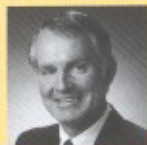


Compiled by Geoffrey M. Knight



The 1998 sandwich restoration

The sandwich technique was first described by John McLean in the early 80s and became popular as a restorative technique because it overcame the dual problems of adhesion of composite resins to dentine and the poor occlusal wear resistance of glass ionomer cements.

There were two major drawbacks:

- Firstly, the technique required two visits, asking patients to return after the glass ionomer cement base had matured sufficiently to be etched prior to placing the composite resin overlay, and
- Secondly, the very process of etching the glass ionomer to create adhesion to the composite resin, weakened the glass ionomer surface to the extent that the bond disintegrated when minor loads were applied.

However, the concept remains a sound one, particularly with the

emerging evidence that glass ionomers may have therapeutic benefits as well as restorative capabilities. Graham Mount's statement that glass ionomer cement should be used to replace dentine, and composite resin used to replace enamel, continues to be a sound approach to restorative dentistry.

A paper in the April 1998 issue of the *Australian Dental Journal* looked at bond strengths between conventional glass ionomer cements and composite resins and between resin modified glass ionomers and composite resins.

The authors found bond strengths of less than 25 MPa between GICs and composite resins while they were able to record bond strengths, acceptable for adhesive restorations, of almost 6 MPa between RMGICs and composites.

As RMGICs contain both resin and glass ionomer cement, it stands to reason that placing RMGIC as an intermediary between uncured glass ionomer cement and composite resin, the three materials would bond together when polymerization occurred.

To test this hypothesis three samples were prepared by placing glass ionomer cement into a semi-circular plastic mould (curved instrument holder on an instrument tray), applying RMGIC at one end and puddling composite resin up against it.

The RMGIC and composite resin were photo initiated for 20 seconds and the specimens were left under a plastic film, to prevent dehydration of the setting glass ionomer cement,

for four minutes. The specimens were then coated with resin monomer, light cured for 10 seconds and placed in water for two days to allow the GIC to mature. Fig. 1.



Fig. 1.

Fracture testing was carried out using two mouth mirror handles to support the specimen and a third to apply force from above until the sample fractured.

In each case the samples failed cohesively. Twice in the resin and once in the GIC. As testing was carried out during breaks between patients' appointments, it was considered an expensive luxury to continue to verify the results.

The improved properties of glass ionomer cements make them suitable for the restoration of small occlusal and initial proximal lesions (tunnel restorations) where associated cusps do not require support.

The following technique describes the management of an occlusal lesion where the associated cusps are unsupported and require an overlay with composite resin to protect them from possible fracture.

- After the removal of caries and existing restorations, the remaining cusps are prepared to just over the rim of the occluso-buccal and occluso-lingual margins.
- Cavo surfaces are air abraded to remove micro-fractures in enamel and dentine and to provide an enhanced surface for adhesion. Diagram 1.

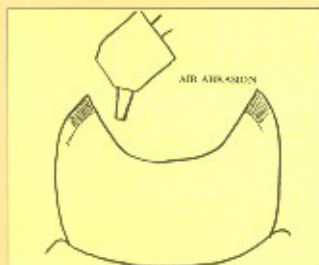


Diagram 1.



Diagram 3.

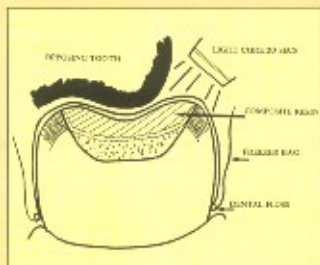


Diagram 5.

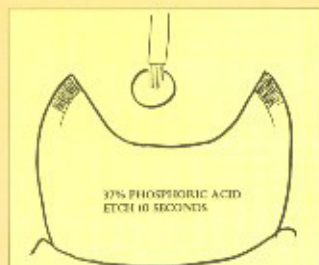


Diagram 2.



Diagram 4.

• The preparation is etched with 37 per cent phosphoric acid for ten seconds to remove the smear layer on the dentine and to etch the enamel. The preparation is washed with water and dried with oil free air. Diagram 2.

• Glass ionomer cement is placed into the lower two thirds of the cavity, Diagram 3, and whilst still malleable a layer of resin modified glass ionomer bond is brushed over the glass ionomer and the remaining exposed cavo surfaces. Diagram 4. ▶

- An increment of a condensable composite resin is puddled into the preparation to just overfill the cavity.
- A three centimetre square of plastic film is placed over the preparation and dental floss is passed through the contact points and tied at the cervical margin. The plastic film acts as a mini rubber dam and prevents the air inhibited layer from forming on the composite surface.
- The patient is asked to masticate lightly upon the restoration with the tongue upon the soft palate to achieve centric occlusion. After lateral and protrusive movements

the patient is asked to remain closed whilst the restoration is spot cured from the buccal aspect for five seconds. Diagram 5.

- The patient is then asked to open and the restoration is co-cured for a further 20 seconds and left for four minutes while initial setting of the GIC occurs.
- Minor occlusal corrections are carried out and after a small amount of anatomical contouring the restoration may be polished and covered with a light cured resin to enhance wear resistance on the composite and protect any exposed maturing glass ionomer cement.

This variation of the sandwich technique has wide applications in general restorative dentistry. After four months there has been little evidence of postoperative sensitivity or breakdown of the composite/glass ionomer bond.

The use of a plastic film for the bite form technique prevents over-contouring of the overlaid cusps, produces a function occlusion table and saves about 10 minutes of chairside time.

A clinical video showing a range of restorative procedures, from small occlusal and proximal preparations to full coronal restorations, incorporating the plastic film bite form technique using bonded glass ionomer, is available for **\$67.50** (including postage and insurance) from the **Dental Health Foundation - Australia, PO Box 679, Glebe NSW 2037. Phone: 02 9351 3219. Fax: 02 9351 4734.**

Reference

1. Farah CS, Orton VG, Collard SM. Shear bond strength of chemical and light-cured glass ionomer cements bonded to resin composites. *Aust Dent J* 1998;43:81-6