-C Sealer is a new calcium silicate–based root canal sealer that has an adequate setting time, flow, and radiopacity. Although this material had high solubility, the micro-CT assessment indicated low volumetric change.

VIANA, L.V.P.; ATIVIDADE ANTIMICROBIANA DE CIMENTOS OBTURADORES ENDODÔNTICOS BIOCERÂMICOS FRENTE A ENTEROCOCCUS FAECALIS EM BIOFILME – ESTUDO IN VITRO. Dissertação de Mestrado apresentada ao Programa de Pós-graduação da Universidade Federal do Ceará, para obtenção do Título de Mestre. FORTALEZA, 2019

Abstract

The results showed an antimicrobial activity of Bio-C Sealer, Sealer Plus BC and BioRoot RCS sealers, when in direct contact conditions, which were statistically different from the control group ($P < 0.05$). Considering of the above, and the conditions of the study, it was concluded that the bioceramic sealers presented antimicrobial action against bacterial biofilms of the two strains of *E. faecalis* tested when in direct contact condition.

FERRAZ, D.C.. AVALIAÇÃO IN VITRO DA INIBIÇÃO DA OSTEOLASTOGENESE PROMOVIDA POR CIMENTOS ENDODÔNTICOS BIOCERAMICOS EM CULTURA PRIMÁRIA DE OSTEOLASTOS. Trabalho de conclusão de curso apresentado a Faculdade de Odontologia da UFU, como requisito parcial para obtenção do título de Graduado em Odontologia. Uberlândia, 2019

Abstract

Inferimos que em condições que se deseje inibir o processo de reabsorção promovido pelos clastos o extravasamento de cimentos biocerâmicos ou a obturação no limite apical parece ser uma alternativa interessante, uma vez que no presente estudo os melhores resultados foram observados nas maiores concentrações. De todos os cimentos avaliados, a maior inibição da osteoclastogênese foi observada para o BIC na concentração de 1:20. OSTEOGENESIS

LOPEZ-GARCIA, S.; ET AL. Comparative Cytocompatibility and Mineralization Potential of Bio-C Sealer and TotalFill BC Sealer. *Materials* 2019, 12, 3087

Abstract

Based on the results from this study, Bio-C Sealer and TotalFill BC Sealer demonstrated better cytocompatibility in terms of cell viability, migration, cell morphology, cell attachment, and mineralization capacity than AH Plus.

LOPEZ-GARCIA, S.; ET AL. Biological Effects of New Hydraulic Materials on Human Periodontal Ligament Stem Cells. *J. Clin. Med.* 2019, 8, 1216; doi:10.3390/jcm8081216

Abstract

Moreover, SEM showed abundant cells adhered on Bio-C Repair and a moderate number of cells attached on Bio-C Sealer. Finally, EDX analysis identified higher percentages of Ca and O in the case of Bio-C repair than with Bio-C sealer, while other elements such as Zr and Si were more abundant in Bio-C sealer. Conclusions: Bio-C Repair displayed higher cell viability, cell adhesion and migration rates than Bio-C Sealer.

SILVA, E.J.N.L.; ET AL. Determining the setting of root canal sealers using an in vivo animal experimental model. Clinical Oral Investigations <https://doi.org/10.1007/s00784-020-03496-x>. ppublished on line august/2020

Abstract

AH Plus and BioC Sealer set under both in vitro and in vivo test conditions. TotalFill BC Sealer did not set under in vitro conditions but did after 1 week under in vivo conditions. Sealapex did not set under either in vitro or in vivo conditions.

INTERLICHE, R; ET AL. Case report: The use of Bio-C Sealer and Bio-C Repair in periapical surgery. <<<https://us.dental-tribune.com/clinical/case-report-the-use-of-bio-c-sealer-and-bio-c-repair-in-periapical-surgery/>>>

Abstract

This case report aims to present a clinical case in which periapical surgery with root-end filling was performed with the use of new bioceramic-based sealers. The ease handle of these materials was verified as well as a fast bone repair in a short period. It was concluded, and, if the results are maintained in the long term, these sealers may be the first choice for these clinical procedures.

CARDOSO, R.M.; ET AL. TRATAMENTO DE LESÃO ENDODÔNTICA PRIMÁRIA COM ENVOLVIMENTO PERIODONTAL: RELATO DE CASO. Rev. UNINGÁ, Maringá, v. 56, n. S3, p. 139-145, jan./mar. 2019

Abstract

Radiographic follow up was showed significant repair of the periapical region. The evaluation of the signs and the correlation of the diagnostic tests were of paramount importance to reach the diagnosis and the adequate management.

ROCHA, B.M.; ET AL. ANÁLISE DA CAPACIDADE DE PREENCHIMENTO DOS CANAIS RADICULARES DE CIMENTOS ENDODÔNTICOS. Braz. J. Surg. Clin. Res.V.31 n.1,pp.39-43 (Jun - Ago 2020)

Abstract

All sealers tested were effective in filling the root anatomy irregularities reaching a percentage above 98%, with Bio-C Sealer having the lowest void indexes, followed by AH Plus and Sealer Plus. FLOWABILITY

KOMABAYASHI, .; ET AL. Comprehensive review of current endodontic sealers. Dent Mater J 2020;Mar 24. doi: 10.4012/dmj.2019-288.

Abstract

Compared to AH Plus, tricalcium silicate sealers show the lowest relative microleakage among the sealers assessed, followed by silicone sealers and other non-AH Plus epoxy resin sealers. Tricalcium silicate sealers also exhibit the most favorable antimicrobial effect and excellent biocompatibility. Future sealers developed should ideally combine a hermetic seal with therapeutic effects.

MURAKAMI, G.J.C.. AVALIAÇÃO DO RETRATAMENTO ENDODÔNTICO EM CANAIS RADICULARES OBTURADOS COM CIMENTO BIOCERÂMICO. Dissertação apresentada ao Programa de Pós-Graduação em Odontologia, Setor de Ciências da saúde, Universidade Federal do Paraná, como requisito parcial à obtenção do título de Mestre em Odontologia. CURITIBA, 2019

Abstract

It is concluded that the retreatment with reciprocating instruments supplemented with additional cleaning methods were not able to completely remove the sealing material. The complementary methods significantly potencialized the root canal cleaning, independent of the sealant cement. RETREATMENT

SAVI, N.G.. AVALIAÇÃO DA RADIOPACIDADE DE DIFERENTES CIMENTOS ENDODONTICOS ATRAVÉS DA ESCALA DE TONS DE CINZENTO. Trabalho de conclusão de curso apresnetado na Faculdade Meridional IMED como requisito para obtenção de grau em odontologia, PASSO FUNDO 2109

Abstract

It is concluded that the retreatment with reciprocating instruments supplemented with additional cleaning methods were not able to completely remove the sealing material. The complementary methods significantly potencialized the root canal cleaning, independent of the sealant cement. RADIOPACITY

TANOMARU-FILHO, M.; ET AL. Flow, Filling Ability and Apical Extrusion of New Calcium Silicate-Based Sealers: A Micro-Computed Tomographic Study. Dental Oral Biology and Craniofacial Research doi: 10.31487/j.DOBCCR.2020.03.04 Volume 3(3): 2-6, 2020

Abstract

Bio-C Sealer and Sealer Plus BC had greater flow and proper filling ability in the apical third. However, these sealers presented high volume of apical extrusion. NeoMTA Plus provided less sealer extrusion, low flow, and more presence of voids.

GIUROIU, C.; ET AL. COMPLETE HEALING OF A LARGE PERIAPICAL LESION FOLLOWING CONSERVATIVE ROOT CANAL TREATMENT IN ASSOCIATION WITH PHOTODYNAMIC THERAPY: A CASE REPORT WITH 5TH-YEAR FOLLOW-UP. Romanian Journal of Oral Rehabilitation Vol. 12, No. 1, January - March 2020

Abstract

The addition of photodynamic therapy to conventional endodontic treatment can increase the reduction of microbial load in the endodontic space and the long-term success rate in non-surgical treatment of large periapical cysts.

SILVA, J.C. OBTURAÇÃO ENDODÔNTICA COM CIMENTO BIOCERÂMICO – RELATO DE CASO CLÍNICO. Trabalho de conclusão de curso de pós graduação apresentado ao Centro de Pós Graduação em Odontologia – CPGO / Faculdade Sete Lagoas – FACSETE, como requisito parcial para a obtenção do título de especialista em Endodontia RECIFE, 2019

Abstract

The treatment was performed with the Sequence Rotary File system (SRF - MK Life), chlorhexidine gel 2% as an irrigating solution and bioceramic cement (BIO C Sealer) as a sealing material. CLINICAL CASE

CARNEIRO, V.F. EFEITO DA AGITAÇÃO ULTRASSÔNICA NA PENETRAÇÃO INTRATUBULAR E NA RESISTÊNCIA DE UNIÃO À DENTINA RADICULAR DE CIMENTOS OBTURADORES À BASE DE SILICATO DE CÁLCIO. Dissertação de Mestrado , Universidade Federal do Ceará, como requisito parcial para obtenção do Título de Mestre em Odontologia. FORTALEZA, 2020

Abstract

Depending on the results, under the conditions of the present study, it can be concluded that ultrasonic agitation did not influence intratubular penetration, but significantly increased the parameters of bond strength in the BCS groups, at the most cervical level, and SPBC, at the most apical level; also, that the tested bioceramic sealers showed a pattern of intratubular penetration and bond strength very similar to each other and with AH Plus.

TAVARES, W.L.F.; ET AL. Guided Endodontics in Complex Scenarios of Calcified Molars. IEJ Iranian Endodontic Journal 2020;15(1): 50-56

Abstract

The use of guided endodontics in cases of calcification in molars was demonstrated to be a viable and reliable alternative treatment. The technique was based on 3D planning. Clinical case

CARVALHO, L.K.C.G. ANÁLISE DE SISTEMAS RECIPROCANTES QUANTO A PRODUÇÃO DE

DESVIOS E REMOÇÃO DE MATERIAL OBTURADOR EM CANAIS RADICULARES: ESTUDO IN VITRO. Tese apresentada como requisito para obtenção do título de doutorado .Universidade Federal do Rio Grande do Norte – UFRN. NATAL - 2019

Abstract

It was concluded that most of the reciprocal systems tested in the retreatment promoted apical deviation, but the WA1 system was able to produce less deviation in the vestibular Mesio canal. The reciprocal systems used were able to remove much of the shutter material, but not in its entirety, the apical third was the one that most difficult to remove the shutter material, however, the WA1 system was the one that performed higher in this third. RETREATMENT

TAVARES, W.L.F. Endodontic Obturation Using a Bioceramic Sealer. Inside Dentistry April 2020 Volume 16, Issue 4

Abstract

In the cases presented, the performance of proper root canal disinfection prior to the 3-dimensional filling of the root canals was paramount to the success of the procedures. The complete healing of the periapical tissues and elimination of postoperative pain or discomfort during the short follow-up period after each case (ie, 3 to 18 months) was remarkable. The bioceramic root canal sealer was shown to be a valuable material with considerable biologic properties that contributed to fast periapical healing.

OKAMURA, T., ET AL. Biocompatibility of a High-Plasticity, Calcium Silicate-Based, Ready-to-Use Material. Materials 2020, 13, 4770

Abstract

The Bio-C Sealer presented weaker cytotoxicity than the Calcipex II sealer containing Ca(OH)_2 in an in vitro system. In addition, the Bio-C sealer is biocompatible and safe to use in close contact with the periapical tissue. Although the induction of periradicular inflammation was not reported, the Bio-C sealer was shown to favor tissue repair. Furthermore, the sealer may contribute to the mineralization process of the periapical tissue, which demonstrates its bioactive potential. The findings of the present study are relevant for clinicians looking to explore the use of the Bio-C Sealer in clinical practice to achieve better outcomes in their patients.

VOLPONI.A.; ET AL. Micro-computed Tomographic Assessment of Supplementary Cleaning Techniques for Removing Bioceramic Sealer and Gutta-percha in Oval Canals. JOE Volume 46, Number 12, December 2020

Abstract

Cleaning with the XPR instrument was more effective in removing residual Bio-C sealer and gutta-percha from oval canals than the other supplementary techniques tested. None of the techniques completely removed the residual root canal filling material

SILVA, E.C.A.; ET AL. Biocompatibility and Bioactive Potential of New Calcium Silicate-based Endodontic Sealers: Bio-C Sealer and Sealer Plus BC. JOE Volume 46, Number 10, October 2020

Abstract

BC and SPBC are biocompatible to be used in close contact with periapical tissue, inducing a mild inflammatory reaction and favoring repair. In addition, both sealers may contribute to the periapical tissue mineralization process because they demonstrate bioactive potential.

SANTOS-JUNIOR, A.O.; EL AL. Effect of obturation technique using a new bioceramic sealer on the presence of voids in flattened root canals. Braz. Oral Res. 2021;35:e028

Abstract

The percentage of voids in the filled root canals was evaluated, and the data were statistically analyzed using the unpaired t-test ($\alpha = 0.05$). The root canals filled using the thermoplastic technique created a smaller percentage of voids in the cervical/middle thirds than those filled using the single-cone technique ($p < 0.05$). There was no difference in the percentage of voids using either technique in the apical third ($p > 0.05$). The flattened root canals in the cervical/middle thirds were better filled using the ready-to-use calcium silicate-based sealer associated to the thermoplastic technique, compared with the single-cone technique. In the apical third, the techniques showed similar filling ability.

HERNADEZ, P.A.;ET AL. Obturación endodóntica de las raíces mesiales de molares inferiores con sellador Bio-C Sealer y AHPlus Rev. Methodo 2020;5(4):129-135.

Abstract

Within the limitations of the current study, it can be concluded that both sealers, AH Plus and Bio-C Sealer, were adequate to fill mesial- buccal and mesial-lingual root canals of mandibular molars. Although, the volume of empty spaces was lower when Bio-C Sealer bioceramic was used. FILLING ABILITY

EID, C.; ET AL. Impact of Warm Vertical Compaction on the Sealing Ability of Calcium Silicate-Based Sealers: A Confocal Microscopic Evaluation. *Materials* 2021, 14, 372. <https://doi.org/10.3390/ma14020372>

Abstract

No differences were observed comparing the HiFlow with the Bio-C sealer. Although the BC sealers are recommended with the SC technique, it might be interesting to reconsider the application of Schilder's principles with these newly introduced sealers. WARM TECHNIQUE

SILVA, E.J.N.L.; ET AL. Determining the setting of root canal sealers using an in vivo animal experimental model. *Clinical Oral Investigations* <https://doi.org/10.1007/s00784-020-03496-x>

Abstract

AH Plus and BioC Sealer set under both in vitro and in vivo test conditions. TotalFill BC Sealer did not set under in vitro conditions but did after 1 week under in vivo conditions. Sealapex did not set under either in vitro or in vivo conditions.

BARBOSA, V.M.; ET AL. Antibacterial Activity of a New Ready To-Use Calcium Silicate-Based Sealer. *Brazilian Dental Journal* (2020) 31(6): 611-616 <http://dx.doi.org/10.1590/0103-6440202003870>

Abstract

In conclusion, the results indicate that fresh Bio-C Sealer does not inhibit *S. mutans* growth, but exhibits antibacterial activity against *E. faecalis*, *S. aureus*, *P. aeruginosa* and *E. coli*. After setting, the Bio-C Sealer exhibits an antimicrobial potential comparable to that of the other sealers evaluated in *E. faecalis* biofilm, but lower than that of EndoFill for *S. mutans* biofilm.

SILVA, E.J.N.L.; ET AL. Determining the setting of root canal sealers using an in vivo animal experimental model. *Clinical Oral Investigations* <https://doi.org/10.1007/s00784-020-03496-x>

Abstract

The following in vitro results were obtained by using ISO 6876 methodology: AH Plus set after a mean time of 423 ± 20 min and 476 ± 35 min, in metal and plaster molds, respectively. BioC Sealer set after 7 days (in dental plaster molds), whereas TotalFill BC Sealer and Sealapex did not set even after 25 days in both tested conditions (metal or dental plaster molds). Using the novel in vivo methodology, AH Plus, BioC Sealer, and TotalFill BC Sealer set after both 7 and 30 days. In contrast, Sealapex did not set at either time point. Conclusions AH Plus and BioC Sealer set under both in vitro and in vivo test conditions. TotalFill BC Sealer did not set under in vitro conditions but did after 1 week under in vivo conditions. Sealapex did not set under either in vitro or in vivo conditions. Clinical relevance The influence of the testing conditions on the setting results is a clear indication that new in vivo experimental models should be useful in future studies on Bioceramics root canal sealers.



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