

\*\*\*\*Handout\*\*\*\*

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## Keys to Success with Posterior Composites

### What are the Most Frequent Causes of Posterior Composite Failure? Gap Formation!

- **Poor isolation.** A rubber dam is always preferred, but in maxillary arch, sometimes other options are OK.
- **Poor adaptation.** Limited application of a flowable composite along the proximal marginal interfaces can improve marginal adaptation, especially when using thicker, more thixo-tropic “packable” posterior composites.
- **Undercuring of composite, particularly along gingival margins.** By the “Law of Squares,” (Inverse Square Law), as you increase the distance of the curing light from the composite increment, the intensity of the light diminishes significantly, thereby reducing the efficacy of the cure. Use at least 10s per 2mm of composite with today’s LED lights.
- **Polymerization shrinkage effects.** Volumetric shrinkage of resin composites can result in bond disruption, cuspal flexure and marginal damage if not controlled.

### The “Fluoride Myth”

Fluoride is incorporated into everything from bonding agents to cements to many types of restoratives. However, anticariogenic effects are largely limited to only two categories of restorative materials: resin modified glass ionomers and glass ionomers (Figure 1).

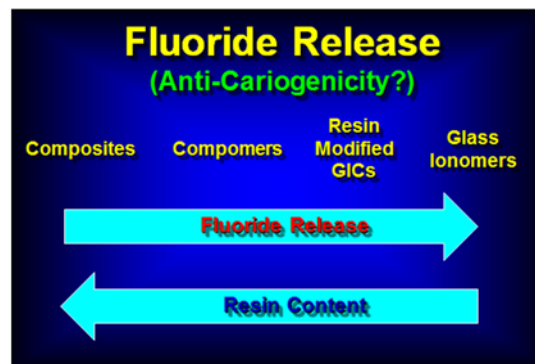


Figure 1

Because RMGICs and GICs experience an acid/base reaction, they are capable of being “recharged” with fluoride upon exposure to subsequent sources of fluoride (eg. dentifrice, varnish, rinses, etc.). According to Donaly et al., a “zone of caries inhibition” can result in tooth structure immediately adjacent to RMGIC and GIC restorations.

### Polymerization Shrinkage Effects

Excessive composite shrinkage resulting from bulk filling in high “at risk” (high C-Factor) preps, such as Class Is, can result in bond disruption. Clinically gap formation of this type can result in pain upon biting, due to compression of a fluid filled gap. Marginal damage resulting from traumatic finishing also is a risk when polymerization shrinkage is high. Abrasive instruments and spiral cut finishing burs can reduce marginal trauma and “white line” formation.

### What Can be Done to Deal with Adverse Effects from Polymerization Shrinkage?

- Place a stress breaking liner (eg. Vitrebond by 3M ESPE).
- Use incremental additions, especially in Class I preps.
- Do not bulk fill, especially in Class I preps.
- Use “soft start” polymerization (eg. distance curing or “poor man’s ramped cure”) for curing the first increment along the pulpal floor.

### Light Curing

Blue LED lights represent significant advantages over past quartz halogen and PAC light systems. Most are compact, rechargeable, cooler, quieter, exhibit almost unlimited bulb life and are highly efficient. Many excellent blue LED lights exist on the market today. Pay your money and take your choice!

### Bulk-Fill Flowable Bases

Bulk-Fill flowable composite bases (eg. Surefil SDR by Caulk Dentsply) have a greater depth of cure due to a greater amount of photoinitiator, and they resist the effects of polymerization shrinkage owing to **their favorable elastic modulus**. However, DO NOT place bulk-fill flowables of this type in contact areas or areas subject to occlusal stress because of their relative lack of resistance to wear.

### How Can You Improve Flow of Posterior Composites and Thereby Reduce Voids and Improve Adaptation?

**Heating of Composite-** Since composites are thermoplastic, heating them can facilitate their ability to flow. A technique developed by Drs. Tom Hilton and Jack Ferracane, University of Oregon, uses 11 gauge needle tubes (Centrix) filled with composite (Figure 2) and heated in a Calset Composite Warmer (Addent) to facilitate flow and insertion of the posterior composite material (Figure 3).

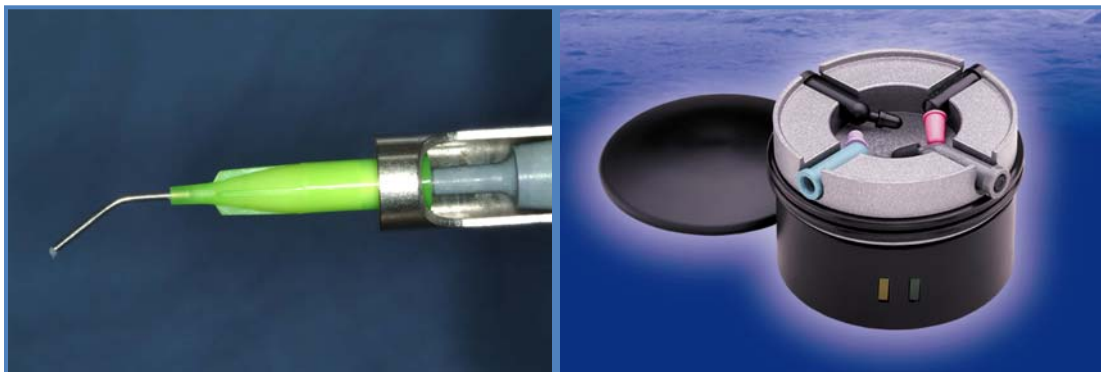


Figure 2

Figure 3

**Vibration of Composite-** A very innovative concept that utilizes vibration of composite to facilitate insertion is seen in the SonicFill II & III systems by Kerr (Figure 4). Composite contained in unit dose tips is rendered to a flowable consistency through vibration from a sonic handpiece, improving adaptation of the composite to the cavity walls. Flow of the composite is increased by 87% through the incorporation of rheological modifiers, and depth of cure is enhanced through the use of a greater amount of photoinitiators.



Figure 4

### Matrixing Systems

**Matrices for MODs-** Convexi-Ts by Clinician's Choice are very thin, pre-contoured stainless steel matrix bands that are held in a Tofflemire type retainer. This is an excellent choice for MOD posterior composite restorations.

**Matrices for two-surface preps-** Sectional matrices secured with a bitine ring represent a superb choice for the restoration of two-surface posterior composites. The V3 or V4 sectional matrix systems by Triodent include pre-contoured matrix bands as well as an innovatively designed bitine ring with forked tines that facilitate "straddling" the wedge for a more secure fit. An equally effective and similar system is the Palodent Plus system by Caulk Dentsply, as well as the Composi Tight 3D system from Garrison.

### Important Clinical Tip

The most important step in establishing consistently tight proximal contacts with posterior composites is "**pre-wedging.**" This concept involves the placement of a wooden wedge immediately following administration of the anesthetic into the proximal area to be restored prior to initiation of the tooth preparation and replacement with a new wedge at the time of matrix placement. This approach allows for ample time to attain the needed orthodontic movement of the involved teeth in order to compensate for the thickness of the metal matrix band. It works!