
Pulpal Protection: bases, liners, sealers, caries control

Module C: Clinical applications

REST 528A Operative #3C
Guidelines for basing, lining, sealing (best base is always the tooth structure itself)

- Do not remove healthy, sound tooth structure to provide space for base
- Use base as build-up and block-out for cemented restorations
- If using base for amalgam or composite restorations minimize extent of base. Always try to leave a dentin seat for the restorative material
- Do not base a preparation to create an “ideal depth.” This is contraindicated and can lead to increased risk of restoration fracture.
Guidelines for lining, sealing

- Liners should be applied with a minimal thickness (less than 0.5 mm)
- Use minimal amount of liner to achieve result
- Calcium hydroxide should be placed only where needed adjacent to pulp
- Currently primary use of adhesives for amalgam as retention as replacement to invasive pin placement and grooves-slots-amalpins
Recommendations for amalgam

Shallow cavity depth

sealer → amalgam

Moderate cavity depth

glass ionomer liner → sealer → amalgam

Deep cavity depth

Calcium Hydroxide → glass ionomer → sealer → amalgam
Recommendations for composite

**Shallow cavity depth**
- sealer → composite

**Moderate cavity depth**
- glass ionomer liner → sealer → composite

**Deep cavity depth**
- Calcium Hydroxide → glass ionomer → sealer → composite
Radiolucency of resin adhesives

Appearance of adhesive on radiographs may mimic recurrent caries
X-ray opacity of flowables
Some dentists use flowable as liners in posterior preps

- Tetric Flow Ivoclar
- Aelite Flow Bisco
- Virtuoso Flowable Den-Mat
Materials for use with amalgam chemical compatibility

- **Cavity sealer**
  - Varnish (*Barrier*)
  - Resin adhesive (*ScotchBond MP*) (use as self-cure)

- **Cavity liner**
  - Calcium hydroxide (*Dycal*)
  - Resin modified glass ionomer (*Vitrebond*)

- **Cavity base**
  - Resin modified glass ionomer (*Vitrebond; Fuji IILC, Fuji IX when left after removing caries control or temporary restoration*)
Dispensing and application of cavity varnish (Barrier) use with amalgam

- Dispensed from bottle
- Use of pipette
  - **Pipette Barrier into tooth preparation**
  - Or
  - **Dip disposable brush into bottle**
    - Apply to tooth preparation with brush (no double dipping)
    - Dry with air stream
    - Place amalgam
Placement of Barrier varnish (for use with amalgam)

- Movie of placement – see Mediasite or Weblink
Materials for use with composite chemical compatibility

- Cavity sealer
  - Resin adhesive (*ScotchBond MP or OptiBond Solo*)
- Cavity liner
  - Calcium hydroxide (*Dycal*)
  - Resin modified glass ionomer (*Vitrebond*)
- Cavity base
  - Resin modified glass ionomer (*Vitrebond*; *Fuji IILC, Fuji IX when left in cavity preparation after it had been caries control or temporary restoration*)
Dispensing and application of adhesive sealer (Scotchbond MP) for use with amalgam and dual cure composites

- Kit contains components for amalgam sealing and retention; used as a dual cure system

- Indications with dual cure composite cores (Fluorocore)

- Indications for amalgam bonding
  - preparation with the need for additional retention beyond preparation form
Scotchbond MP for use with amalgam or dual cure and self cure composite resin

Step 1: etch for 15 seconds

Step 2: **Activator mixed with Primer (1 drop each)**, apply to etched preparation for 15 seconds gently dry from preparation 5 sec

Step 3: **Adhesive and catalyst Mix together (1 drop each)**, apply to preparation; place amalgam (or dual cure resin cement or FluoroCore composite core)
Dispensing and technique for adhesive-composite resin procedure

- **Etch (15 sec)**
  - Enamel
  - Dentin

- **Adhesive**
  - Single component
  - Multi-bottle
  - Self-etching

- **Composite resin**
Materials for adhesive procedure

**Adhesive**

- Etch and Rinse
- Multibottle (5\textsuperscript{th} generation) 
  - *(Scotchbond MP)*
    - Primer
    - Adhesive
- Single component (4\textsuperscript{th} generation) 
  - *(Optibond Solo Plus)*
    - Primer-adhesive
Purpose of adhesive

- Seal tooth/restorative interface
- Decrease leakage at tooth/restorative interface
- Enhance restoration retention by mechanical locking of adhesive to roughened surface

Etched dentin

Resin infiltrating Dentin tubules

Resin sealing enamel and dentin

Resin in this part

Etched enamel
Enamel-dentin smear layer created during tooth preparation

- Layer on tooth surfaces created by rotary cutting instruments
- Made of loosely bound debris, collagen, and hydroxapatite crystals
Etching tooth surfaces

- Smear layer
- Etchant applied to Tooth 15 sec
- Etched dentin
- Etched enamel
Rinsing etchant from tooth

Rinse etchant from tooth for 10 seconds with air/water spray
Etched surface

- Tooth is dried with air
- Enamel has frosty appearance
- Dentin should not be dehydrated
  - should be slightly moist with glossy appearance
  - No visible water on surface

after etching; note frosty appearance of enamel
Application of adhesive

*Single component (Optibond Solo)*

- Apply matrix and wedge
- Apply single component adhesive with brush or microbrush
- Rub into dentin surface
- Let sit on surfaces 5 seconds
- Gentle air stream over adhesive
  - Evaporates solvent
  - Slightly thins adhesive layer
- Light cure 10 seconds
- *Resin will be wet (air inhibited layer)* - this is important for bonding between composite and adhesive

*mylar matrix strip and wedge applied before adhesive application*
Application of multibottle adhesive

(Scotchbond MP)

Hydrophilic primer applied 5 sec, air evaporate solvent

Apply, blow air to thin Adhesive layer, LIGHT CURE 10-20 sec
Multibottle (4th generation)
- Primer: organic solvent + hydrophilic monomer (HEMA - hydroxyethylmethacrylate)
- Adhesive: BisGMA resin + hydrophilic monomer

Single component (5th generation)
- Primer-adhesive: organic solvent + hydrophilic monomer + BisGMA resin + water
Bonding Procedure

Simultaneous etch enamel and dentin = 15 seconds

Etch enamel first

Etch dentin next
15 sec total

Apply adhesive

Light cure 10-20 seconds
Dispensing-mixing materials
Calcium hydroxide (Dycal)

- Dispense equal from each tube equal volume on a paper mixing pad
- Mix the two pastes together thoroughly for 10 seconds
- Using a base placement instrument- place in tooth preparation
- To accelerate set of Dycal, place a moist cotton pellet in the cavity preparation for 15 seconds; remove; continue with next step
Mixing Dycal (calcium hydroxide liner)

Movie of mixing – see Mediasite or Weblink
Placement of Dycal (calcium hydroxide liner)

- Movie of placement – see Mediasite or Weblink
Dispensing and mixing materials
Resin modified glass ionomer (Vitrebond)

- Dispense one drop of liquid and one scoop of powder on a paper mixing pad
- **Mix the liquid and powder together for 10 seconds**
- Using a base placement instrument - place in tooth preparation
- **Light cure for 20 seconds; continue with next step**
Mixing Vitrebond (liner/base)

- Movie of mixing – see Mediasite or Weblink
Placement of Vitrebbeond (liner/base)

- Movie of placement – see Mediasite or Weblink
Clinical application to deep cavity preparation

Diagnosis: Class V Caries

Caries removed
Dycal covered with Vitrebond
212 clamp
Clinical application of Vitrebond as a liner

Caries removed

Vitrebond placed

Vitrebond Light cured 20 seconds
Clinical application of Vitrebond as a liner

Vitrebond placed

Vitrebond Light cured 20 seconds
Clinical application with Dycal and Vitrebond

Deep axial wall
Moderate pulpal depth

axial wall: Dycal + Vitrebond
pulpal wall: Vitrebond
Radiographic appearance of liners/bases
Pulpal Protection: bases, liners, sealers, caries control
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