Hold Firm, Or Go With the Flow?

A rubric for deciding composite viscosity selection

Composite resin has become the most common material selected by practitioners for direct restorations over the past three decades. An expanding desire for tooth-colored restorations, advancements in material science and simplification of delivery are equally responsible for doctors choosing composites for an expanding list of clinical indications.

Insurance company reimbursement data indicates that Class I and II restorations account for nearly 70% of composites delivered in contemporary practices. A combination of Class III, IV and V restorations account for most of the remaining procedures submitted. Through research and development, manufacturers continue to provide doctors better materials and technologies. In my estimation, the four most important advancements in this area include:

Nanofiller technology. Nanofillers are in large part responsible for mitigating many of the shrinkage-related liabilities related to traditional composites by lowering values below the 2% threshold. Aesthetics, strength, handling and many other improved characteristics are attributed to nanoparticle integration.

Bulk-fill options. Volumetric shrinkage stress, depth of cure and conversion, and improvements in aesthetic potential are just a few challenges that have been overcome with modern bulk-fill entries. They allow practitioners to reduce delivery time, simplify technique, and reduce voids and gap formation associated with traditional layering.

Predictable adhesion. The evolution of bonding agents affords practitioners simplification with respect to delivery, expanded and improved adhesion to various substrates (including predictable dentin bonds), and just plain stronger bonds with reduced deviations.

Viscosity variations. One of the most important advancements in composite differentiation is the expanded menu revolving around viscosity. Not only do the traditional body composites present in a variety of viscosities ranging from very creamy to mid-consistency and all the way to firm, but all of these also can be further modified via the introduction of heat using composite warming technologies that continue to gain traction. Added to this is an increased menu of flowable composites that can range from highly flowable to the heaviest of viscosities.

by Dr. Foroud Hakim

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The balance of the article will focus on *composite viscosity*—in particular, critical and intentional viscosity variation based on the clinical circumstance. In my opinion, and through my observations when providing continuing education to colleagues, viscosity selection is an underutilized strategy that can greatly benefit doctors in daily practice while helping to improve outcomes and efficiency.

Case 1

A 64-year-old patient presented with recurrent decay involving a long-standing occlusal amalgam on tooth #30 (Fig. 1). After anesthesia, the old restoration and all remaining infected tooth structure was removed (Fig. 2) under Isolite isolation (Zyric). A selective-etch approach to tooth conditioning was employed, with the enamel margins etched with 37% phosphoric acid (Fig. 3) using Ultraetch (Ultradent) for 20 seconds.

After application of the eighth-generation adhesive Futurabond U (Voco) and appropriate light curing, a thin layer of an opaque shade of flowable composite (Grandioso Flow Opaque A2, Voco) was deployed to mask the amalgam-stained dentin and mitigate any unsightly shine through (Fig. 4).

Final restoration (Fig. 5) was achieved using X-tra Base bulk-fill flowable composite (Voco) in a universal shade for the base layer and Grandioso nanohybrid composite (Voco) in shade A1 for the capping layer.


Fig. 1


Fig. 2


Fig. 3


Fig. 4


Fig. 5

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Case 2

A 46-year-old patient presented with multiple noncarious cervical lesions (NCCLs) on bicuspids and first molars in all four quadrants. He had a history of mucogingival graft surgery and had recently completed orthodontic aligner therapy. Tooth #28 displayed a moderate NCCL spanning from line angle to line angle mesiodistally and about 3 mm in height from the free gingival margin (Fig. 6).

The exposed dentin surfaces were lightly planed with a round-ended fine diamond bur while the enamel margin at the incisal border of the lesion was prepared to an erratic bevel varying in both depth and length of projection using a flame-shaped diamond bur (Fig. 7).

The selective-etch strategy and the Futurabond U adhesive approach used in Case 1 was employed in preparation for composite application. The lesion was restored to natural contour (Fig. 8) using Grandioso Heavy Flow high-viscosity flowable composite (Voco). A natural transitional shade gradient was developed by using an A3.5 shade of the flowable composite for the apical layers but switching to A3 for the incisal third of the Class V cavity fill. This strategy of shade striation can purposely be spanned both in hue and value to match the clinical presentation of adjacent teeth in the mouth, rendering a restoration undetectable to the eye.


Fig. 6


Fig. 7


Fig. 8

Discussion

The case reports demonstrate a logical viscosity selection rubric leading to predictable, efficient and high-quality restorative outcomes.

A flowable material was employed at the pupal base of the Class I restoration for tooth #30 to ensure an even and void-free adaptive layer to mask stain, and to reduce the need for layering and placing multiple incremental layers of the final capping composite needed for load-bearing occlusion. However, only a viscous flowable composite was used to produce the Class V restoration on tooth #28.

For a number of reasons, using either a mid- or high-viscosity flowable composite is my material of choice for restoring Class V cases. Because the cervical aspect of the tooth is not under occlusal load, a highly filled capping composite is not required for durability. However, the cervical neck of a tooth may be susceptible to flexural stress. A flowable composite demonstrates a flexural modulus closer to that of dentin; in other words, a well-bonded flowable composite has a better opportunity to flex with a tooth, while an extremely stiff composite may be more prone to delamination.

It is important to emphasize, however, that the most critical common denominator to success is achieving the highest shear bond strength via the adhesive process.

Concerns about higher volumetric shrinkage and the related shrinkage stress associated with a less-filled flowable composite are mitigated because I never fill the entire Class V lesion with a single flowable composite increment.

The approach I take is to decouple the gingival and incisal walls of the tooth being bonded: I will layer the flowable composite in single increments starting at the gingival margin and use an explorer to precisely drag the incremental composite puddle across the entire gingival floor before curing. In an average-size lesion, I may lay down three or four increments and cure each layer individually until the entire incisal border including the erratic bevel is fully covered. This approach ensures never creating stress between two opposing walls; rather, it always delivers the volumetric shrinkage to a single wall or a previously cured layer of composite. This strategy all but eliminates the effect of shrinkage stress.

The opportunity for precision is made available by a relatively viscous flowable composite, which also reduces some of the problems with overfill and the need for excessive rotary reduction during finishing and polishing. Colleagues who train in this technique will quickly comment on how much kinder they find this technique to be on the periodontium, the increased speed and time savings, as well as the improvement in final contour and aesthetic potential. I firmly believe that a contemporary doctor cannot practice at the highest level possible without deploying a variety of composite viscosities. ■