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Cements

When Placing Zirconia or Lithium Disilicate Restorations, What Factors Govern Your Decision to Employ Traditional Cementation vs a Bonding Protocol?

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NATHANIEL LAWSON DMD PHD: Cementation of zirconia restorations with glass-ionomer or resin-modified glass-ionomer (RMGI) cements is sufficient to retain the crown and is a preferred option because it is a less technique-sensitive protocol. Examples of clinical situations in which I would prefer to bond zirconia restorations include those involving short molars, Maryland bridges, and nonretentive anterior preparations. In the case of a short molar, I try to perform minimal occlusal reduction (0.8 to 1.0 mm) and maintain a supra- or equigingival margin. I will choose zirconia as the restorative material due to its lower requirements for material thickness and use a bonding protocol to increase retention and compensate for the reduced height of the crown preparation. Maryland bridges benefit from the strength of zirconia, especially at the connectors, but require bonding. When a discolored substructure is present in the anterior region, restorations should be performed with layered zirconia to mask it, but this will also require bonding if the preparations lack retention.

Unlike zirconia crowns, lithium disilicate restorations must be bonded to tooth structure to reinforce their strength, unless the crown is sufficiently thick enough to tolerate occlusal forces. The required thickness for a lithium disilicate crown to be conventionally cemented is somewhat controversial, but recommendations range from 1.0 to 1.5 mm.

My protocol with glass-ionomer cements is the same for both zirconia and lithium disilicate. After the crown is tried-in, I vigorously clean it with water spray. Glass-ionomer cements do not chemically bond with zirconia, so the cleaning of the crown can be achieved with water, sodium hypochlorite, sandblasting, or a cleaning solution. Although glass-ionomer cements are more moisture tolerant than resin cements, I still achieve isolation with either a cotton roll or a stiff Dri-Angle® (Dental Health Products) in the buccal and lingual vestibule. Next, I rinse the tooth (leaving it slightly moist), fill the crown with cement, seat it, clean up any excess cement (while maintaining occlusal pressure), and allow the cement to set for its full setting time as the patient bites on a cotton roll.

JOHN O. BURGESS, DDS, MS: Of the types of ceramic materials, polycrystalline zirconia is the dominant choice for posterior restorations, whereas lithium disilicate is the preferred material for anterior restorations. Zirconia began as an opaque, layered material (ie, 3 mol% yttria stabilized), but has evolved into a more translucent, albeit weaker, esthetic material (ie, 5 mol% yttria stabilized).

Research has shown that the bond with zirconia approximates that of the bond with lithium disilicate after 5 months of water storage and 10,000 thermocycles. The clinical indications for bonding include conservative partial coverage zirconia restorations, long-span fixed partial dentures, resin-bonded fixed partial dentures, onlays, veneers, and thin restorations. Bonding is not always required, but the fracture strength of bonded restorations is greater than the strength of those that are conventionally cemented with an RMGI cement. Situations involving poor isolation require cementation with RMGI cement.

When bonding to zirconia, a clean/prime/bond technique should be used to optimize the results. First, the preparation and the restoration

must be thoroughly cleaned. Use pumice and water to remove any provisional cement from the preparation and rinse it well. After the final zirconia restoration is tried in, clean the intaglio surface of any saliva to prevent contamination. The phospholipids in saliva bond directly to zirconia. Trying to bond to this surface is like trying to park two cars in the same parking space. Both cars (ie, saliva and adhesive) can't occupy the same space. Removing the phosphate groups can't be accomplished with phosphoric acid or alcohol; however, using a zirconium oxide cleaning paste (eg, Ivoclean, Ivoclar), sodium hypochlorite, or particle abrasion will remove them. Following this, the restoration should be rinsed and thoroughly dried. Once cleaned, prime the intaglio surface by applying a silane and phosphate monomer primer (eg, Ceramic Primer, Kuraray ;Monobond Plus, Ivoclar) and dry it. After the restoration has been primed, use either a self-adhesive cement (eg, RelyX™ Unicem 2, 3M) or a dual-cured cement (eg, Panavia™ V5, Kuraray) for which no light-curing of the tooth or ceramic primer is needed. With RelyX Unicem 2, no adhesive is applied to the tooth. For Panavia V5, The bond forms when the material contacts the primers, reducing adhesive film thickness and allowing complete restoration seating. With either choice, the cement is injected into the primed restoration, the restoration is seated, any excess cement is removed, and all of the margins are cured.

When bonding lithium disilicate (ie, glass containing) restorations, an etching protocol is used to increase retention micromechanically. First, etch the intagilo surface for 20 seconds with a 5% hydrofluoric acid solution, and then rinse clean. Apply a universal ceramic primer (eg, Monobond Plus, Ivoclar; Clearfil™ Ceramic Primer, Kuraray) and dry it thoroughly. The primed intagilo surface is hydrophobic and contaminants rinse off easily after try-in. Silane containing phosphate bonding systems can be used for lithium disilicate or zirconia restorations, simplifying inventory.

After the restoration has been tried in and rinsed, place it with a self-adhesive cement (eg, RelyX Unicem 2, 3M) or apply a bonding agent to the tooth (eg, Prime & Bond elect™, Dentsply), cure it, and bond it into place using a dual-cured resin cement.

ALAN M. ATLAS, DDS: The retention form and finish line position of the preparation design are the two most important components influencing my choice of restorative material and decision to cement and/or bond. As described by Burgess, the cementation of all-ceramic restorations using adhesive resin mandates optimal protocols for bonding to the intaglio surface of each substrate type. For retentive preparations where the margins will be in an equalgingival or supragingival position, I prefer to use a self-adhesive resin cement because it's less technique sensitive. For less retentive preparations involving veneers, inlays, and onlays, where I would only use lithium disilicate, I prefer adhesive cementation utilizing a self-etching bonding agent and a selective-etch technique on the enamel.

When proper isolation for optimal adhesive cementation can't be achieved, either because of potential saliva contamination or subgingival finish line preparation, I opt for the non-resin-based "conventional" cements described by Lawson. For conventional cementation, the presence of a retentive preparation is mandatory because the substrate surface treatments used for resin cementation are not helpful to adherence to the intaglio surface.

For lithium disilicate restorations, I prefer to avoid using conventional cementation in the anterior region because of less-than-optimal esthetic outcomes. I also avoid conventionally cementing lithium disilicate restorations in the posterior region because of the requirement of additional tooth preparation due to the material's reduced fracture resistance when compared with resin cementation.