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PLACEMENT PROCEDURE FOR *DIRECT* COMPOSITES

(Protocol using “**total etch**” dentin bonding systems)

- 1) **ISOLATE** tooth (rubber dam is strongly recommended). Remove caries. Avoid sharp internal angles. I like to place a bevel at the occlusal enamel margin.
- 2) Clean dentin and enamel surfaces with a slurry of fine **pumice** and water. I use disposable “**Preppies**” from **Whip-Mix** for this. I like to use this material on an **ICB brush** from **Ultradent**. These small brushes are excellent for getting into the internal aspects of your preparation.
- 3) Wash with an air/water spray, quick air dry.
- 4) I will almost always use a resin-modified glass ionomer liner (**Vitrebond 3M ESPE**) at this point. This is a change from my previous protocol where I used flowable composites as a liner. I changed because I have read too many studies that indicate a superiority of RMGI's, when compared to flowable composites, in minimizing dentin microleakage (which is still a significant problem). There is also the potential benefit of high fluoride release from RMGI's as well as a favorable modulus of elasticity and coefficient of thermal expansion and contraction (which is similar to dentin). There is also anecdotal evidence from clinicians who were having significant postoperative sensitivity problems that was eliminated when they switched from flowable composite liners to RMGI liners. The RMGI should be mixed, placed in a thin layer on the dentin (paying particular attention to cervical and box areas), and light cured.
- 5) Treat enamel and exposed dentin with **30%-40% phosphoric acid** for 15-20 seconds. Ring the enamel first and then flow the acid onto the dentin. It's OK if the acid gets on the RMGI liner.
- 6) Wash with a water/air spray 5-10 seconds. Use a quick air dry (1 second) or **BLOT dry** technique (which I prefer). I generally do not air dry at all but instead **BLOT** out access water with cotton pellets (or sponge). You want to leave a definitively moist surface but not puddles or pools of water. *If exposed dentin is inadvertently dried (or purposely dried to visualize the frosted enamel), you can re-moisten for 20 seconds with **Aqua-Prep (BISCO)**, **Gluma Desensitizer (Kulzer)**, or other re-wetting type solution. “Wet” bonding works with enamel as well as dentin so it's OK if the enamel is left moist.
- 7) **PRIME** the dentin, enamel, and RMGI, with 2-3 liberal coats of either **ONE-STEP PLUS (BISCO)** or **Single Bond PLUS (3M ESPE)** single bottle primers (I like them both). There are of course many good dentin-bonding agents that could be used, but these are the two I use for pretty much everything. I dry the primers (evaporate the

solvents) for at least 10 seconds with an air syringe (I use the “**Totally Clean & Dry Air System**” from *Best Buy Discount Dental Supply* (800-781-2226). Warm air-drying (**Dyna-Flex warm air drier** 800-489-4020) is also very effective. It is very important to completely evaporate the solvents from the various dentin bonding agents prior to polymerization.

8) **LIGHT CURE THE PRIMER** 10-20 seconds. Virtually all your bond strength is being developed at this stage. The properly primed surface should have a definitive and uniform shine to it. If this shiny surface is not seen place additional primer, dry, and light cure. The primers (primer/adhesives) penetrate the acid demineralized dentin, polymerize (locking into the dentin substrate), and leave a chemically active outer layer that will bond to composite materials subsequently placed. They also bond well to RMGI's.

9) If you did not use a **RMGI** and elect to place a **flowable composite** instead, it should be placed and light cured at this time. It should be placed in a thin uniform layer on the floors and walls of your preparation. Light cure for 20 seconds. I believe either a **RMGI** or a **flowable composite** should be used because these materials get into all the “nooks and crannies” of your preparation and help insure optimal adaptation of higher viscosity composites that will be subsequently placed. If you like to use flowable composites there are many good ones available. Use the one that you feel handles the best in your hands.

10) Place and cure the composite material of your choice. I like to use **unit dose compules** that can be “injected” into the preparation. I feel they are more convenient to use than conventional “screw type” composite syringes and it's easier to place material in tight spots like proximal boxes. I suspect the chemistry of the composite is also more consistent in unit dose compules as compared to conventional composite syringes (when you use screw type syringes the composite at the back end generally ends up drier than the composite at the front end). I use a horizontal incremental placement technique. There is a great deal of controversy regarding the use of high intensity versus low intensity polymerization (even amongst all the “experts”). Some manufacturers claim their high intensity lights will “cure” any composite in three seconds. Research clearly shows this is **NOT** the case. If you use a high intensity light, I still recommend at least a 10 second cure for all materials.

11) After finishing and polishing a surface sealer such as **Fortify Plus (BISCO)** can be placed if desired. Re-etch the restoration and surrounding enamel for 5-10 seconds, wash, and dry very thoroughly. Place sealer, blow thin, cure for 20 seconds, and use a scaler or white stone to remove any flash. There is disagreement among researchers regarding the necessity of surface sealers.

TOTAL ETCH PROTOCOL

FLOWABLE COMPOSITE TECHNIQUE

RMGI TECHNIQUE

Clean decay

Clean decay

Pumice-wash-dry

Pumice-wash-dry

Etch

Place *RMGI* (*Vitrebond*) – cure

Wash -Blot dry

Etch

Place Primer-dry-cure

Wash and Blot dry

Place *FLOWABLE* – cure

Place Primer-dry-cure

Place Composite

Place Composite

Self-etching primers (*Clearfil SE Bond / Kuraray, Linerbond 2V / Kuraray, Prompt L-Pop / 3M ESPE, Touch & Bond / Parkell, Simplicity / Apex Dental, etc.*) are gaining in popularity. In my opinion the major advantage of these systems is their effectiveness is not contingent on the hydration state of the dentin. This removes the ambiguity often associated with the “wet bonding technique (“how wet is wet”). There are also anecdotal reports of less sensitivity. However, caution is urged when using self-etching primers. There are serious concerns about the ability of many of these systems to bond to enamel as effectively as total etch systems (especially LONG-TERM bond). If you elect to utilize a self-etching system, you may want to consider first etching the enamel with phosphoric acid. At this point I feel Clearfil SE Bond is the most predictable self-etching system in the marketplace based on numerous independent studies as well as clinical track record.