

Self-Adhesive Resin CEMENTS:

Convenient, Strong and Nearly Universal

by Robert Margeas, DDS

The proliferation of dental cements on the market today makes it important for dentists to have a solid understanding of their capabilities and indications. The wrong cement or the wrong technique can easily lead to problems ranging from post-operative sensitivity to debonding, which can cut into productivity and can also potentially sour the dentist-client relationship.

Traditional materials can offer challenges, but in recent years, the introduction of the self-adhesive resin cement category has offered advantages in many different types of cases.

The Challenges of Traditional Materials

Conventional resin cements have been a popular choice in the past, albeit a technique-sensitive one. Because traditional resin cements typically necessitate the use of a bonding agent, it is not uncommon for the material to penetrate the dentin tubules and result in post-operative sensitivity.¹ Resin modified glass ionomer (RMGI) cements, while not associated with the same sensitivity issues as resin cements, come with their own drawbacks. These materials do not offer the same level of strength as resin cements, and also are not appropriate for some types of ceramic restorations due to the fact that they expand when seated and some can cause breakage of the restoration.²

Previously, dentists often had to compromise by choosing between a material that did not offer great strength and a material that had a strong chance of causing sensitivity. In fact, the rate at which sensitivity was reported in the 1990s was cause for concern in the dental community, with one survey finding 37 percent of patients reporting sensitivity in the first year after crown placement. Even more concerning, up to 11 percent of the teeth treated in this study required endodontic treatment within the first year.³

As dentists know, a moderate to high level of post-operative sensitivity can be extremely frustrating for patients, with pain caused by anything from temperature variances to bite pressure. Several solutions have been proposed for this problem in conjunction with the traditional resin cement bonding technique, including adaptations to the bonding technique, use of a desensitizer or use of a self-etching primer and bonding agent.¹

However, the introduction of self-adhesive resin cements gave the dental community a much simpler way to prevent this issue.

A Better Alternative

Self-adhesive resin cements were initially introduced in 2002, with RelyX Unicem Self-Adhesive Resin Cement from 3M ESPE. This category was developed as an alternative to the traditional cementation options of conventional resin cement and RMGI cements. The introduction of self-adhesive resin cement offered dentists a new tool for cementation that had greater ease of use than the existing materials at the time, as well as strong bond strengths and aesthetics. The original material in this category combined technologies from glass ionomer materials, adhesives and composite cements to create a universal cement appropriate for a long list of indications, including inlays, onlays, crowns, bridges, posts, pins and screws made of ceramics, composite or metals.⁴ These materials also offered dentists the advantages of having choices of shades and translucencies, making them more useful and aesthetic for thin restorations, as opposed to the opaque look of older cements.

To eliminate the need for etching, priming and bonding, this material was formulated with phosphoric acid modified methacrylate monomers, which enable the cement to self-adhere to the tooth surface. At the same time, the monomers also create a cross-linked cement matrix during radical polymerization, which contributes to greater mechanical and dimensional stability.⁴

These cements undergo a unique change from acidic to neutral from the time they are initially mixed to 24 hours after application, which is what enables them to adhere to tooth

Chart 1: Delivery Method

Brand	Automix Dispensers	Unit Dose Dispensing	Hand Mixing
3M ESPE RelyX Unicem	No	Yes	Yes
3M ESPE RelyX Unicem 2 Automix	Yes	No	Yes
Ivoclar SpeedCEM	Yes	No	No
Kerr Maxcem Elite	Yes	No	No
GC G-CEM	Yes	Yes	No

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structure but also maintain long-term strength. For example, the original RelyX Unicem cement has a pH level of approximately 2 immediately after mixing, which is instrumental in its self-adhesion, and also enables a high moisture tolerance. This low pH level and accompanying hydrophilicity allow the material to adapt well to the tooth structure. However, the cement quickly increases in pH value and after 24 hours achieves a neutral level of 7. At this pH, the cement is characterized as hydrophobic. This property makes it resistant to water uptake, helping prevent staining and cracking and adding to its long-term stability.⁴

In addition to their ease of use and strong mechanical properties, a primary advantage of this class of cements is the “near-total elimination of post-operative sensitivity” reported with their use, thanks to their one-step demineralization and infiltration of dentin.^{5,6}

These cements have become enormously popular in the past decade, thanks not only to the properties described above, but also their high bond strengths. An easy-to-use material is no advantage if it does not perform well. The bond strengths of self-adhesive resin cements make them well-suited for most indications.^{7,8,9}

Choosing the Best Option

As these materials have advanced – so too have their delivery systems – making them even more convenient to use in practice. Perhaps most convenient are automix delivery systems, which are available with several brands of these cements, including G-CEM Automix and Biscem Self-Adhesive Luting Cement. 3M ESPE has also recently introduced a second generation of its self-adhesive resin cement in an automix version – RelyX Unicem 2 Automix Self-Adhesive Resin Cement. This cement is based

largely on the formula of the original, but with changes to its monomer makeup and filler particles, as well a new rheology modifier, all of which optimize the formula for use in an automix dispenser. Testing of the material has also shown increased mechanical properties and strong adhesion performance.

In addition to automix dispensers, other dispensing alternatives include unit-dose capsules that are mixed in a triturator and dispensed onto the bonding surface, and a dual-chambered dispenser that automatically dispenses the proper ratios of the cement components so the dentist can then mix them on the pad.

Dentists will find their individual preferences for each of these systems. In my own multiple-unit cases, I find automix systems are especially helpful. This delivery method is also very well-suited for root canal cases, as the dispensers are designed with small tips to fit directly in the canal. For a one- or two-unit case, a triturator capsule or clicker-style dispenser provides a convenient size and reliable mix.

It's important to know the limits of any material, however, and there are a few clinical situations in which I advise against the use of a self-adhesive resin cement. The most important is in a case with a non-retentive crown. In a case such as this, the etching, priming and bonding steps of a traditional resin cement are better suited to the situation. However, crowns with good retention can be very easily seated with self-adhesive resin cement.

Dependability and Predictability

Long-term results for self-adhesive resin cements have been excellent, with one five-year study showing a debonding rate of just 0.8 percent. The same study found just 1.8 percent of patients reported occasional temperature sensitivity.¹⁰ Another

Chart 2: Clinical Indications

Resin Cement	RMGI	Self-adhesive Resin Cement
Porcelain-fused-to-metal (PFM) crowns and bridges	PFM crowns/bridges	Ceramic inlays, onlays, crowns and bridges
Metal crowns, bridges, inlays and onlays (high noble, noble and base metals)	Metal crowns	Three-unit inlay/onlay bridges
Crowns and bridges with minimal tooth structure	All-zirconia or all-alumina strengthened core ceramic restorations (such as Lava or Procera)	Endodontic pins and posts
Maryland bridges (resin-bonded bridges)	Endodontic pins and posts	Screws
All ceramic/porcelain and pre-cured composite crowns, bridges, inlays and onlays	Orthodontic appliances	All-ceramic, composite, or metal restorations to implant abutments
Endodontic posts		Two- or three-unit Maryland bridges
Adhesive (bonded) amalgam restorations		<i>*The author prefers to use this category for retentive crowns only</i>

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five-year study on post-cementation found similar success, with just one restoration failing during the period due to fracture of the abutment tooth.¹¹ The long-term track record of this category of materials should be reassuring to dentists who seek products with proven safety and performance.

Dentists are always in need of reliable and convenient materials that will serve patients well over long-term use. In the case of cements, there is certainly no shortage of material options, but the class of self-adhesive resin cements provides distinct advantages in many clinical situations. A material that offers such high performance and extreme simplicity of use is one that should have a valuable place in any operatory. ■

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