Efficiency and esthetics in the posterior region

Since bulk-fill composites have been on the market for a number of years, the time has come to take a look back at the introduction, development, current trends and future options of these materials.

By Dr Eduardo Mahn, Chile

When bulk-fill composites first hit the market, they were considered a true innovation. We had been layering posterior composites for more than 40 years, yet many of us were not quite sure for what reasons the layering technique was mandatory. Understanding the reasons why a certain technique is applied is crucial for the correct assessment of the pros and cons of any technique.

Basically, the reasons were four:
1. Aesthetics: It is obvious that a layering technique involving dentin, enamel and effect shades leads to a better final outcome than a technique that uses only a single layer in a standard translucency. As regards the bulk fill technique, this reason can easily be rejected because, objectively, most posterior restorations are almost always placed using one shade only and most patients are satisfied with the result.
2. Reduction of volumetric shrinkage: The less composite we place, the smaller the volumetric shrinkage.
3. Reduction of shrinkage stress: This reason makes sense and is based on the configuration factor. It is said that the shrinkage stress is reduced if the unbounded surface area of a layer is larger than the bounded surface area. Although there is enough in-vitro evidence on the relevance of the C-factor, a clinical correlation has not yet been shown. This can be easily illustrated by the fact that Class-I restorations have an unfavorable C-factor but a high survival rate while Class-V restorations have a favourable C-factor but a low survival rate. This example shows that the C-factor is only one of many factors that determine the success of a direct restoration - and frequently not the most important one.
4. Depth of cure: This is probably the most important factor because increments of only 2 mm could be applied before the advent of bulk fill composites. Some studies suggest that the depth of cure of certain composites is even lower than 2 mm. This was the reason why all layers were restricted to a maximum thickness of 2 mm. If not, the composite material placed in the deeper areas of the cavity would never receive enough light to cure adequately. Having discussed all these factors, we may realize that we are not so far from the bulkfill technique. If a composite is capable of reducing the stress when applied in thick layers and, at the same time, offers an increased level of translucency and a more effective light curing process, the bulk fill technique is feasible. In most cases, shrinkage stress relievers are responsible for the reduction of shrinkage stress. Shrinkage stress relievers are fillers with a lower modulus of elasticity. Their function is to release the stress as the composite polymerizes. The second aspect, i.e. the depth of cure, was achieved by making the composites more translucent with the effect of enhancing the passage of light through the material. As a result, the depth of cure was increased. This point has also been proven to be true. In addition, some companies such as Ivoclar Vivadent have improved the polymerization process in deep areas by adding newly developed initiators (i.e. tetravin) to the formulation.

Nowadays, all major dental manufacturers offer bulk fill composites. Bulk fill composites can basically be categorized into two main groups: first, flowable bulk fill composites requiring a final capping layer and, second, sculptable bulk fill composites. Generally, these materials increase the efficiency of the restorative workflow as they allow the fillings to be placed with either a single-increment technique (sculptable composite) or a two-increment technique (dentin replacement with flowable composite and capping layer with sculptable composite). These methods are obviously faster and easier to perform than conventional layering procedures. However, this advantage is undermined by the fact that bulk-fill materials are generally too translucent and allow discolourations to shine through the restorations, especially if they are used to replace an amalgam filling.

Fortunately, new developments offer the way for new technologies. By this I mean the Aessence technology developed by Ivoclar Vivadent. The Aessence technology allowed a composite to be highly translucent prior to being light cured and causes a drop in translucency as it polymerizes. Once polymerized, the material exhibits a dentin-like translucency and is capable of effectively masking most discolourations. Practitioners can follow a very efficient procedure to accomplish fillings due to the Aessence technology of Tetric EvoFlow Bulk Fill and the combination with Tetric EvoCeram Bulk Fill as the final capping layer. Two steps will be enough in most clinical situations. At the same time, patients will receive a sufficiently aesthetic restoration.

In addition, the entire adhesives restorative protocol has become more predictable with the recent introduction of universal adhesives, as they have eliminated the need for dentin etching. Dentin etching was one of the reasons for the variability and sensitivity of the adhesive technique in the past years. A recently published meta-analysis showed the importance of predictable clinical protocols as the correlation between in-vitro tests and clinical performance is poor. Furthermore, there is growing evidence in clinical trials and elsewhere that self-etch protocols show a favourable performance. The clinical case below demonstrates how three materials are used.

Clinical case
A 33-year-old patient presented with a failing amalgam restoration on the upper right 4 with no interproximal contact (Fig. 1). After the amalgam filling had been removed and a rubber dam placed (Fig. 2), a matrix, wedge and ring were inserted (V4 Trident). The enamel was etched with phosphoric acid (Total Etch) and then rinsed with water (Fig. 3). Subsequently, the adhesive (Adhese Universal) was applied with...
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Anterior no-preparation ultrathin veneers

By Drs Feng Liu & Xing Liu, China

Introduction

No-preparation ultrathin veneer is one of the most minimally invasive restorations. Its thickness ranges from 0.3 to 0.5 mm. In the right circumstances (Figs. 1 & 2) it can show excellent aesthetic appearance, and provide long-term stability and health of soft- and hard-tissue.

The overall structure of ultrathin veneer is flexible, in that its neck can gradually change from thick to thin, and the border can be knife-edge-like or thin round-convex (Figs 3 & 4).

Manufacturing inlays, onlays, crowns and veneers chairside with a CAD/CAM system has become established in most dental offices. This technique can produce immediate scan, design, milling and restoration quickly and conveniently. It is the same for the no-preparation ultrathin veneer for chairside CAD/CAM systems.

The biocomposite, which is widely used for restoration design, has target contours such as wax up. In this mode, the operator should scan the original tooth shape in the mouth or on the model first, then wax up and re-scan the wax-up shape into the CEREC system. Both optic impressions will transfer into the virtual model, and match to each other to obtain the restoration contour information. Depending on the 3-D data, chairside milling can be complete in a few minutes. Post-milling processes usually contain shaping and polishing. In some conditions, it may be necessary for additional staining and glazing.

Case report

A 72-year-old female patient presented, whose dentition had apparent colour changes and abrasions that had occurred gradually over time. These problems resulted in an unattractive smile and made her appear older than her age. She also made a request for a highly comfortable and minimally invasive treatment plan, and expected an improvement in the colour and shape of her upper anterior teeth, which would rebuild her smile and self-confidence (Figs. 5 & 6).

It was found that due to the abrasion which had occurred over several decades, the labial surface was plane and flat, the incisal edges had been worn to a straight line and also had abrasion-associated defects (Figs. 7 & 8). The no-preparation veneer that would occupy the ‘outer space’ of the teeth would produce the slight wrinkles around the lips. These effects were part of the patient’s expectations and the treatment plan was accepted.

The patient wanted her teeth colour to seem natural and to disguise the discoloured tooth structure. The C-factor is no longer an issue due to the Aessencio technology. Post-milling gaps do not occur more frequently and are not larger compared to the conventional layering technique. Application is clearly quicker and the aesthetic effect is in most cases similar to that of conventional composite restorations. The differences in the translucency of materials for conventional posterior composite restorations are no longer of relevance due to the Aessencio technology. This sets a new standard in this group of composites.

Conclusion

To sum up, the “bulk-fill technique” using Tetric EvoFlow Bulk Fill and Tetric EvoCeram Bulk Fill allows us to be more efficient with almost no compromises compared to the conventional layering technique. The patient needed an issue due to the shrinkage stress relievers. As expected, marginal gaps do not occur more frequently and are not larger compared to the conventional layering technique. Application is clearly quicker and the aesthetic effect is in most cases similar to that of conventional composite restorations. The differences in the translucency of materials for conventional posterior composite restorations are no longer of relevance due to the Aessencio technology. This sets a new standard in this group of composites.

The manufacture of no-preparation veneer could depend on the precise wax up of pre-operation. This step...