Influence of Polishing with Prophylaxis Paste Containing Fluoride on Dentin Bond Strength of Self-etch Adhesives

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Abstract

Purpose: Although the prevalence of dental caries has declined markedly, the disease is still a major problem for both adults and children. Fluoride-containing products reduce tooth decay via topical mechanisms which include inhibition of demineralization and enhancement of remineralization. However, few studies have evaluated the effect of prophylaxis paste treatment with fluoride on bonded restorations to dentin. The purpose of this study was to investigate the influence of fluoride contained prophylaxis paste treatment on the dentin bond strengths of single-step self-etch adhesives.

Methods: The adhesive systems employed in this study were three self-etch systems: BeautiBond (Shofu), Bond Force (Tokuyama Dental) and G-Bond Plus (GC), and an etch-and-rinse system: Single Bond Plus (3M ESPE). Bovine mandibular incisors were mounted in self-curing resin and wet ground with #600-grit silicon carbide paper to expose labial dentin. Prophylaxis pastes with fluoride (Merssage Cleargel, Shofu) and without fluoride (Pressage, Shofu) were applied on the tooth surface once on the first day, or twice a day for 7 days. Adhesives were applied and resin composites were condensed into a mold on the dentin and light irradiated. The finished specimens were transferred to distilled water, and stored at 37°C for 24 h. Ten specimens per group were tested in shear mode in a universal testing machine (Type 5500R, Instron) at a crosshead speed of 1.0 mm/min. One-way ANOVA and Tukey HSD test (α = 0.05) were performed within each adhesive system.

Results: The mean bond strength ranged from 5.7 to 15.7 MPa for self-etch adhesives and from 8.3 to 19.5 MPa for the etch-and-rinse system. The dentin bond strength of the self-etch adhesive systems decreased after treatment with prophylaxis pastes regardless of fluoride content. For the etch-and-rinse system, significantly lower bond strengths were obtained for the immediate and the 7-day treatment groups. The reasons for the decreased bond strengths were thought to be the presence of fluoride and remnants of prophylaxis paste, such as glycerin, silica and pumice, in dentinal tubules. These remnants might reduce the etching effect and prevent resin monomer penetration into dentin, leading to decreased bond strengths.

Conclusion: The results of this in vitro study indicate that the use of prophylaxis paste prior to self-etch adhesive application reduces the dentin bond strength of single-step self-etch adhesives.

Key words: Self-etch adhesive, Fluoride, PTC paste, Dentin, Bond strength