

Simplifying endodontics: a single cone obturation technique using EndoREZ®

Dr. Carlos A. S. Ramos discusses his technique for an effective seal

The current concept among clinicians is that after complete debridement, total obliteration of the root canal space with a biocompatible material constitutes one of the key factors for successful endodontic therapy because coronal leakage can contribute to root canal treatment failure.^{1,2} To avoid apical and coronal leakage, a variety of sealers and cements have been tested in combination with gutta percha for root canal sealing. Studies have shown that EndoREZ® (Ultradent Products, Inc.), a urethane dimethacrylate resin-based endodontic sealer, provides an effective seal when used in different obturation techniques, such as single cone or lateral condensation.³⁻⁵ The hydrophilic properties of EndoREZ improve the penetration of the sealer into moist dentin and dentinal tubules (Figure 1) up to 1000µm⁴ and chemically bond to the EndoREZ resin-coated gutta-percha points (Ultradent Products Inc.), creating a monoblock obturation (Figure 2).

Aiming to decrease setting time, the EndoREZ® Accelerator (Ultradent Products, Inc.) has been introduced. The combination of EndoREZ and EndoREZ Accelerator speed up the polymerization of the sealer, thus allowing for an immediate continuation of the coronal restoration. It also prevents dislodgement of

the obturating material when a post space is prepared immediately after obturation, potentially causing early bacterial leakage.

Single cone technique

Over the past century, numerous obturation materials and techniques have been introduced in an attempt to obtain a micro-biologic barrier within the confines of the root canal system. One major benefit of the single-cone technique is its simplicity. Studies have shown that the single-cone technique with a suitable resin-based sealer can achieve the same rates of success than other types of obturation methods.^{6,7} As with any endodontic procedure, some important relevant details must be observed to achieve success in the technical implementation of this type of obturation method using EndoREZ sealer.

During irrigation

Sodium hypochlorite, EDTA, and chlorhexidine can be used as irrigants during

instrumentation. To improve lubrication through the initial steps of instrumentation, the peroxide-free File-Eze® EDTA Lubricant (Ultradent Products, Inc.) can be used. Non-peroxide-free lubricants like EndoGel*, Endo-Sequence*, Glyde*, ProLube*, RC-Prep*, and SlickGel ES are not compatible with EndoREZ.

Final irrigation

The collagen network of dentin is better preserved when EDTA is used as the final rinse.⁸ A hybrid layer and resin sealer tags (Figure 1) will be created as a result of dentin surface demineralization by EDTA. After using EDTA for 1 minute, a final flush with distilled water should be done. Chlorhexidine 2% solution can be used (fill the canal and wait 3 to 5 minutes) as a final rinse prior to the obturation procedure. Do not mix sodium hypochlorite with chlorhexidine, as a harmful brown precipitate will form.

* Trademark of a company other than Ultradent



Carlos A. S. Ramos, DDS, MS, PhD, graduated in dentistry in 1987 from State University of Londrina, Brazil. During that year, he received a scholarship to study in Japan at the University of Tokyo. In 1990, he received the title of endodontics specialist from the University of São Paulo, Bauru School of Dentistry. From 1991 to 1993, he attended the Master's program in endodontics at the same university, receiving a Master's of Science degree and presenting a dissertation on accuracy of apex locators in vitro. From there, he began the PhD program in endodontics, completing it in 1997 and culminating in his presentation of an in vivo thesis on apex locators. In the same year, he published his first book, *Endodontics, Biological and Clinical Foundations*. From 1995 to 2012, as professor of endodontics at State University of Londrina, he coordinated the endodontics sector, predoctoral endodontic dental course, and graduate program. Now Dr. Ramos is an Adjunct Professor in the Endodontics Department at Roseman University, College of Health Sciences, Salt Lake City, Utah. He has performed many lectures, hands-on workshops, and conferences both in Brazil and abroad each year, and has published articles in national and international journals.

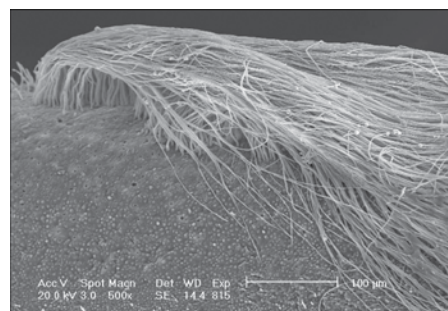


Figure 1: SEM showing EndoREZ tags up to 1000µm length. Hydrophilic properties of the sealer improve the penetration of the sealer into moist dentin and dentinal tubules

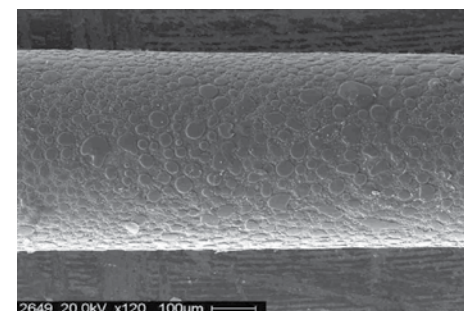


Figure 2: SEM showing the surface of a resin-coated EndoREZ gutta-percha cone



Figures 3A-3C: Clinical cases using the single cone technique with EndoREZ



Figure 4. The delivery technique using a Skini syringe and NaviTip tip allows insertion of EndoREZ at the apical third

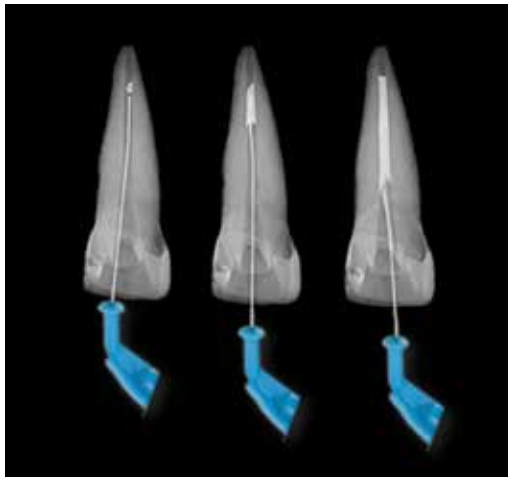


Figure 5. Express EndoREZ with light pressure into canal while withdrawing tip. Keep the NaviTip tip buried in the material while expressing EndoREZ and withdrawing the tip

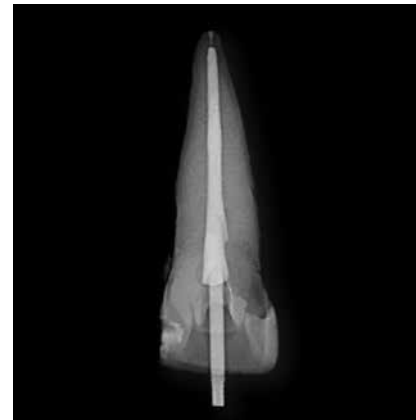


Figure 6: Insert the master EndoREZ resin-coated cone to working length. Be sure to make one single, gentle movement toward the apical area, avoiding any “pump” movements with the cone. Without the use of the accelerator, EndoREZ will set in about 20 to 30 minutes

Auto mixing tip and delivery

The canal space should be dried using a capillary tip (Ultradent Products, Inc.), followed by paper points (paper points should be damp 1 mm to 3 mm at tip). The canal should be damp, not desiccated, prior to obturating with EndoREZ in order to take maximum advantage of the hydrophilic properties of the sealer, thus allowing for resin tag penetration and/or the formation of a hybrid layer. EndoREZ is expressed out of the dual barrel syringe with a mixing tip into the back of a Skini syringe (usually one-third of a Skini syringe is more than adequate for a multi-rooted tooth). Filling the Skini syringe to the back flange inhibits air from remaining between the plunger and the sealer. Do not attempt to mix EndoREZ on a paper pad or in a glass slab — being a resin-based sealer, incorporating oxygen during manual mixing will interfere in the sealer setting properties.

EndoREZ should be delivered into the canal using a NaviTip® 29ga tip attached to the Skini syringe (Figures 4 and 5). Based on the final instrument, different levels of insertion can be used. Small diameters — from 25 to 30 (Figure 4, left) allow inserting 2 mm before the working length. For large diameters — from 60 to 80 (Figure 4, right), it is recommended to insert 4 mm before the working length.

The master EndoREZ gutta-percha resin-coated cone has to be inserted to the working length (Figure 6). Be sure to insert the cone using a single gentle movement toward the apical area, avoiding any “pump” movements. Without the use of accelerator, EndoREZ will set in about 20–30 minutes.

In large final shaping diameters, it's probable that space may remain laterally around the master cone. Accessory resin-coated

gutta-percha cones (20 or 25 .02) can be used, being inserted passively until resistance is achieved.

Working time

Light cure EndoREZ with a curing light for 40 seconds. Initial surface polymerization with curing light (without EndoREZ Accelerator) is less than 0.3 mm thick and aids in immediate restoration. Do not expect that all of the sealer will be set at this moment.

Working time with EndoRez Accelerator

EndoREZ Accelerator reduces EndoREZ set time from 20 to 30 minutes to about 5 minutes. If using the single cone technique, dip the master cone to its full length in the vial and insert the cone at the working length.

Apical resorption

Special attention needs to be paid to the apical stop position and the relation

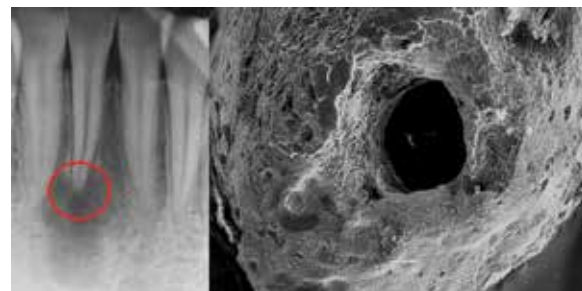



Figure 7: Radiographic image of a lower incisor with apical lesion (left). Under SEM (right), the apical foramen shows large areas of resorption

with the foramen. In cases of chronic apical lesion, the foramen area is resorbed (Figure 7) and could favor sealer extrusion. In this particular situation, a calcium hydroxide interappointment intracanal medication is recommended for 3 weeks before obturation. Calcium hydroxide will be able to generate an apical calcified area and prevent sealer extrusion. Small amounts of EndoREZ outside the canal at the periapical area will be resorbed after a certain period of time, based on the amount of sealer extruded. 

REFERENCES

- Madison S, Wilcox LR. An evaluation of coronal microleakage in endodontically treated teeth: part III. In vivo study. *J Endod.* 1988;14(9):455–458.
- Saunders WP, Saunders EM. Coronal leakage as a cause of failure in root canal therapy: a review. *Endod Dent Traumatol.* 1994;10(3):105–108.
- Zmener O, Pameijer CH, Serrano SA, Vidueira M, Macchi RL. Significance of moist root canal dentin with the use of methacrylate-based endodontic sealers: an in vitro coronal dye leakage study. *J Endod.* 2008;34(1):76–79.
- Kim YK, Grandini S, Ames JM, Gu LS, Kim SK, Pashley DH, Gutmann JL, Tay FR. Critical review on methacrylate resin-based root canal sealers. *J Endod.* 2010;36(3):383–399.
- Zmener O, Pameijer CH. Clinical and radiographical evaluation of a resin-based root canal sealer: a 5-year follow-up. *J Endod.* 2007;33(6):676–679.
- Somma F, Cretella G, Carotenuto M, Pecci R, Bedini R, De Biasi M, Angerame D. Quality of thermoplasticized and single point root fillings assessed by micro-computed tomography. *Int Endod J.* 2011;44(4):362–369.
- Yilmaz Z, Deniz D, Ozcelik B, Sahin C, Cimilli H, Cehreli ZC, Kartal N. Sealing efficiency of BeeFill 2in1 and System B/Obtura II versus single-cone and cold lateral compaction techniques. *Oral Surg Oral Med Oral Pathol Oral Radiol and Endod.* 2009;108(6):e51–e55.
- Osorio R, Erhardt MC, Pimenta LA, Osorio E, Toledano M. EDTA treatment improves resin-dentin bonds' resistance to degradation. *J Dent Res.* 2005;84(8):736–740.