Abstract

Dental adhesion secures the bond between dentin, enamel, composite and other restorative materials, contributing to the success of a restoration. Universal adhesives work with direct and indirect restorations, as well as with self-etch, selective-enamel-etch, and total-etch techniques, to ensure long-term bonds and treatment function. Unlike traditional adhesives that can only be used in specific procedures or restorative techniques, universal adhesives allow the clinical indication to dictate the materials used. Additionally, with an advanced delivery system, universal adhesives work efficiently, predictably and cost-effectively.

Introduction

Adhesive-bonding techniques and their associated materials were introduced to enhance the attachment of restorative materials, such as composites and ceramic, to tooth structures. Adhesives are an alternative to conventional cementation, and combine preparation design and resistance to connect a restoration to the underlying tooth structure. Adhesive bonding creates a micromechanical connection between a tooth surface and a restoration, a connection that is dependent upon not only the adhesive and bonding agents used, but also the etching techniques that precede their placement.

Etching tooth surfaces removes the smear layer and exposes the dentin tubules, which enables the adhesive to form a hybrid layer with the tooth structure, sealing the microtubules and adhering to dentin and enamel. Etching can be achieved in one of three ways: self-etch techniques, whereby the adhesive itself contains an etching component; selective-enamel etch, whereby phosphoric acid is used only on affected enamel areas; and total-etch techniques, in which both the enamel and dentin are etched. Regardless of the etching technique, an adhesive must be selected that is compatible with the technique and materials used.

Depending on their formulation, adhesives can be used with direct or indirect restorations, or both. With increasing popularity, continued development of the adhesive armamentarium is consistently improving its range of use and application. Therefore, determining the appropriate adhesive for use in different restorative procedures can be challenging, since chemical composition, working time, and bond strength—among other characteristics—must be considered. However, to ensure accurate seating of indirect restorations, ideal adhesives will exhibit low film thickness.

Additionally, the manner in which adhesives can be delivered to, and placed on, a tooth structure can either facilitate or hinder the adhesive process. Conventional delivery systems require the use of a mixing well and applicator to apply adhesive. Although effective, this delivery system does not efficiently utilize the material, since excess adhesive must be discarded, and opening and closing the bottle can lead to decreased bond strength over time. Alternative delivery methods are necessary to create a more cost-effective adhesive technique. Universal adhesives that can be used with all restorative materials, as well as all etching methods, provide practitioners with a simple and comprehensive option that strengthens bonds in variety of clinical situations.

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Universal application

Adhese Universal by Ivoclar Vivadent is a single-component, light-curing universal adhesive for bonding direct and indirect restorations. Compatible with all etching techniques, it ensures durable and robust bond strengths using any etching protocol.

Along with its comprehensive compatibility, Adhese Universal demonstrates a high tolerance to different degrees of clinically relevant dentin moisture. The optimized solvent assists in detangling and rewetting collapsed collagen fibers so that the adhesive can then infiltrate into the dentinal tubules and create a strong bond.

Previous adhesive and etching materials have been known to cause increased tooth sensitivity because of exposed dentinal tubules. However, with Adhese Universal, patients experience virtually no sensitivity. The integrated micro-fillers and water solvent enhance penetration into the dentin tubules, stabilizing and supporting the collagen network. This combination also forms a homogenous layer and achieves high bond strengths to enamel and dentin with only one coat of adhesive, resulting in optimum sealing of the dentinal tubules to prevent movement of dental fluid, microleakage, and postoperative sensitivity.

Traditional dental adhesives stored in bottles tend to decrease in bond strength over time because each time the cap is removed, some of the volatile solvent evaporates. Although Adhese Universal is available in a conventional bottle, it is also offered in the VivaPen delivery system, which keeps the adhesive stable at room temperature. This ergonomic pen-like design—combined with its angled brush cannula—enriches comfort, control and speed during intraoral application.

Clinical case

A 32-year-old female patient presented with large occlusal and lingual caries lesions (Fig. 1). After a complete clinical examination and radiographs, radiographic decay was seen on tooth #14, and occlusal shadow and lingual caries were clinically detected (Fig. 2). Although an indirect inlay restoration or direct restoration were possible treatment options, a conservative approach utilizing composite restoratives was selected. Adhese Universal and Tetric EvoCeram Bulk Fill were chosen for treatment because they would efficiently simplify the procedure while providing aesthetic and durable results.

A rubber dam was placed to isolate the tooth, and the caries were completely removed using a hygienic non-latex technique (Fig. 3). The tooth was pretreated with three percent chlorhexidine gluconate, and the enamel was then selectively etched with 35 percent phosphoric acid etchant solution (Fig. 4). After the preparation was thoroughly rinsed and dried, Adhese Universal was applied on the tooth surface (Fig. 5) and air dried (Fig. 6). The adhesive was then cured for 10 seconds with an LED curing light (Bluephase Style) (Fig. 7).

Next, Tetric EvoCeram Bulk Fill in shade IVA was placed in one increment (Fig. 8) and sculpted (Fig. 9). After the restoration was contoured, it was light-cured for 10 seconds (Figs. 10 & 11). The rubber dam was removed and the occlusion adjusted. The restoration was then finished and polished (OptraPol Next Generation, Astropol) (Fig. 12). The occlusion was checked and radiographs were taken to ensure margin integrity and complete restoration depth (Fig. 13).