

DIRECT PLACEMENT COMPOSITE RESTORATIONS

Step 1: Shade selection:

Since I will usually layer the restoration I will select the shade I think is one shade darker to represent dentin then lighten if necessary. A perfect match is rarely needed to satisfy the patient. Usually a slight mismatch is easier to manage and detect.

Step 2: Isolation

Rubber dam is absolutely necessary if you work alone or you have a difficult isolation problem. Adhesive materials do not work if Blood or Saliva contaminate the field before the restoration is completely placed. I often use cotton rolls and work fast because I have the use of an assistant.

Step 3: Tooth Preparation

Prewedging: a useful and simple technique that helps prevent adjacent tooth damage (occurs 60-100% of the time) and aids in establishing tight contacts.

Slot preps: adjacent tooth damage is particularly a problem with small initial proximal preparations where contact may be maintained. A steel matrix can help protect the adjacent tooth if needed. You should be able to prepare a slot while maintaining a thin section of enamel and then break the enamel away. Remove unsupported enamel with spoon, hatchet or diamond bur. Breaking contact is not necessary and makes reestablishing contacts easier. **Mechanical retention** in the slot is important even with adhesive materials. This is especially important the more posterior the restored proximal surface is. These ridges take some heavy loads during chewing.

Bevels: No bevels on the occlusal surfaces. We teach a conventional amalgam preparation with no bevels. Proximal bevels are optional

Check adjacent Teeth: to evaluate for existing caries or damage from preparation. If a small carious lesion is detected it is easily repaired at this time without a slot prep.

Smooth any adjacent tooth damage with a finishing bur at least

Step 4: Clean Tooth: Pumice

(**Preppies**, Whipmix) and an occlusal **bristle brush** can be used. Some use Concepts (Ultradent) scrub which is a chlorhexadine. Chlorhexadine has been shown to slow degradation of bonds.

Step 5: Pulp Protection and base:

CaOH (Dycal or like) for exposures otherwise use RMGI (**Fuji2 LC**) as a base. This seals extremely well, releases fluoride, minimizes or prevents sensitivity. If the base is internal and will not extend to the external proximal surfaces (ie open sandwich) then I place the base before the band. This allows me to flow it in, allow it to set and quickly refine prep prior to composite placement. In the case of re-restoration where there is a large volume of missing tooth, the base makes a good first layer. Do not overbase the preparation and minimize the composite thickness or the composite will be at some risk

of fracture. If the proximals are deep and I wish to have RMGI extend subgingival (**Open Sandwich**), I will place band prior to base application. A RMGI liner (Vitrabond) can be used if there are isolated deep areas.

Step 6: Place matrix band or like.

2 surface : To get good consistently tight contacts, the ring type band (**Palodent Plus**, Dentsply or V3 Blue Disposable Ring Ultradent) seems to work better in dental students hands.

3 surface: we have thin dead soft Ho bands and prewedging. Wedging one side at a time during restoration can help also.

Burnish matrix: regardless of the matrix system, burnishing the matrix is key. If the matrix is not in contact with the tooth after wedging, there will be no contact.

Step 7: Open Sandwich:

Use RMGI (Fuji II LC). Conventional GI (Ketac Fil) will not work. It washes out over time to a greater extent. RMGIs seals extremely well, releases fluoride, minimizes or prevents sensitivity and acts as a good 1st layer to minimize composite volume. You can usually seal the gingival margin with a band adequate enough to prevent gingival leakage. The dentin is conditioned with the conditioner, rinsed, and lightly dried. Remember RMGI like moist dentin not dry dentin. Fill the gingival floor of the box and any deep occlusal areas that need base. Place enough base to bring the floor of the box above the free gingival margin but leave it below the contact. You want the contact to be in composite since this is more wear resistant. The one disadvantage of this technique is that sometimes I need to remove the band to re-prepare the base and flatten the floor. The RMGI is flowable but you cannot always control the final shape. I still like the technique because gingival tissue seems to respond well to this material.

Step 8: Place wedge:

If you are using the ring type matrix system DO NOT wedge tightly. The ring is designed to spread the teeth and wedging hard adds more to the movement and the contacts may wind up being real tight. Other systems can be wedged as usual. With a regular band and 3 surface I often place the wedge on one proximal side, fill it to just below the marginal ridge height, remove that wedge and place it on the opposite side and do the same. **Burnish matrix:** The matrix must be in contact with the tooth after the teeth are wedged.

Step 9: Etch Tooth:

Self-etching systems: Etch Enamel only. Most self etch adhesive do not give the same etch pattern as phosphoric acid etch so many manufacturers recommend etching the enamel only and rinsing and drying prior to adhesive application.

Total etching systems : if you are using a total etch system, the research suggests that it may be wise to etch the enamel for 15 seconds but shorter times on the dentin may be better. Longer etching of dentin leads to deeper penetration of collagen rich area and

more difficulty to completely hybridize the collagen. Five seconds or less etch of dentin is enough time for 37% phosphoric acid to clean smear layer and demineralize surface. There is no evidence that a deeper hybrid layer is better. In fact there is evidence that bond strengths drop from overetching. This may also help minimize sensitivity. Rinse but DO NOT OVER DRY. This is a potential sensitivity causing step.

Step 10: Apply Primer/Adhesive

Optibond Solo Plus is placed with a light scrubbing motion for 15 sec to mechanically aid in penetration. Removing the volatile components is an important part of the adhesive application. Air syringe and high vacuum are the two main choices. After curing the tooth should appear shiny. If it does not, multiple layers adhesive primers should not create a problem. The goal here is to fully rewet the collagen with primer. We have used this system as our principal adhesive since 1995 or so. It is a system that can lead to sensitivity unless the dentin is managed in a thoughtful way. Selective etch or Selective etch with a quick dentin etch is encouraged to minimize sensitivity. Some place Gluma prior to adhesive application which makes it similar to a 3Step total etch system.

Step 11: Incremental fill

Many clinicians promote the application of a flowable resin to fill the floor of the boxes. There is some evidence that it improves the adaptation of this area and minimizes the potential for voids or gingival flash from packing. There is little evidence that it helps reduce sensitivity or leakage. It is convenient to use and that is its main advantage. Like RMGI, you would want to fill only the box floor and have the contact established in the restorative material (better wear resistance). Use RMGI if margins are in dentin and cementum and are very subgingival (open sandwich). This is still a somewhat controversial technique with little evidence to support its routine use and RMGIs are sometimes more difficult to inject than flowable resins in some hands. The number of increments depends on the size of the cavity to restore and the technique that is used. There is a trend away from multiple layer greater than 3.

Step 12: Remove Wedge and matrix

Step 13: Contour

Gross contour: I use fine diamonds. They cut faster than finishing carbides

Fine contour: I use finishing carbides. They leave a smoother finish and cut slower for fine detail. ET finishing burs (Brasseler)

Embrasure Areas

12 scalpel blade

ET finishing burs (Brasseler)

Finishing strips

Step 14: Check contacts

Step 15: Finish and Polish

Prophy cup and pumice followed by luster paste

Shofu polishing points

(Jiffy brushes (Ultradent), Jiffy Cups, disks

Enhance points, cups, disks (Dentsply))

Step 16: Sealers: (?)

There are many composite sealers on the market. While many recommend their use and I believe they are a good idea and cannot hurt, I do not use them. Most require that you re-etch the tooth to clean the surfaces and then apply the resin to all areas, thin and cure. No evidence that these improve performance.