BRASSELER USA®

BC SEALER ion+™

Brasseler USA's next generation of bioactive cement

- IDEAL FOR COLD & WARM OBTURATION
- IMPROVED HANDLING
- INCREASED RADIOPACITY
- ENHANCED BIOACTIVITY

The Next Generation of Bioactive Sealer!

BC Sealer ion+ is a patented, revolutionary, premixed bioceramic sealer based on Akermanite, which is a well-established mineral used in the medical field due to its osteogenic and angiogenic properties. Unlike all other bioceramics, BC Sealer ion+ releases both calcium and magnesium ions for maximum bioactivity.

- Cold and Warm Techniques
- Improved Handling
- Increased Radiopacity
- Enhanced Bioactivity
  - 2x Tissue Repair
  - Stem Cell Differentiation
  - Micronized Particles
  - Antibacterial Effect

BC Sealer™ ion+™

1	2g syringe
20	Applicator Tips
1	Instructions for Use (IFU)
1	Safety Data Sheet (SDS)

Order No. 5031639U0

BC Sealer™ ion+™ Bulk:

2	2g syringe
40	Applicator Tips
1	Instructions for Use (IFU)
1	Safety Data Sheet (SDS)

Order No. 5031640U0

Order No. 5031642U0

COMPOSITION

	BC Sealer ion+	BC Sealer
Bioceramic components	Calcium and Magnesium Silicate (17%) Calcium Sulfate Hemihydrate (5%) Calcium Oxide (2%) Potassium Sulfate (2%) **TOTAL 26%**	Tricalcium Silicate (20-35%) Dicalcium Silicate (5%) Calcium Hydroxide (1-4%) Calcium Phosphate **TOTAL 27%**
Radiopacifier	Zirconium Oxide (40%)	Zirconium Oxide (35-45%)
Fillers and thickening components	Polyethylene Glycol (32.5%) Thickening Agents (2.5%)	Propylene Glycol (32.5%) Thickening Agents (2.5%)

✓ RESIN FREE

✓ EUGENOL FREE

✓ ALUMINUM FREE

PHYSICAL PROPERTIES

BC Sealer ion+ has similar properties compared to traditional BC Sealer

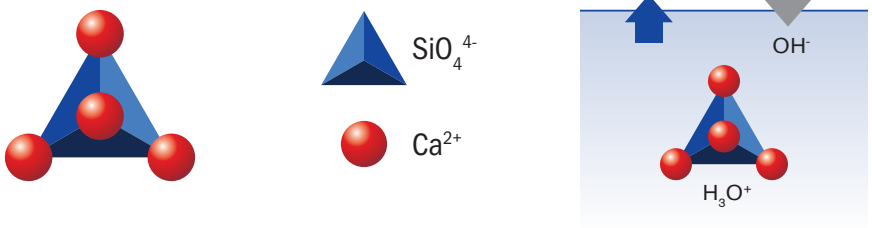
	BC Sealer ion+[1]	BC Sealer [2]	ISO 6876: 2012 *(Standard Value)*
Radiopacity	6.8 ± 0.8 Al	4.8 ± 0.6 Al	> 3 mm Al
Flowability	29.5 ± 2.6 mm	19.9 ± 0.5 mm	> 17 mm
Film Thickness	43.0 ± .01 µm	46.7 ± 0 µm	< 50 µm

1. Assessment of Bio-C-ION sealer, Birmingham Material Testing Services BiMaTS, 2024.

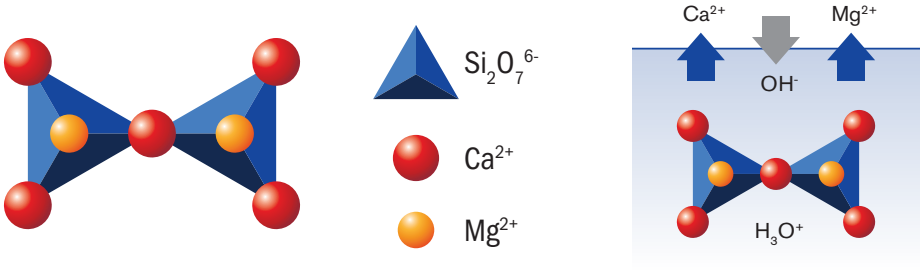
2. Characterization and Assessment of Physical Properties of 3 Single Syringe Hydraulic Cement-based Sealers JOE, vol.50, Number 03, March 2024.

MECHANISM OF ACTION

The structural differences between simple tetrahedral nesosilicates (e.g. C_3S) and double tetrahedral sorosilicates (e.g. Akermanite) significantly influence their ion release behavior and subsequent bioactivity. While C_3S provides rapid Ca^{2+} release for immediate effects, Akermanite's controlled release of both Ca^{2+} and Mg^{2+} offers prolonged bioactivity, enhanced structural stability, and multifaceted biological benefits.



When in contact with water, the Calcium Sylicate crystal releases only Calcium ions into the medium.



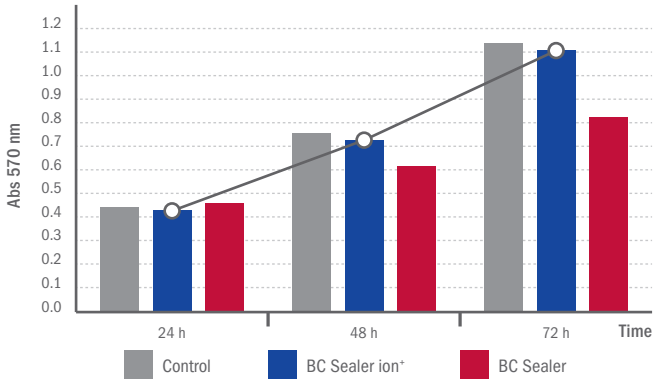
When in contact with water, the Akermanite crystal releases Hydroxyl, Calcium, and Magnesium ions into the medium.

RESULTS

hDP-SCs (Human Dental Pulp Stem Cells)

Cell Viability: hDP-SCs

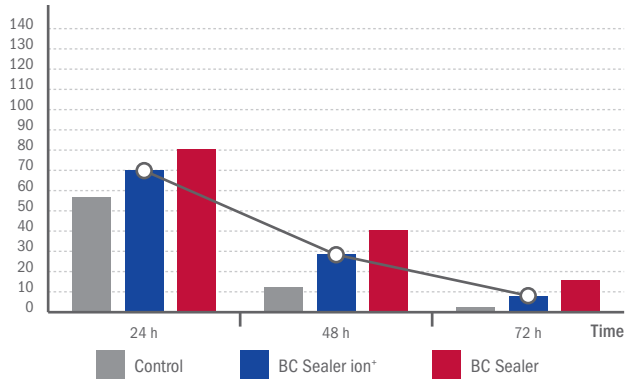
MTT Assay



The results showed that, at 48 and 72 hours, BC Sealer ion+ maintained high cell viability, similar to the control, indicating good biocompatibility and pro-regenerative potential. Endosequence BC Sealer also showed an increase in viability, but it is still inferior in long-term performance.

Cell Migration: hDP-SCs

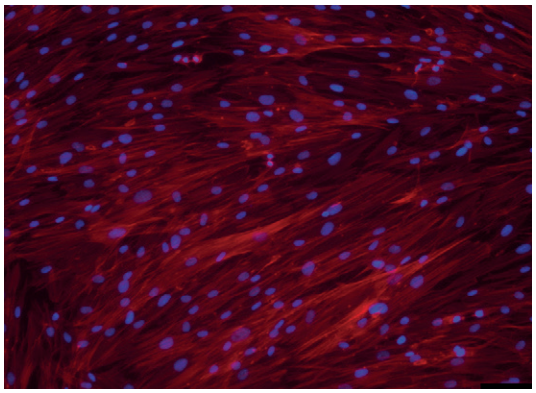
Scratch Wound-Healing Assay



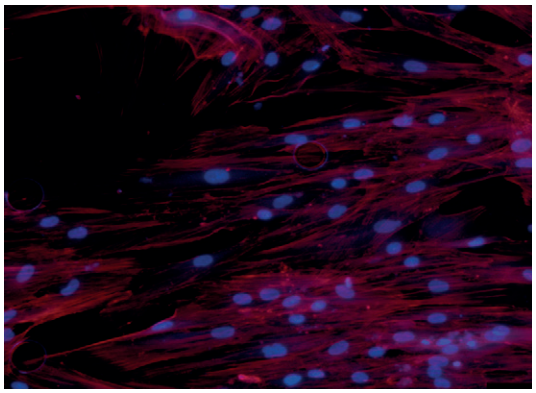
The cell migration results showed that BC Sealer ion+ exhibited the greatest reduction in the wound compared to Endosequence BC Sealer, demonstrating faster healing at all time assessed. Endosequence BC Sealer reduced the wound, but at a slower rate.

Cell Adhesion: hDP-SCs

Confocal Microscopy - Cell nucleus (Blue) and F-actin filaments (Red)



BC Sealer ion+



BC Sealer

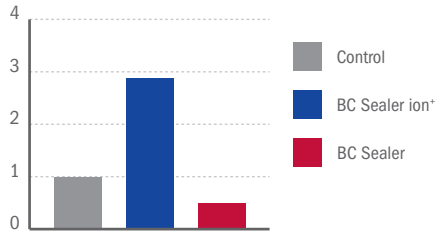
The cell adhesion assay results showed that BC Sealer ion+ had more cell nuclei (Blue) and F-Actin (Red) filaments formed compared to Endosequence BC Sealer, being more effective in promoting cell adhesion and organization (after 72hs).

Cell Differentiation (osteoblastic and odontoblastic)

Bone and dentin formation

Dentin sialophosphoprotein (DSPP): 21 days

DSPP/GAPDH Relative gene expression

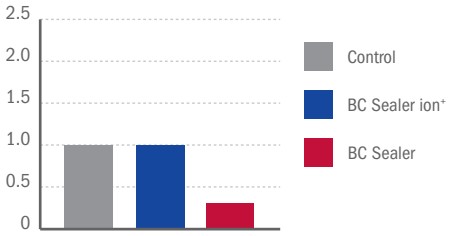


These results after 21 days indicate that BC Sealer ion+ enhanced the expression of the gene (DSPP/GAPDH ratio) associated with dentin formation, highlighting its superior performance in promoting dentin regeneration compared to Endosequence BC Sealer.

Formation of extracellular matrix (Cementum)

Cementum protein (CEMP1): 21 days

CEMP1/GAPDH Relative gene expression

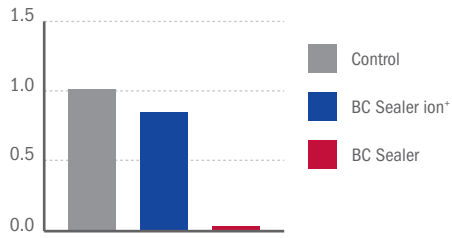


These results after 21 days indicate that BC Sealer ion+ enhanced the expression of the gene (CEMP1/GAPDH ratio) associated with cementum formation, highlighting its superior performance in promoting cementum regeneration compared to Endosequence BC Sealer.

Formation of extracellular matrix (Collagen)

Bone Matrix Collagen type 1 (Col1A1): 21 days

Col1A1/GAPDH Relative gene expression

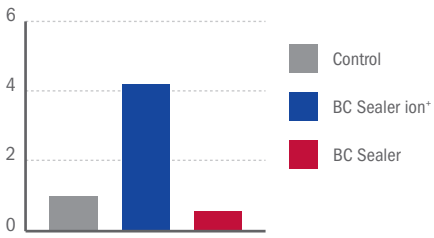


These results after 21 days indicate that BC Seale ion+ enhanced the expression of the gene (Col1A1/GAPDH ratio) associated with collagen type I formation, a key component of the bone extracellular matrix. This highlights its superior performance in promoting cellular matrix development and bone collagen production compared to Endosequence BC Sealer.

Alkaline Phosphatase Activity

(ALP Activity): 21 days

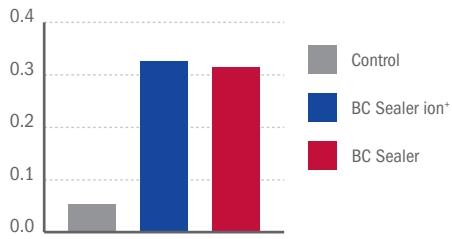
ALP/GAPDH Relative gene expression

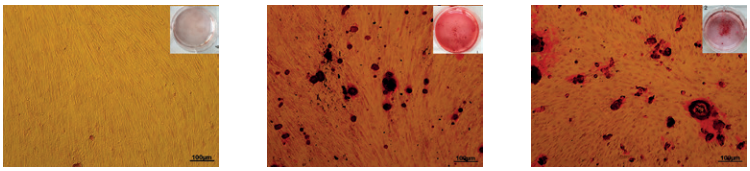


These results after 21 days indicate that BC Sealer ion+ enhanced the expression of the gene (ALP/GAPDH ratio) associated with alkaline phosphatase activity, a key marker of early osteogenic differentiation. This highlights its superior performance in promoting bone formation processes compared to Endosequence BC Sealer.

Mineralization Assay

Quantification after 28 days





Control BC Sealer ion+ BC Sealer

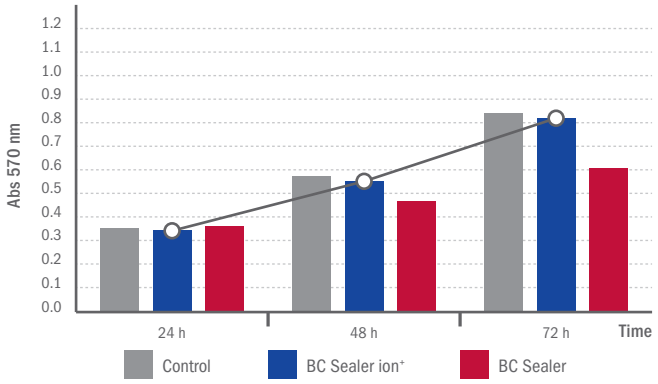
The results of BC Sealer ion+ and Endosequence BC Sealer were statistically similar, suggesting comparable potential in promoting mineralization processes, which are essential for hard tissue formation.

RESULTS

hPDL-SCs (Human Periodontal Ligament Stem Cells)

Cell Viability: hPDL-SCs

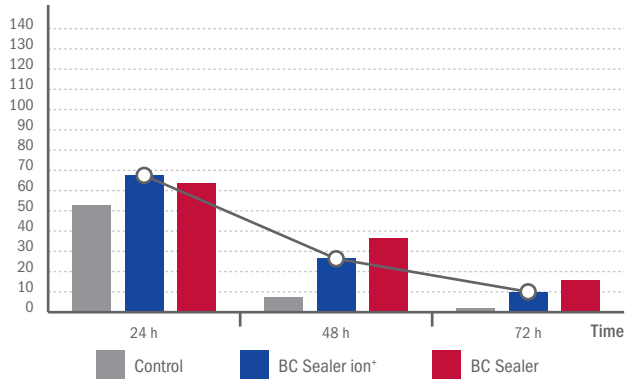
MTT Assay



The results showed that, at 48 and 72 hours, BC Sealer ion+ maintained high cell viability, similar to the control, indicating good biocompatibility and pro-regenerative potential. Endosequence BC Sealer also showed an increase in viability, but it is still inferior in long-term performance.

Cell Migration: hPDL-SCs

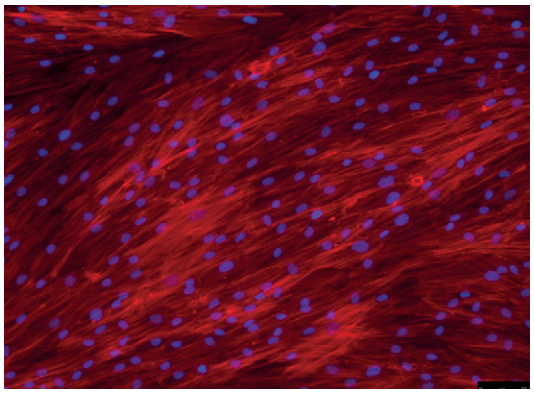
Scratch Wound-Healing Assay



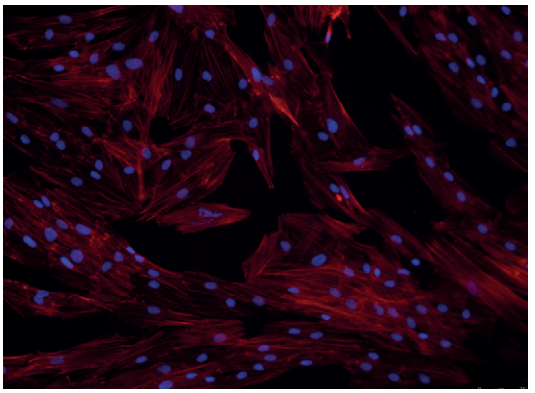
The cell migration results showed that BC Sealer ion+ exhibited the greatest reduction in the wound compared to Endosequence BC Sealer, demonstrating faster healing at all time assessed. Endosequence BC Sealer also reduced the wound, but at a slower rate.

Cell Adhesion: hPDL-SCs

Confocal Microscopy - Cell nucleus (Blue) and F-actin filaments (Red)



BC Sealer ion+



BC Sealer

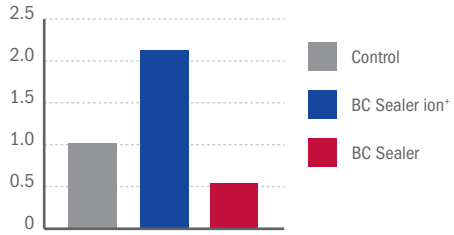
The cell adhesion assay results showed that BC Sealer ion+ had more cell nuclei (Blue) and F-Actin filaments (Red) formed compared to Endosequence BC Sealer, being more effective in promoting cell adhesion and organization (after 72hs).

Cell Differentiation (osteoblastic and odontoblastic)

Bone and dentin formation

Dentin sialophosphoprotein (DSPP): 21 days

DSPP/GAPDH Relative gene expression

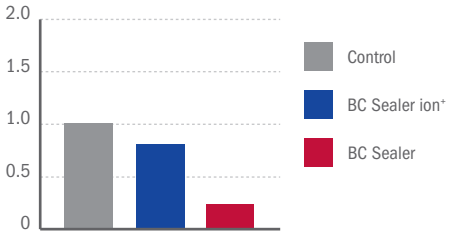


These results after 21 days indicate that BC Sealer ion+ enhanced the expression of the gene (DSPP/GAPDH ratio) associated with dentin formation, highlighting its superior performance in promoting dentin regeneration compared to Endosequence BC Sealer.

Formation of extracellular matrix (Cementum)

Cementum protein (CEMP1): 21 days

CEMP1/GAPDH Relative gene expression

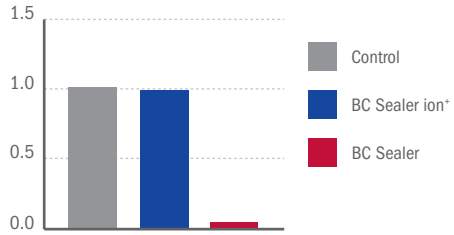


These results after 21 days indicate that BC Sealer ion+ enhanced the expression of the gene (CEMP1/GAPDH ratio) associated with cementum formation, highlighting its superior performance in promoting cementum regeneration compared to Endosequence BC Sealer.

Formation of extracellular matrix (Collagen)

Bone Matrix Collagen type 1 (Col1A1): 21 days

Col1A1/GAPDH Relative gene expression

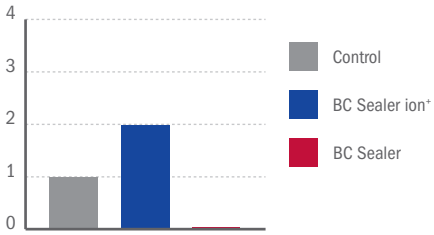


These results after 21 days indicate that BC Seale ion+ enhanced the expression of the gene (Col1A1/GAPDH ratio) associated with collagen type I formation, a key component of the bone extracellular matrix. This highlights its superior performance in promoting cellular matrix development and bone collagen production compared to Endosequence BC Sealer.

Alkaline Phosphatase Activity

(ALP Activity): 21 days

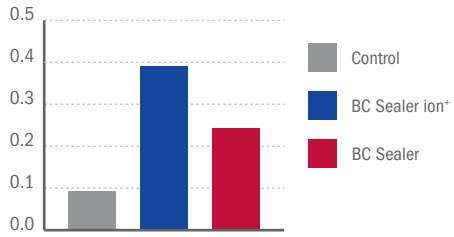
ALP/GAPDH Relative gene expression

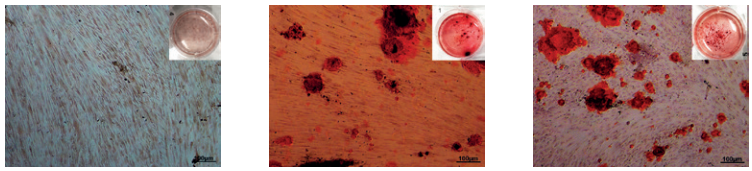


These results after 21 days indicate that BC Sealer ion+ enhanced the expression of the gene (ALP/GAPDH ratio) associated with alkaline phosphatase activity, a key marker of early osteogenic differentiation. This highlights its superior performance in promoting bone formation processes compared to Endosequence BC Sealer.

Mineralization Assay

Quantification after 28 days





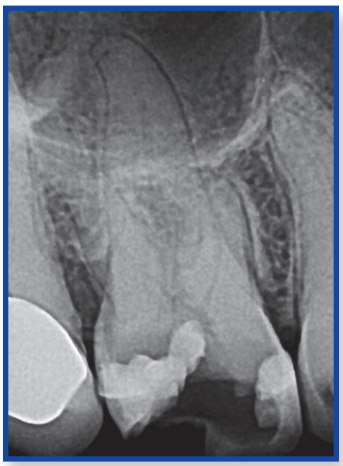
Control BC Sealer ion+ BC Sealer

These results after 28 days indicate that BC Sealer ion+ showed higher absorbance in the alizarin red assay, reflecting greater mineral deposition compared to Endosequence BC Sealer. This highlights its superior potential in promoting mineralization processes, which are essential for hard tissue formation.

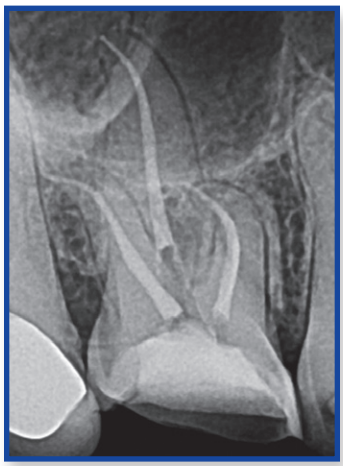
CLINICAL CASES

CASE 1 *Alex Fleury, DDS, MS*

Tooth #3: C&S with XP-3D Shaper and XP-3D Finisher;
Obturation using GP and hydraulic condensation with BC Sealer ion+



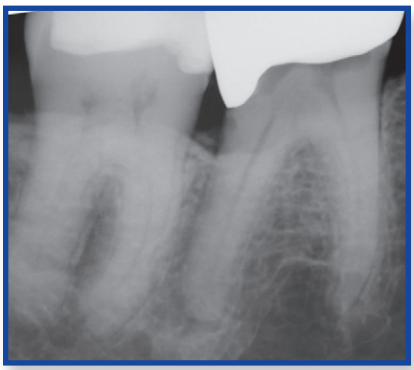
Pre-Op



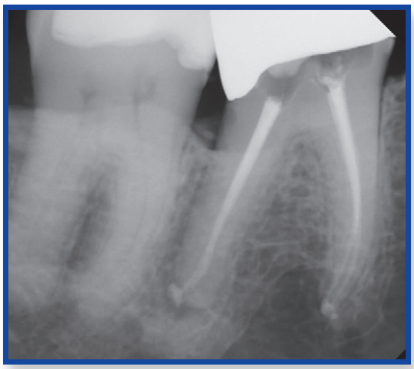
Post-Op

CASE 2 *Alex Fleury, DDS, MS*

Tooth #30: Previously accessed;
C&S with XP-3D Shaper and XP-3D Finisher;
Obturation using GP and hydraulic
condensation with BC Sealer ion+



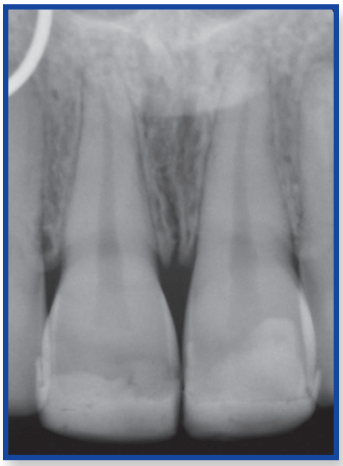
Pre-Op



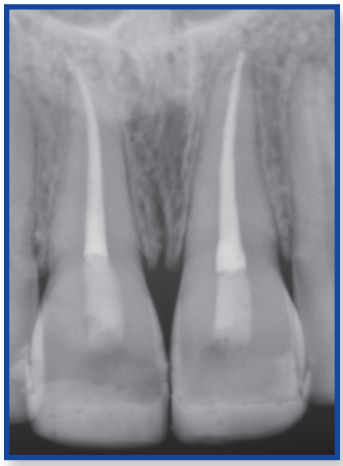
Post-Op

CASE 3 *Alex Fleury, DDS, MS*

Teeth #8 & #9: Uncomplicated crown fracture; Irreversible pulpitis;
Normal periradicular; C&S with XP-3D Shaper and XP-3D Finisher;
Obturation using GP and hydraulic condensation with BC Sealer ion+

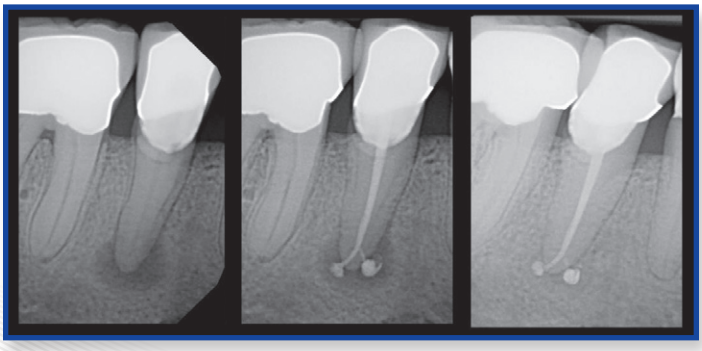


Pre-Op



Post-Op

CASE 4 *João Barbizam, DDS*

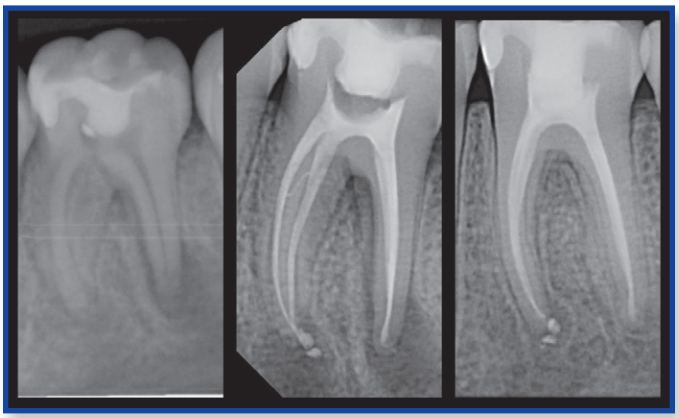


Pre-Op PA

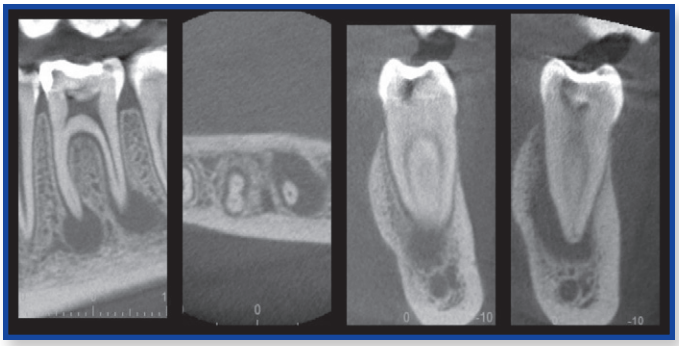
Immediate
Pre-Op PA

7-Month
Follow-Up PA

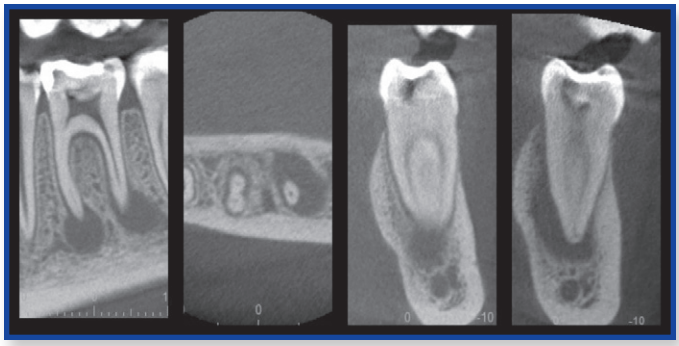
CASE 5 *João Barbizam, DDS*



Pre-Op PA | Immediate Pre-Op PA | 1-Year Follow-Up PA

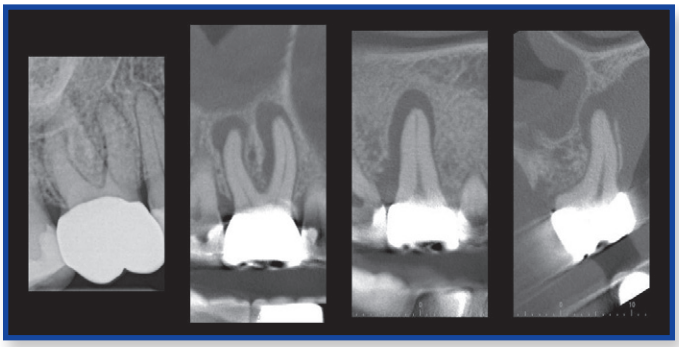


Pre-op CBCT Images

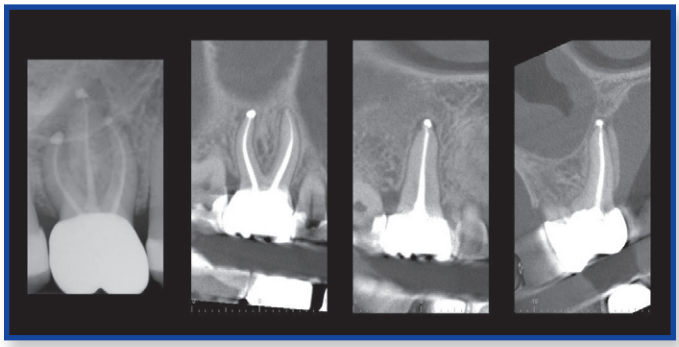


1-Year Follow-Up CBCT Images

CASE 6 *João Barbizam, DDS*



Pre-Op PA | Pre-Op CBCT Images



Immediate Post-Op PA | 1-Year Follow-Up CBCT Images

TESTIMONIALS

I have used Brasseler's BC Sealer for over 15 years. I recently switched to the new BC Sealer ion+ because of the improved flow properties, versatility with cold or warm obturation and I was impressed with the additional release of beneficial magnesium ions which should lead to more thorough and rapid healing. It also has excellent radiopacity.

— Alex Fleury, DDS, MS
Dallas, TX

Bio-C Sealer ion+ offers exceptional practicality with its pre-mixed, ready-to-use formulation, saving valuable time during busy clinical days. Its viscosity allows it to flow into the intricate details of the tooth's microanatomy, as evidenced by its excellent radiopacity. Moreover, the sealer's bioactivity promotes a faster healing process, which can be observed radiographically in shorter periods.

— João Barbizam, DDS
Bellevue, WA

BIBLIOGRAPHY

1. SANZ, J.L. et al. Microstructural composition, ion release, and bioactive potential of new premixed calciumsilicate–based endodontic sealers indicated for warm vertical compaction technique. Clinical Oral Investigations, [S.l.], v. 24, n. 7, p. 2365-2374, jul. 2020. DOI: 10.1007/s00784-020-03453-8.

2. ESTILAVET, M.S. et al. Bioactivity Potential of Bioceramic-Based Root Canal Sealers: A Scoping Review. Life, [S.l.], v. 12, n. 11, p. 1853, 2022. DOI: 10.3390/life12111853.

3. PONTORIERO, D.I.K. et al. Outcomes of Endodontic-Treated Teeth Obturated with Bioceramic Sealers in Combination with Warm Gutta-Percha Obturation Techniques: A Prospective Clinical Study. Journal of Clinical Medicine, [S.l.], v. 12, n. 8, p. 2867, 2023. DOI: 10.3390/jcm12082867.

4. Padilha Janini, A.C., Pelepenko, L.E., Boldieri, J.M., dos Santos, V.A.B., da Silva, N.A., Raimundo Jr, I.M., Gomes, B.P.F.A., & Marciano, M.A. (2023). Biocompatibility analysis in subcutaneous tissue and physico-chemical analysis of pre-mixed calcium silicate-based sealers. Clinical Oral Investigations, 27, 2221-2234. DOI: https://doi.org/10.1007/s00784-023-04957-9.

5. Xia L, Yin Z, Mao L, Wang X, Liu J, Jiang X, Zhang Z, Lin K, Chang J, Fang B. Akermanite bioceramics promote osteogenesis, angiogenesis and suppress osteoclastogenesis for osteoporotic bone regeneration. Sci Rep. 2016;6:22005. doi: 10.1038/srep22005.

6. Huang, Y., Jin, X., Zhang, X., Sun, H., Tu, J., Tang, T., Chang, J., & Dai, K. (2009). In vitro and in vivo evaluation of Akermanite bioceramics for bone regeneration. Biomaterials, 30(26), 5041-5048.

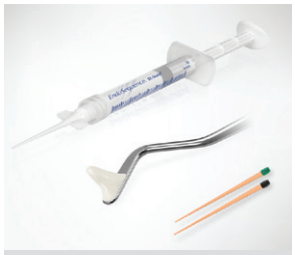
7. Lunguo Xia, Zhiyuan Zhang, Lei Chen, Wenjie Zhang, Deliang Zeng, Xiuli Zhang, Jiang Chang, and Xinquan Jiang. “Proliferation and osteogenic differentiation of human periodontal ligament cells on Akermanite and -TCP bioceramics.” European Cells and Materials, vol. 22, December 2011, pp. 68-83. DOI: 10.22203/eCM.v022a06.

DIAMONDS

CARBIDES

POLISHERS

PROCEDURE SYSTEMS



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