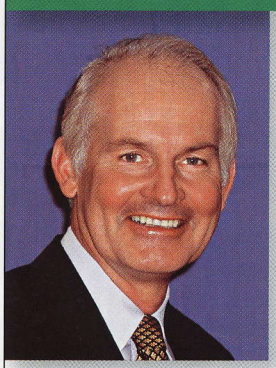

Compiled by
Geoffrey M Knight

Resin modified GLASS IONOMER CEMENT BONDING

Resin dentine bonding requires managing a highly stressed mechanical bond to an active biological surface. After eight generations of development these fundamental problems still remain to be addressed before a truly predictable resin bond to dentine can be achieved.

Resin modified glass ionomer cement (RMGIC) (*Fuji Bond LC – GC*) has been available as a dentine bonding agent for over 12 years and during that time clinical trials have shown it to be the most predictable long-term dentine bonding agent on the market, still a first generation material that has worked from the outset.

Mixing a resin modified glass ionomer cement (*Vitremer - 3M ESPE; Riva LC – SDI; Fuji II LC- GC*) at three times the liquid/powder ratio, i.e., three drops of liquid to one scoop of powder required for a restorative material will produce a creamy paste that can be used as an intermediary bonding agent between composite resin and tooth structure.

There are significant benefits using a resin modified glass ionomer cement to bond composite resin to dentine:

- Most predictable dentine bonding agent
- Minimal stress at the dentine composite resin interface
- Covalent chemical bond as opposed to a mechanical bond
- High levels of fluoride release
- Compatible with tooth remineralization
- Placement protocol not critical

The technique for placing using a RMGIC as a bonding agent is described below:

1. After cavity preparation etch the cavity for five seconds with 37% phosphoric acid (Fig1).
2. Wash and dry with oil free air and isolate the preparation (Fig 2).
3. Mix a described resin modified glass ionomer cement at three times the liquid/powder ratio to produce a thin creamy liquid (Fig 3).
4. Using a micro brush paint the bond over the enamel and dentine surfaces (Fig 4).
5. Photocure for five seconds. A five second photocure sets any free HEMA (2-Hydroxyethylmethacrylate) in the cement preventing moisture absorption from the dentine into the RMGIC and HEMA leeching out into the tooth from the restoration (Fig 5).
6. Apply a second layer of RMGIC bond (Fig 6).
7. Place a single increment of composite resin (Fig 7).
8. Photocure the restoration. As the composite resin polymerizes before the RMGIC there is little if any stress at the restorative interface from the polymerization shrinkage of the composite resin (Fig 8).
9. Contour and polish the restoration (Fig 9).

This technique should be reserved for small restorations where the thickness of composite resin does not exceed 2mm. For larger restorations a horizontal incremental layering technique can be used, placing a thin layer of RMGIC bond between layers of composite resin or alternatively utilize the co-cure system replacing dentine with auto cure glass ionomer cement, a layer of RMGIC bond and replacing enamel with composite resin.

Members requiring references to substantiate the claims made within this article may contact the author – geoffbds@dentalk.com.au

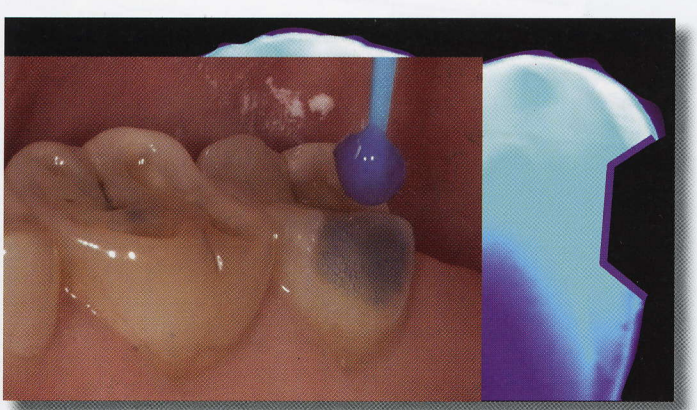

Fig 1. After cavity prep etch with 37% phosphoric acid for five seconds.

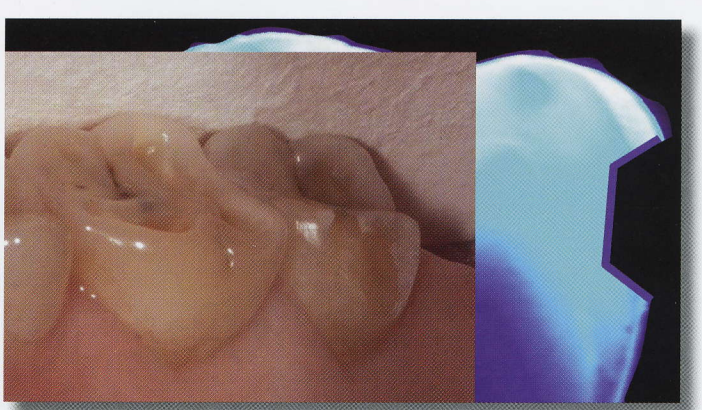

Fig 2. Rinse with water and dry with oil-free air.

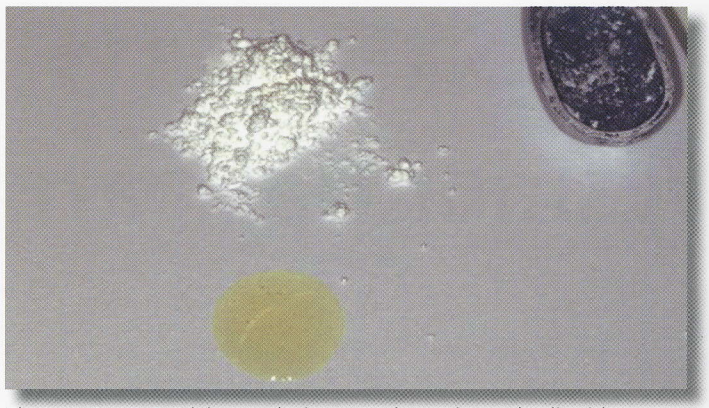

Fig 3a. RMGIC mixing technique - three times the liquid as recommended for a restoration mix.

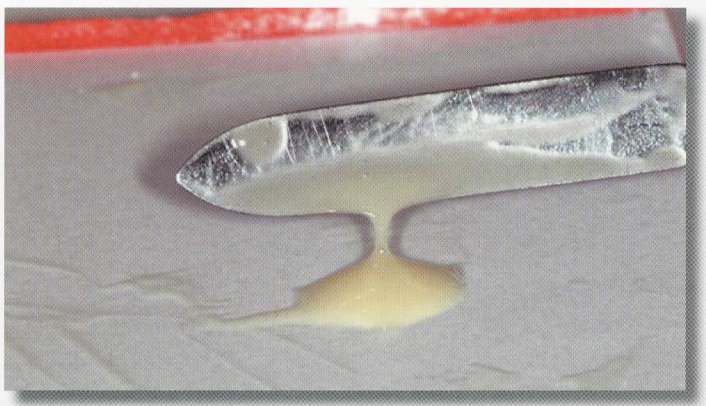

Fig 3b. Mix to a creamy consistency that just holds onto the spatula.

Fig 4. Paint RMGIC over enamel and dentine walls.

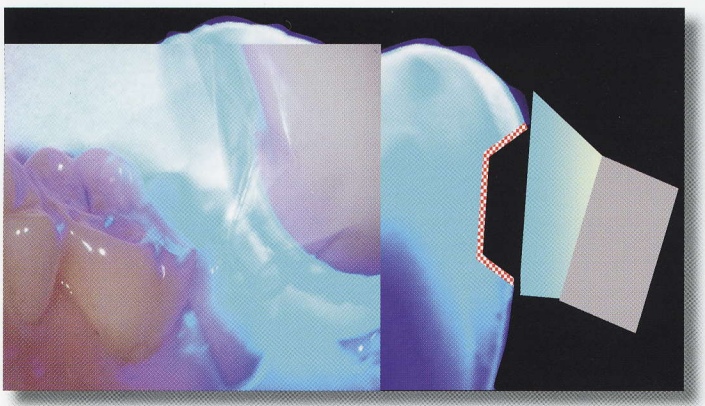

Fig 5. Photo cure for five seconds.

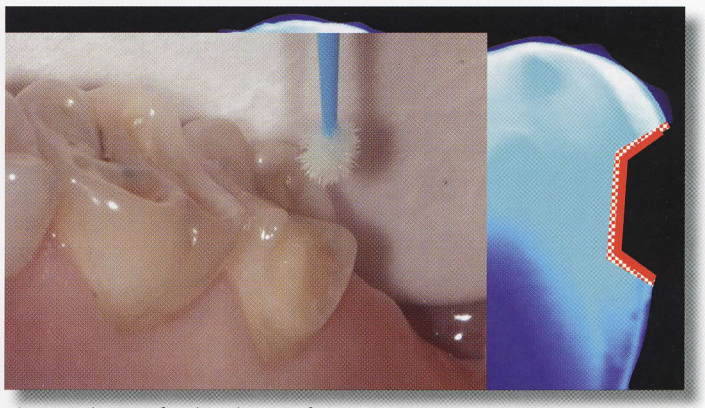

Fig 6. Place a further layer of RMGIC.

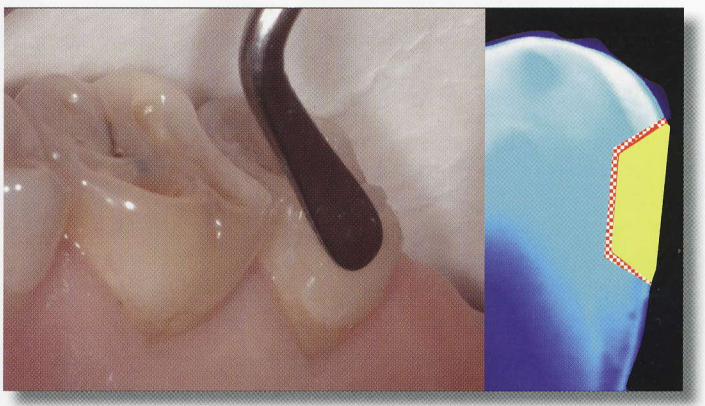

Fig 7. Place composite resin to slightly overfill the preparation.

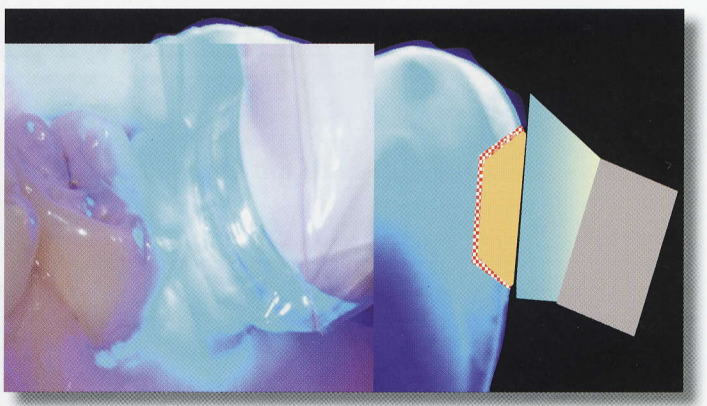

Fig 8. Photo cure restoration for 10 seconds. Composite resin polymerizes before RMGIC creating a stress free bond at the tooth composite resin interface.

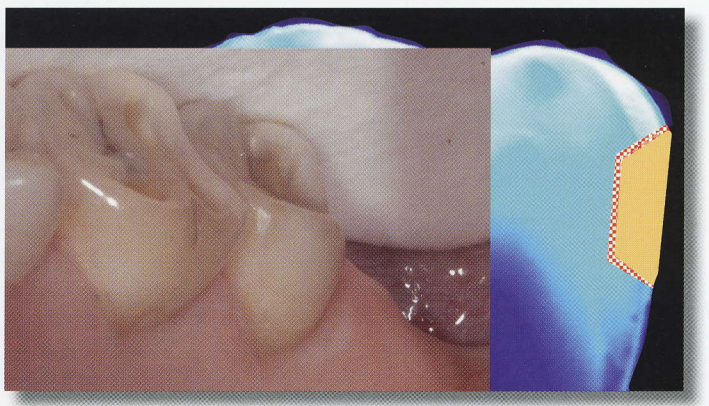

Fig 9. Contour and polish to create a stress free covalent bond between tooth structure and composite resin.

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