



## The Forgotten Retention: Core, Posts, and Pins

**Gordon's Clinical Observations:** How are you providing retention for the crowns you place? Are you leaning too heavily on cements and bonding agents to retain these crowns? Are you using all the retention options available to you? It is time to review and become more familiar with THREE often-overlooked or misunderstood options for crown retention: core build-up, posts, and pins. CR scientists and clinicians have some important suggestions for you based on clinical observations, in-vitro research, and CR survey data.

- **Although 90% of clinicians place core build-up** in their practice,\* many of these procedures could be significantly improved.
- **Only one third of endo-treated teeth are receiving posts.**\* This percentage would likely be higher if clinicians better understood the value of posts.
- **Posts are NECESSARY for many situations** after endodontic treatment, such as inadequate tooth structure, bruxers, etc. (see example at right).
- **Pins should be considered whenever core build-up is used.** However, only half of clinicians use them.\*

\* Recent CR survey data. Full results online at [cliniciansreport.org](http://cliniciansreport.org)

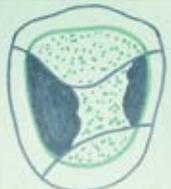
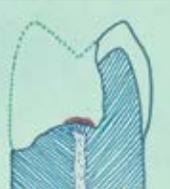
This report contains practical clinical information relating to: when core, posts, and pins should be placed; how to place them; and representative reliable brands.



Is a post necessary here? In such a clinical case where endodontic treatment leaves minimal coronal tooth structure (<25% here), use of posts is suggested.

### Core Build-Up

#### When Core Build-up is Indicated

Coronal tooth structure remaining:	More than one-half: Conventional restorative technique with composite resin as a <b>filler</b> (see Clinicians Report November 2017)	Less than one-half: Core build-up	None: Extraction likely (see Clinicians Report August 2014)
Examples:	  <p>Class V restoration in place to be removed</p> <p>Areas of previous class II restoration, in order to fill voids</p>	  <p>• <b>If tooth is vital:</b> Significant mechanical retention is required, such as titanium pins (see 'Pins' section below)</p> <p>• <b>If tooth is non-vital:</b> Both post and pins usually required (see 'Posts' and 'Pins' sections below).</p>	 <p>• <b>No tooth structure above gingival line:</b> Low success rate. Provide informed consent if choosing to restore (note: adequate ferrule required). Crown lengthening is an alternative.</p> <p>• <b>No tooth structure above crestal bone:</b> Poor prognosis. EXTRACT.</p>

#### Suggested Core Build-up Procedure

1. **Provide adequate ferrule**—circular band of tooth structure preferably 2mm above the prepared finish line. This provides resistance to lateral forces from dislodgement or potential fracture of entire tooth at the margin.
2. **Provide mechanical retention in tooth prep:** Use small operative bur—such as 329 carbide—to create “pot holes,” grooves, and channels to increase surface area to be bonded. Create undercuts and roughness for retention. Pins are also suggested when necessary (see Pins section below).
3. **Disinfect and desensitize the prep:** Place glutaraldehyde-HEMA solution onto tooth preparation (two 1-minute applications, then suction off). Example brands: Gluma by Kulzer, MicroPrime G by Zest Dental Solutions. See Clinicians Report November 2009 for more detail.
4. **Place circumferential matrix for optimum adaptation.** Examples: Gripper Soft Copper Band by Parkell (pictured at right), Greater Curve Tofflemire Band by Greater Curve. See Clinicians Report February 2014 for more information.
5. **Place effective bonding agent with appropriate technique.** See Clinicians Report May 2018 for brands and additional information. Note: Unpredictable long-term dentin bond continues to be a challenge, hence the need for mechanical retention to supplement any chemical bond (see #2 above).



Gripper Soft Copper Band (Parkell) can be trimmed easily to proper height and used as an inexpensive matrix for core build-up.

## The Forgotten Retention: Core, Posts, and Pins *(Continued from page 1)*

### Core Build-Up *(Continued)*

#### *Suggested Core Build-up Procedure (Continued)*

- 6. Place core build-up material.** Most brands have flowable viscosity (*see brands below*). Keep tip submerged within material while filling to minimize entrapped air. Note: Avoid use of more expensive restorative resins, as their esthetic properties and wear resistance are unnecessary for build-ups.
- 7. Light cure with proven curing light** for light-cure or dual-cure brands. Dual-cure brands provide more assurance of complete polymerization internally.
- 8. Make tooth preparation for indirect restoration.** See *Clinicians Report* July 2012 for proper tooth preparations of various indirect restoration types.
- 9. Check clearance for adequate occlusal thickness of crown prior to impression** (*depends on crown material chosen*). See *Clinicians Report* November 2016 for more information on suggested thicknesses.

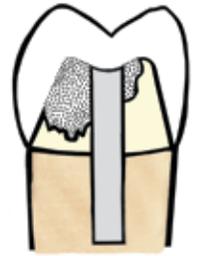
#### *Representative reliable brands (CR clinical tests):*

- Absolute Dentin, Parkell (\$3.70/mL)
- Build-It FR, Pentron (\$6.90/mL)
- CompCore AF SyringeMix Stack, Premier Dental (\$12.30/mL)
- Core Paste XP, DenMat (\$8.40/mL)
- MultiCore Flow, Ivoclar Vivadent (\$9.50/mL)

### Posts

#### *When to Use: For endo-treated teeth with ANY of the following additional conditions*

- Tooth with one-half or less of supra-gingival tooth structure present
- Canine in canine-guided occlusion
- Tooth used as abutment for fixed prosthesis or removable partial denture
- Grinding bruxers
- Clenching bruxers
- Tooth with heavy incisal guidance
- Single tooth without adjacent teeth
- Any endodontically treated tooth expected to undergo significant loading in service



#### *How to Use:*

- 1. Identify canals to receive post.** A post in each affected canal can be beneficial; at least one post in endo-treated teeth is recommended (*see list of conditions requiring a post above*). Note: Larger canals are potentially less problematic for post placement.
- 2. Remove necessary gutta percha** carefully, without pulling it out of root apex. Use effective instruments such as Gates Glidden-type carbide burs. Note: Use of rotary instruments in tooth canals should always be done slowly and with caution.
- 3. Roughen prepared canal(s)** with a narrow surgical-length tapered diamond at low speed or with handheld instrument (*Komet USA or Brasseler USA*).
- 4. Choose post:**
  - **Material:** Fiber-reinforced composite posts (*see reliable brands below*) are most popular clinically due to translucency, strength, and flexibility. Titanium alloy is also a quality option, although less esthetic. Pure titanium and cast posts have very low use. **Warning: Stainless steel has high allergenic potential due to nickel content and should be avoided.**
  - **Shape and size:** Tapered shape is most common and appropriate for most tooth canal anatomy. Radiographs greatly help to ensure proper placement. Note: Post should be cut to top surface of build-up.
- 5. Choose cement:** From research in *Clinicians Report* August 2011, RelyX Unicem 2 (3M) was among the easiest to use and had high retentive strength. Other excellent brands include: ParaCore (Coltene), Multilink Automix (Ivoclar Vivadent), and Panavia F 2.0 (Kuraray).
- 6. Place cement into canal:** Use a narrow attachment tip that will reach the apical portion of the prepared canal space (*or use Centrix AccuDose needle tube*). Back fill from apical to coronal. This technique is superior to use of a Lentulo spiral or dipping the post in cement.
- 7. Place post into cement-filled canal to depth,** then hold with low to moderate pressure to reduce hydraulic pressure (*keep post in canal*).
- 8. Light cure the dual-cure cement.** Hold for several minutes until stable.

#### *Representative reliable brands (CR clinical tests): Fiber-reinforced composite posts*

- C1 Post, Parkell (\$6.20/post)
- Cure-Thru IntegraPost, Premier Dental (\$11.00/post)
- D.T. Light Post, Bisco Dental (\$11.10/post)
- EndoSequence Fiber Post, Brasseler USA (\$9.90/post)
- FibreKleer and FibreKor, Pentron (\$12.00–13.00/post)
- Macro-Lock Oval, Clinician's Choice (\$15.80/post)
- ParaPost Fiber White, Coltene (\$18.00/post)
- RelyX Fiber Post 3D, 3M (\$15.10/post)

#### **Confronting the Controversy: The Benefits of Posts**

*Although controversy exists relative to post placement, two important benefits of posts have been proven clinically, when placed correctly:*

- **Posts attach core build-up to the tooth root.** In CR tests, posts enhanced retention of core build-up by an average of 42%.
- **Posts increase the overall strength of the tooth.** The results of CR tests showed that overall strength of an endodontically treated tooth can be increased by as much as 100% when using posts (*see Clinicians Report* November 2013). Scientific literature generally supports this conclusion. Conservative preparation of post channel is strongly recommended to retain tooth structure and strength.

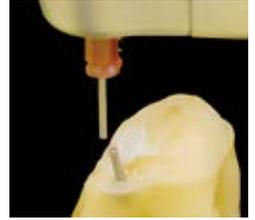
*Note: For those concerned with the risk of placing posts, crown lengthening is also an option.*

## The Forgotten Retention: Core, Posts, and Pins (Continued from page 2)

### Pins

**When to use:** Consider need for pins whenever core build-up is used AND less than one half of coronal tooth structure remaining (see 'Core build-up' section on page 2)

- CR testing shows pins increase retention by 50% to 230% over use of bonding agent alone (see *Clinicians Report July 2013*).
- Pins provide anti-rotational benefit when a single post is used
- Billing: Be aware that some dental insurance companies will only cover cost of core build-up (ADA code D2950) if pins are also used



#### How to use:

- 1. Choose pin:** Pure titanium (*more flexible*) and titanium alloy pins are suggested. Stainless steel pins should be avoided due to nickel content. See suggested brands below. Note: Larger-diameter pins provide more strength and retention, but have been associated with greater risk of cracks in tooth preparations (see *Clinicians Report July 2013*).
- 2. Make pilot hole** with manufacturer-provided drill to depth of 2mm (*drills often have self-limiting depth included*) AND at an angle of 15 degrees or more from the long axis of the tooth (*for better retention to the prep*). Repeat as necessary for desired quantity of pins. Important: Avoid unnecessary irritation or damage to tooth pulp with proper pin insertion after initial procedural radiograph.
- 3. Insert pin.** Pin systems often include self-shearing placement feature for ease of use. Repeat as necessary for desired quantity of pins.
- 4. Slowly bend protruding portion of pin** into long axis of the tooth.

*Note: Pin retention decreases over time due to dentin "relaxation."*

#### Representative reliable brands (CR clinical tests):

- Filpin (*pure titanium*), Filhol Dental (\$3.00/pin)
- TMS Link Plus Minim (*titanium alloy*), Coltene (\$6.20/pin)

#### CR CONCLUSIONS:

- Core build-up is indicated for added retention when more than one-half of the coronal tooth structure is missing.
- Pins and other mechanical retention features (*i.e., grooves, pot holes, channels, undercuts*) are strongly recommended to supplement chemical bonding provided by adhesives. Bonding alone is not sufficient in many situations where minimal tooth structure is present.
- Posts in endo-treated teeth have been shown to provide better attachment of core build-up to tooth roots and also to add overall strength to the tooth (*clinically and in CR testing*).
- The use of posts in connection with placement of core build-up is necessary for the situations described in this article (*i.e., inadequate tooth structure present, bruxers, etc.*).



# What is CR?

## WHY CR?

CR was founded in 1976 by clinicians who believed practitioners could confirm efficacy and clinical usefulness of new products and avoid both the experimentation on patients and failures in the closet. With this purpose in mind, CR was organized as a unique volunteer purpose of testing all types of dental products and disseminating results to colleagues throughout the world.

## WHO FUNDS CR?

Research funds come from subscriptions to the Gordon J. Christensen Clinicians Report®. Revenue from CR's "Dentistry Update™" courses support payroll for non-clinical staff. All Clinical Evaluators volunteer their time and expertise. CR is a non-profit, educational research institute. It is not owned in whole or in part by any individual, family, or group of investors. This system, free of outside funding, was designed to keep CR's research objective and candid.

## HOW DOES CR FUNCTION?

Each year, CR tests in excess of 750 different product brands, performing about 20,000 field evaluations. CR tests all types of dental products, including materials, devices, and equipment, plus techniques. Worldwide, products are purchased from distributors, secured from companies, and sent to CR by clinicians, inventors, and patients. There is no charge to companies for product evaluations. Testing combines the efforts of 450 clinicians in 19 countries who volunteer their time and expertise, and 40 on-site scientists, engineers, and support staff. Products are subjected to at least two levels of CR's unique three-tiered evaluation process that consists of:

1. Clinical field trials where new products are incorporated into routine use in a variety of dental practices and compared by clinicians to products and methods they use routinely.
2. Controlled clinical tests where new products are used and compared under rigorously controlled conditions, and patients are paid for their time as study participants.
3. Laboratory tests where physical and chemical properties of new products are compared to standard products.

**Clinical Success is the Final Test**



## Clinicians Report® a Publication of CR Foundation®

3707 N Canyon Road, Building 7, Provo UT 84604

Phone: 801-226-2121 • Fax: 801-226-4726

CR@CliniciansReport.org • www.CliniciansReport.org

**CRA Foundation® changed its name to CR Foundation® in 2008.**



*This team is testing resin curing lights to determine their ability to cure a variety of resin-based composites.*

*Every month several new projects are completed.*

## THE PROBLEM WITH NEW DENTAL PRODUCTS.

***New dental products have always presented a challenge to clinicians because, with little more than promotional information to guide them, they must judge between those that are new and better, and those that are just new. Because of the industry's keen competition and rush to be first on the market, clinicians and their patients often become test data for new products.***

***Every clinician has, at one time or another, become a victim of this system. All own new products that did not meet expectations, but are stored in hope of some unknown future use, or thrown away at a considerable loss. To help clinicians make educated product purchases, CR tests new dental products and reports the results to the profession.***

Products evaluated by CR Foundation® (CR®) and reported in the *Gordon J. Christensen Clinicians Report®* have been selected on the basis of merit from hundreds of products under evaluation. CR® conducts research at three levels: 1) multiple-user field evaluations, 2) controlled long-term clinical research, and 3) basic science laboratory research. Over 400 clinical field evaluators are located throughout the world and 40 full-time employees work at the institute. A product must meet at least one of the following standards to be reported in this publication: 1) innovative and new on the market, 2) less expensive, but meets the use standards, 3) unrecognized, valuable classic, or 4) superior to others in its broad classification. Your results may differ from CR Evaluators or other researchers on any product because of differences in preferences, techniques, product batches, or environments. CR Foundation® is a tax-exempt, non-profit education and research organization which uses a unique volunteer structure to produce objective, factual data. All proceeds are used to support the work of CR Foundation®. ©2018 This report or portions thereof may not be duplicated without permission of CR Foundation®. Annual English language subscription: US\$229 worldwide, plus GST Canada subscriptions. Single issue: \$29 each. See [www.CliniciansReport.org](http://www.CliniciansReport.org) for additional subscription information.