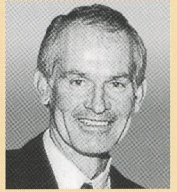


Compiled by Geoffrey M Knight



The merge-in margin

Eighteen years ago Fred Widdop wrote an article for the first issue of the *Australian Society of Dental Aesthetics' Newsletter*. The choice and quality of composite resins have improved substantially since then but the technique is as relevant to clinical dentistry today as it was in 1986.

Dental students have always been taught to approach a lesion in an anterior tooth from the lingual aspect. It is surprising that there is a persistent parade of patients who present with unsightly Class III restorations that have been prepared from the labial surface. Certainly better labial access may lead to less tooth removal but the eventual staining, detectable margins and an inability to match the colour of the adjacent tooth at the restorative margins inevitably leads to an unsightly blemish in a patient's smile. Managing an anterior tooth with a cavity preparation that results in

cavitation on the labial surface either due to a pre-existing restoration or caries can be a clinically challenging exercise (Fig 1).

The secret to restoring these teeth goes back to times when hunter/gatherers required an ability to detect game on the horizon, making 'man's' horizontal plane perception particularly acute with perception in the vertical plane less so. Furthermore, laminas naturally occur in the long axis of tooth surfaces whereas horizontal or curved lines do not.

The success of this preparation lies in the way the margins of the restoration are prepared by exaggerating the marginal bevels in an incisal and cervical direction so that a vertical tangent is formed at the vertical arc of the cavity outline. This bevel preparation will create a vertical marginal profile masking the extent of cavity preparation and comfortably merging into labial anatomy of the tooth as a developmental groove.

Cavity preparation

Cavity preparation should be minimal, focused on the removal of cariously infected dentine. Undermined enamel may be left *in situ* as an adhesive restoration will prevent further surface breakdown.

Once the existing restoration and or caries have been removed the cervical and incisal aspects of the



Fig 2. The cervical and incisal aspects of the enamel margins are bevelled from the DEJ for about 2 mm in a vertical direction.



Fig 3. The long bevel forms a tangent to the vertical aspect of the cavity margin.



Fig 1. Placing an invisible restoration on the labial surface of an anterior tooth is a challenging clinical exercise.

enamel margins are bevelled from the DEJ for about two millimetres in a vertical direction, forming a tangent at the vertical cavity margin. This may be carried out using an end cutting 541 diamond high speed bur (Fig 2, 3).

Cavity isolation

The cavity may be isolated with rubber dam if this is the preferred restorative technique. Its use is limited by the clinical skills of the operator and it does not possess a supernatural ability that creates perfect dentistry. Nothing is achieved by criticizing dentists who can create superb clinical results without it.

Cavity isolation can also be achieved by placing a small amount of trichloroacetic acid (TCA) at the gingival margins using a perio probe. This will shut down crevicular exudates completely for the duration of the restorative process. If gingival bleeding persists, placing a small amount of local anaesthetic into the surrounding attached gingivae will assist with exudates control.

Surface preparation

Etch the cavity and surrounding enamel for five seconds with 37 per cent phosphoric acid and wash with copious amounts of water then dry with uncontaminated oil-free air. A compressor with ceramic seals or a refrigerated air dryer in the air lines are essential components for practising predictable adhesive dentistry. Even if a self etching primer system is to be used a short application of phosphoric acid guarantees an etch of the enamel and will remove the smear layer from the dentine that is more than likely to be contaminated with oil (from the handpieces) and other biofilms.

Matrix placement

Correct matrix placement saves a considerable amount of time in contouring and finishing the restoration. Determine the dimensions of the interproximal space and insert a paper point that fits snugly into the space. Gutta percha (GP) points can be used as an alternative although they won't absorb crevicular exudates the way paper points will. Paper points also help hold the matrix strip, most importantly

prevent proximal overhangs and finally discourage patients from swabbing the lingual surface of the cavity preparation with their tongues.

Bonding

There is a wide range of dentine/enamel bonding systems currently available. The bottom line is, dentists should use the one that, in their hands, gives the best clinical results with minimal post-operative sensitivity. A large lesion with recurrent caries is best restored with a base of glass ionomer cement (GIC), leaving the softened non-carious affected dentine beneath to remineralize.

Composite resin

Manufacturers have recently introduced aesthetic restorative kits using micro hybrid and nano resins that have superb optical qualities and breathtaking aesthetics. Dentists who have anything more than a passing interest in cosmetic dentistry should see that they have one of these kits in their operatories. They offer a range of dentine shades with high chromas and increased opacity, a range of enamel shades that are more translucent with a varying range of values and a series of colour modifiers for tinting and specific effects.



Fig 4. Dentine colour, one shade darker than surrounds, placed to fill spatial area of pre-existing dentine.

Dentine shade

Choice of the first resin increment is placed to match the surrounding dentine. Getting the shade right is a function of making enough mistakes before things finally fall into place. As a rule of thumb: when a dentine shade is covered with an enamel shade, the high value in the enamel shade will usually push the colour up through one shade level. On this basis, if the dentine appears to be B2 select a B3 shade and most of the time this will work out.

Place the dentine shade so that the material occupies the spatial area of pre-existing tooth dentine. This opacity of dentine shades will prevent shine through from the lingual and commence building up the colour palate of the restoration (Fig 4).

Enamel shade

Ideally, the enamel shade should be a microfill, especially if the restoration is large, as this material has a permanent shine that vigorously resists staining. The problem with microfills is that there is a limited range of enamel shades, which is something for the manufacturers to ponder.

Choice of the enamel shade is based upon the value of the surrounding enamel. Remembering that the dentine shade was chosen on the assumption that the value of the enamel shade would push the shade higher, decide upon an enamel shade that is slightly higher than that of the surrounding tooth enamel. Practice on your mother-in-law!

Contouring

Normal contouring techniques apply. Dentists seem to think that overfilling a restoration with composite resin will lead to a better result; in fact the opposite is true as shrinkage is greater. Over-packed restorations waste resin and increase contouring time. Much of the contouring can be done with a Ward's Carver prior to photo initiation. Resin placed sparingly facilitates contouring with coarse discs and fine pointed diamonds (Fig 5).



Fig 5. Sparingly placed resin, using a Ward's Carver facilitates contouring.

Recall

All composites undergo post-photo initiation polymerization, increasing surface hardness by up to 50 per cent over a four week period. Rescheduling the patient for a brief



Fig 6. Finishing with fine rubber wheels and discs achieves a high surface lustre.

Finishing

Finishing is carried out using either fine rubber wheels or discs until the optimal surface shine is achieved (Fig 6).



Fig 7. Fluorescence of tooth prior to restoration placement.

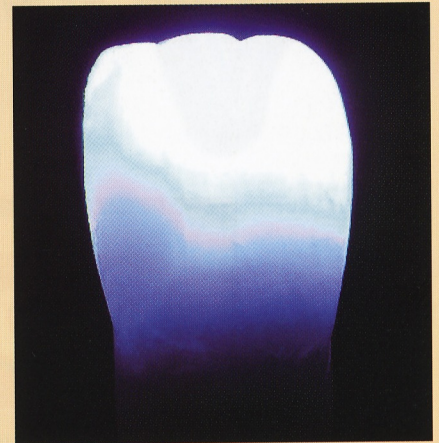


Fig 8. After placement of the restoration, fluorescence is observed being emitted from the composite in the mesial aspect of the tooth.

polishing visit or a note on the card to polish the restoration at recall optimizes the outcome of the restoration.

Summary

The current generation of micro hybrid and nano resins have superior optical and handling properties. They mimic tooth structure even to emitting their own fluorescence (Fig 7, 8).

They are fun and a challenge to use and combined with Fred Widdop's 'Merge-in Margin' technique enable clinicians to produce all but invisible Class III restorations. □