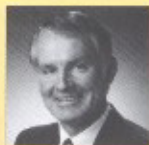


Compiled by Geoffrey M. Knight



Fabricating Direct Resin Laminates

This month Geoffrey Knight presents a step-by-step description of a method of direct bonding which he terms 'a little unorthodox' although he maintains that it provides the potential for an excellent result. The article is reprinted here by courtesy of the Editor of FDI Dental World.

Introduction

The advent of 'bonding' heralded a new era for aesthetic dentistry. For the first time dentists were able to provide their patients with non-invasive and economical alternatives to traditional techniques that had changed little over twenty years.

Early attempts at bonding consisted of placing a single shade of composite resin over an etched tooth surface, curing and contouring to the principles learnt during undergraduate dental anatomy classes. As there was no formal training available, dentists experimented with new products and clinical hints as they became available, but margins were often poorly defined and surface finishing inadequate. As a result many dentists found direct bonding an unsatisfactory procedure and patients returned with marginal staining, black spots from surface pocketing and dull, non-vibrant aesthetics subject to tobacco and coffee stains.

Since those early times composite resin technology has improved greatly and new direct bonding techniques now enable the fabrication of laminates that approach the aesthetics of natural teeth. This article describes the steps in the preparation of such veneers which, when placed within protected occlusal boundaries, can be expected to give many years of service with minimal maintenance requirements.

There are dentists who advocate tooth preparation for anterior veneers. This is an irreversible procedure and, while sometimes unavoidable in order to meet aesthetic expectations, is best avoided. The protagonists of preparing teeth claim, amongst other reasons, that enamel removal is necessary to maintain the emergence

profile and to keep teeth confined within the existing arch. However, there are no self-cleansing areas on an incisal tooth surface where plaque control is a function of mechanical or chemical intervention. Besides, emergence profile is an aesthetic consideration and not a parameter for gingival health.

Teeth are often positioned labially for full denture wearers to compensate for alveolar bone loss and the ease with which even elderly patients are able to accommodate altered arch forms suggests that this is of little clinical consequence for the success of labial veneers.

It is unfortunate that tooth preparation is now perceived as a necessary precursor for the clinical success of laminate veneers. It is a dogma that should be beaten by the stigma of removing healthy tooth enamel.

Initial preparation

Preparing a tooth for a composite veneer should, ideally, consist of removing only the pellicle layer from the tooth surface with a pumice and water slurry in a rubber polishing cup. The surface should then be etched with 37 per cent phosphoric acid for 15 seconds, washed with copious amounts of water, and dried thoroughly with oil-free air.

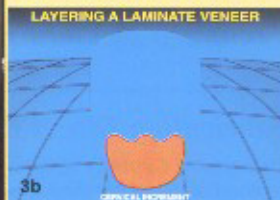
Exposed dentine surfaces must be covered with either a dentine bonding agent or glass ionomer cement. Light-cured glass ionomer cements do not require further etching but conventional glass ionomer cements do, by the method described above. The bonding resin should then be applied over the prepared surfaces and cured for 10 seconds after which the tooth is ready for the placement of the laminate.

In this article a dark plastic tooth replica removed from a shade guide serves to demonstrate the technique (Fig. 1).



Dental enamel becomes translucent with age and as a result the hue of the dentine shows through, yellowing the tooth. Most laminates are placed for the purpose of rejuvenating a smile and, as immature dental enamel tends to be more opaque than mature enamel, it is often necessary to place a thin opaque layer as a base. The opaque layer will also mask any discolorations due to enamel hypoplasia or stains from restorations. Most opaquers currently available have intense chromas and create a flat lifeless effect that dulls the natural translucence of a tooth. However, P50 Shade 'Y' is a useful opaquer that masks blemishes in very thin layers, yet still maintains the translucence of the underlying tooth. Opaquers should be placed in thin layers so that the underlying blemishes are just masked from view as shown in Fig. 2a and schematically represented in Fig. 2b.

The opaque layer may now be cured for about five seconds by positioning the curing light about 80 mm away from the resin and moving slowly towards the tooth. This prevents a snap cure of the resin and reduces stress at the tooth-resin interface. It is not required to completely cure the resin at this stage as further curing will occur with the placement of each subsequent increment. ▶



Microfill composites are vastly superior to hybrids for anterior laminates. While some of the newer hybrids have excellent polishability, after three months the surfaces of these composites become dull and tend to pick up stains whereas microfill composites retain their polish for many years.

Placement of a layer of resin bond between laminates improves handling of the next increment and reduces the possibility of air inclusions between the layers.

Shade selection

Under close examination teeth demonstrate a range of hues and

chromas over their surfaces. The cervical region usually displays a yellowish shade and a higher chroma than the body of the tooth due to the thin layer of enamel in this region. It is, therefore, advisable to choose a microfill resin with a high chroma, about one Vita[†] shade above the chosen body shade. Helioprogress[†] dentine shade 22 is often useful for this increment which should be built out from the gingival margin and reduced in thickness to a thin smear at about one-third of the way towards the incisal edge as shown in Figs 3a, b.

The body increment is next. This is the

increment that will project the overall hue of the tooth and as such must be chosen carefully, particularly if a single veneer is being placed to match in with an existing dentition. When a series of veneers is being placed the most acceptable shade to patients appears to be Vita A1. Whilst many dentists feel that this shade is too light, cosmetic dentistry is driven by patient demands and satisfaction is generally proportional to tooth whiteness. Vita B1 shades, however, are best reserved for entertainers who require particularly



white teeth under stage lighting as under normal lighting conditions this shade will appear artificial.

As a rule of thumb, when placing multiple veneers for women and young men, a Vita A1 for body shade and a Vita A2 for cervical shade are recommended, replacing the A2 cervical shade for an A3 in mature men.

The body increment is blended over the incisal third of the cervical increment and 'puddled' over the occlusal surface thinning down towards the incisal margin. Prior to curing, a series of vertical grooves are placed on the surface to emulate the enamel ridges seen in natural teeth (Figs 4a, b). The composite chosen should be a micro-fill, but with less chroma than a cervical shade; Durafill VS⁸ resin is a suitable product to use for this increment.

Tinting is the next procedure and it is important to differentiate between opaques and tints. Opaques are used to block out colours whilst tints are used to provide subtle hue enhancements in the finished veneer. Tints are extensively used in porcelain work and the principles transfer readily to composite resins.

Patients usually resist the use of brown tints to characterize teeth unless they are being used specifically to match an adjacent tooth or teeth. Brown or orange tints have limited use in the cervical regions to create a natural look for older patients, whilst white tints are generally used only for characterization. A reddish tint may be used to add warmth and depth. Figs 5a, b demonstrate the use of tints and SDII tints are used here.

Tints are basically unfilled resin with pigments added and as such must be overlaid with composite resin to protect them from the oral environment. They may be placed with fine brushes used for characterizing porcelain. There is a tendency to become

over enthusiastic when using tints and this should be resisted to avoid a result which looks more like a barber's striped pole than an aesthetically enhanced tooth!

A composite resin representing the 'enamel' shade is overlaid next, onto the incisal third of the veneer. Greater translucency is required in this region, and aesthetics are improved if an opalescent material is used such as Silux Plus Incisal shade* (Figs 6a, b). The proximal regions of a natural tooth consist entirely of enamel and the effect of this should be reproduced in the veneer. This is achieved by inserting a mylar strip at the proximal margin, placing uncured incisal shade resin between the veneer and the strip and pulling the strip lineally, to drag the resin interproximally, before wrapping the strip over the surface of the facing and curing (Figs 7a, b). The resin placement is then complete and Fig. 7c shows, diagrammatically, the various composite layers.

Finishing procedures

Contouring is initially carried out with coarse discs and high-speed diamonds to 'rough in' the outlines of the veneer, followed by finer discs and points to shape the veneer within the confines of the aesthetic landmarks. Whilst it is not easy to create a truly anatomical surface with composite resin it is relatively simple to produce a surface that projects a vibrant and sparkling smile. The final steps in polishing include:

- Smoothing the surface with a dark blue Soflex Disc* (Fig. 8).
- Using a high speed pear-shaped Shofu Carborundum Stone FG25[†] with a dry field, and working the stone over the surface with multiple strokes in the long axis of the tooth (Fig. 9).
- Creating a high lustre with silicone rubber polishing discs. Vivadent[‡] produce some useful discs which create a high lustre without removing



the surface characteristics previously created with the stone. The grey disc is used first for polishing, followed by the finer green disc. Fig. 10 shows the Shofu stone and Vivadent discs.

- A final polish with a fine, light blue Soflex disc (3M 19821) which brings the surface to a high shine without removing the characterization.

At the conclusion of polishing the laminate is further cured for 40 seconds to give maximum hardness to the outer surface of the veneer (Fig. 11).

This method of direct bonding is a little unorthodox compared with traditional techniques (Fig. 12) but attention to detail and persistence to achieve excellence have the potential to create a result that is satisfying to both patient and dentist as the finished result shows (Fig. 13).

Manufacturers

Products are identified as a guide to readers based on the author's experience. It is acknowledged that similar materials are available for the techniques described.

- *3M Dental Products Division, USA.
- †VITA Zahnfabrik, Germany.
- ‡Vivadent, Liechtenstein.
- §Vivadent Kuller GmbH, Germany.
- ¶Soculux Dental Industries Ltd, Australia.
- ‡Shofu Inc., Japan.