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# Sometimes simpler really *IS* better:

## Presenting the posterior compression technique—a fast, simple way to improve the longevity of your posterior composites.

By David H. Roholt, DDS, Auburn, CA

There's a lot of research suggesting that the stress caused when a light-cured composite shrinks can lead to a number of problems, particularly in deep, high C-factor restorations.

It may break the bond between tooth and restoration allowing leakage, gapping, sensitivity and marginal breakdown. If it doesn't break the bond, this rapid shrinkage may bend the cusps inward or crack the enamel prisms creating a mysterious white line immediately outside the margins.<sup>1</sup>

Though most researchers agree that shrinkage-stress is a problem, there's no consensus on what to do about it.

For example, some research suggests that curing a flowable liner before you start to build the composite will reduce the stress and prevent leakage and gapping. But other studies suggest that the flowable resin doesn't reduce gapping at all.<sup>2,3</sup>

Some lecturers suggest that curing the first increment through the tooth from the opposite side or building the restoration in multiple oblique layers will solve the problem. But other studies suggest this doesn't accomplish anything, except increase the chance of leaving the restoration poorly cured.<sup>4,5</sup>

Some suggest that you can reduce gapping if you use a composite with low shrinkage—or a low modulus of elasticity—or a high "internal flow rate" (whatever that is.).

Still others say you can minimize shrinkage-stress using a special light-curing protocol—a pulsed-cure or soft-start cure or a stepped-cure procedure.<sup>6</sup> But again, other studies suggest this doesn't really make much difference and (once again) there's the possibility of leaving the composite undercured.<sup>7,8,9,10,11</sup>

When even the researchers don't agree on how to address the light-cure shrinkage problem what is the poor evidence-based dentist to do?

### Well, here's what I've done.

In deep posterior preparations I don't use light-cure composites. Not at all. And I haven't for the past 10 years.

You see, it's not the shrinkage that creates the gapping problem so much as it's the speed of that shrinkage. Light-cure composites set very rapidly. This creates a lot of stress at the bonded interface.

Self-cure composites, on the other hand, set much more slowly. And as they shrink, they remain much more plastic. This means the shrinking resin can draw material from the free surface as it shrinks ... almost like the castings we did in dental school drew metal from the reservoir on the sprue. In theory, this should relieve the stress.

And in fact, studies suggest that in deep Class I and II preparations, self-cure composites generate significantly less shrinkage-stress and less gapping than light-cure composites.<sup>12,13</sup>

### And there's another advantage to using a self-cure resin.

Because self-cure resin develops its body slowly, I can physically push it against the tooth using a plugger. My theory is that this compression both assures intimate contact between resin and tooth, and also helps counteract any potential gapping due to shrinkage.

Can I prove it? Not really. (But something is causing those margins to look so good after serving 10 years on a functional surface.)

What materials?

In the early days I used hand-mixed chemical-cure resins and a two-material technique (that is, one material for the base with another material laminated over it.) They were a pain to mix, load into the tube and into the tooth—but the margins held up beautifully. Some of the earlier materials discolored with time—but,



**Figure 3:** Though I'm now using HyperFIL, my technique is somewhat different from the one Parkell Promotes. I minimize the light-cure and I apply compression as it self-polymerizes.



**Figure 1:** These three restorations (#14MO, #13MOD, #12DO) were placed in 1999 using a bulk-compression technique. The photo and radiographs were snapped at recall appointment 9-years later. Notice the tight margins.



**Figure 2:** Placed three years ago using a core material.

(Continued)



**Figure 4:** Here's my armamentarium.



**Figure 5:** The amalgam MOD was failing and required replacement.



**Figure 6:** So we fitted the rubber dam ...



**Figure 7:** removed the old filling ...



**Figure 8:** and applied the matrix, wedges and rings.



**Figure 9:** The bonding agent was applied and cured. (I use an etch/prime/bond system. But whatever you use, be sure to check with the supplier that it's compatible with self-cure composites. Many bonding agents are not.)



**Figure 10:** I overfilled the preparation with HyperFIL. Now here's where the technique differs from Parkell's instructions ...



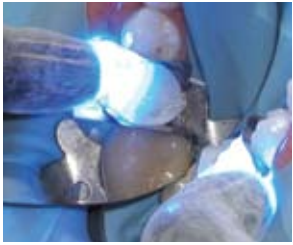
**Figure 11:** Instead of immediately light-curing from the occlusal, I use a large plugger to compress the material against the tooth surface. For small preps, I start with a small plugger or ball burnisher. This assures that the composite is in intimate contact with the prep and helps counteract any shrinkage.



**Figure 12:** As the polymerizing composite develops body, I switch to a larger plugger and apply progressively more pressure.



**Figure 13:** When the HyperFIL has set and I can no longer compress the composite, I loosen the matrices ...



**Figure 14:** and light-cure from the buccal, lingual and occlusal.



**Figure 15:** This creates a surface that's immediately hard.



**Figure 16:** I remove the matrices. I always need a hemostat because the contacts are so tight.



**Figure 17:** Here's the restoration before contouring and shaping ...



**Figure 18:** And after

again the margins looked great at recall, even if the shade didn't.

The cartridge-based dual-cure core materials made the procedure much easier, especially when companies started offering smaller cartridges with mixing tips that fit easily into preparations.

Now I'm using HyperFIL™. The angled tip fits nicely into a posterior prep with minimal waste and the material finishes much better than a core material.

### Here's where Parkell and I differ.

HyperFIL is a dual-cure composite. It includes two separate initiator systems...one light-cure...the other self-cure.

The technique Parkell promotes for HyperFIL treats it essentially as a light-cured composite. For example, Parkell recommends zapping the restoration immediately after filling the preparation.

The self-cure catalyst is there to compensate for poor light-curing at the bottom of a deep, dark preparation.

In contrast, I use HyperFIL essentially as self-cure composite. I don't reach for my light until the resin is almost hard – say at 3 minutes. I'm using the light to achieve a hard final surface cure. Self-cured resin takes a long time to reach maximum hardness (DAYS!), so I light-cure the surface to resist early staining, color change and wear.

Here's the technique step-by step. It can save you significant chairtime, particularly when you're placing multiple restorations. But in my opinion the real benefit of the compression technique is what those margins will look like at recall.

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