

CLINICAL TECHNIQUES

CORE BUILDUP TECHNIQUE (VITAL TEETH)

1. Isolate, Control Hemorrhage, Clean the Substrate and Kill microbes (holy triad)

Total isolation is mandatory, no organic fluids (blood, saliva, serum). ALL bleeding must be controlled. Use # 7 *silTrax epi* [Pascal] soaked in *hemodent* [Premier] and rinsed thoroughly immediately after placement in sulcus or use *hemodent* in a 3-cc syringe [Best Buy Discount Dental Supply] with an *inspiral Brush Tip* [Ultradent]. Use the brush tip to scrub and apply pressure to the bleeder and express *hemodent* slowly with high-speed vacuum in place to catch the *hemodent*. Rinse very thoroughly. DO NOT USE aluminum chloride impregnated cord because aluminum chloride and many other astringent agents can inhibit the set of resin composites. If *hemodent* is used, thoroughly rinse it away to avoid the problem of resin composite set inhibition from the aluminum chloride. If possible, avoid tissue laceration when removing old restorative in order to avoid the use of astringent chemicals that can potentially compromise resin bonding.

Clean the caries free substrate before etching. Research reports a 20% increase in bond strength when the following technique is used: Residual decay detecting solution must be removed by grinding on all tooth surfaces to be bonded using water and *slow speed steel burs #'s 1/2, 2, 4, or 6* [Schein] or *diamonds*. Even the surfaces of the tooth that do not stain should be ground on to remove the propyl-ene glycol containing decay detecting solution residue, because it may obstruct proper dentin bonding. Grinding debris and handpiece oil should be scrubbed away with *pure 4% CHG* [Best Buy Discount Dental Supply] using an *inspiral Brush Tip* on a 3-cc syringe. In addition to cleaning the tooth and killing bacteria, *pure 4% ChG* binds to the amino acids in the dentin and continues to kill bacteria (substantivity) for several hours. To allow a good etch, the superficial smear layer is removed, using *Tubulicid red* [Global Dental] in a 3-cc syringe with a *Blue Mini dento infusor Tip* [Ultradent] with a vigorous scrubbing action for 15 seconds. The superficial smear layer contains bacteria and often stains from

decay detecting solutions. Acid etching will not always remove the stained smear layer. In addition to smear layer removal, the benzalkonium chloride in *Tubulicid red* [Global Dental Products] is a potent antimicrobial. Lastly, scrub the tooth surfaces to be bonded thoroughly for 15 seconds with *NaOCl* (Clorox) using a *3-cc syringe* with an *inspiral Brush Tip*. Rinse after each two teeth are scrubbed, and have the assistant keep the vacuum very close to avoid taste bud contact with the Clorox. The Clorox kills bacteria and fungus. Rinse and dry the tooth.

2. Etch, Rinse, Stabilize Collagen & Prevent MMP's

Apply *32% H₃PO₄* [32% Uni-Etch BAC from Bisco] for 15 seconds to the prepared tooth. Rinse thoroughly - DO NOT DRY. This etch has no silica in it and is easier to rinse than silica containing gels. Silica has an affinity for the collagen in demineralized dentin. NEVER etch dentin more than 15 seconds. NEVER dry the dentin to see if the enamel is etched, because this will collapse the collagen fibrils and decrease the ability to infiltrate them with primers. A gelatin film forms on the surface of etched dentin when it is dried; this film prevents proper primer penetration. Apply *pure 4% ChG*, Rinse and lightly dry but leave moist. The *pure 4% ChG* will stabilize the collagen in dentin and prevent the formation of the matrix metalloproteinases (MMPs).

3. Infiltrate the Demineralized Dentin and Form the Hybrid Zone

All-Bond 2

Dispense an equal number of drops of *all-Bond 2 parts a and B* [Bisco] (1:1) into a chemically clean disposable *dappen dish* [Dapaway]. Dispense 2 drops for the Dappen Dish and 1 drop for each prep.

Do not touch the inside of the *dappen dish* with gloves. BE SURE TO SHAKE THE BOTTLES BEFORE DISPENSING AND IMMEDIATELY RECAP THE BOTTLES AFTER DISPENSING. Using a *Bend-a-Brush* [Centrix], mix well for 5 seconds. Apply 10-20 coats onto the tooth preparation. Air dry very thoroughly to ensure total alcohol evaporation, using light air pressure for at least 5 seconds on each substrate. A separate 3-way syringe that only has clean and dry air, no water or oil

(e.g. *Totally Clean & dry air system* [Best Buy Discount Dental Supply]) should be used to do this. Avoid vacuuming saliva into the field. If moisture is left on the dentin or spritzed on by a leaky 3-way syringe after primer application, tears result in the hybrid layer, bond strength is decreased and/or gaps are caused, resulting in microbial invasion from microleakage and/or nanoleakage (leakage within the hybrid layer). Usually post-operative sensitivity, especially to biting pressure, is the result. Bond failures are also likely to occur. If blood, sulcular fluid, serum or saliva contaminate the surface, abort the process, re-isolate, re-etch and then re-apply the primers. The surface should appear shiny; otherwise apply additional coats of *all-Bond 2* and gently but thoroughly air dry until there is no visible movement of the material. If retraction cord was used, it should be totally dry.

4. Total Seal

Apply one thin coat of All-Bond 2 Resin using a Ball-Point Applicator [Pinnacle]. Air thin if necessary. Avoid pooling (air lightly or vacuum, only if necessary, over-thinning ruins bond strength), Light Cure for 20 seconds at 500mW/cm². Any water, blood, serum or saliva contamination, prior to resin composite application will require acid etching again.

5. Composite Buildup

Mix for 40 seconds and apply refrigerated *enamel shade Core paste* [Den-Mat]. Inject *enamel shade Core paste* to fill the deepest part of the cavity first using a needle tube with an *s class syringe* [Centrix]. Large amounts of *enamel shade Core paste* can be injected if the *enamel shade Core paste* is kept refrigerated to increase working time. Let set uncontaminated for 5 minutes. Presto – a virgin tooth to prepare!

NOTE 1: It is advisable to remove all buccal and lingual enamel prior to core buildups on full coverage restorations to avoid implosion fractures that result from polymerization shrinkage of the resin composite core material. For core buildups on inlays, just inject enough to block out the undercuts and cover the deeper areas of the prep. With onlays, reduce the cusps before core buildup. These steps will decrease, but unfortunately, not totally eliminate “implosion” fracture.

NOTE 2: If the *enamel shade Core paste* is kept refrigerated until just prior to use, it stacks like soft ice cream. Slower setting due to the colder state means there will be less stress on the dentin bond caused by polymerization shrinkage, because more of the shrinkage forces will be dissipated within the body of the material as it slowly sets. Fast set *enamel shade Core paste* should be avoided due to the loss of this phenomenon.

NOTE 3: Core buildups are mandatory for 99% of teeth to be restored with indirect restorations, especially all-ceramic restorations.

NOTE 4: Use Clorox full strength – not diluted.

NOTE 5: The 15 second application times for the holy triad are increased or decreased based on the tooth to be bonded. Young teeth, fractured teeth, symptomatic teeth and any tooth with pulp or potential pulp involvement should have extended application times. Application times for “no problem” teeth can be decreased to 5 seconds or so.

Benefits of Cores

The benefits of core buildups are many; a few are:

- Decrease porcelain fracture in metal ceramic cases due to homogenous thickness of metal under porcelain, which allows for uniform cooling of the porcelain after firing (less trapped tensile forces).
- Decrease porcelain fracture in porcelain to zirconia cases due to homogenous thickness of zirconia under the porcelain, which allows for uniform cooling of porcelain after firing (less trapped tensile forces).
- Decrease porcelain fracture due to homogenous thickness of porcelain, especially substructures made of ceramics with different thermal coefficient of expansion than the veneering porcelains.
- Decrease in amount of precious metal used in metal and metal ceramic cases
- Decrease in post-op sensitivity
- Decrease the need for endodontic therapy (prophylactically & later)
- Increase office income
- Decrease cement failures due to inadequate retention
- Increase the use of partial coverage thus preserving more tooth structure
- Decrease abutment tooth fracture due to strengthening effect of resin bonding
- Decrease line of draw problems
- Increase retention of provisionals

- Increase the ease of provisional fabrication (no undercuts)
- Decrease the effect of eugenol on the pulp
- Decrease the effect of microleakage under both provisional and definitive restorations
- Increase the predictability of impression making
- Decrease the fracture potential of stone dies
- Increase the ease of waxing (no undercuts, less wax, etc.)
- Allow for fabrication of an all-ceramic restoration on a preparation that has an appropriate contour with no sharp points, which cause all-ceramic restorations to fracture
- Increase in the accuracy of castings and therefore increase the fit of castings
- Increase the ease of fitting a casting to the die
- Allow cementation with conventional cements without anesthesia 95% of the time when using provisional cements that are easily removed
- Provides a definitive "end point" for pathology extending in an apical direction for the periodontist so he can decide if osseous removal is necessary to establish room for the biologic width.
NOTE: The primary clinical purpose for core buildups is to preserve the integrity of the pulps, and to insure the clinical success of the crown and bridge case. The secondary purpose is to provide an adequate volume of artificial tooth structure to create a proper preparation. Insurance companies that deny core buildups on the basis of volume of tooth structure missing are, in my opinion, cheating their policyholders.