COMMENTARY

Enamel and Dentin Bond Strengths of a New Self-Etch Adhesive System[1]

JORGE PERDIGÃO, DMD, MS, PhD*

Currently, there are two major dental bonding strategies. While etch-and-rinse adhesives remove the smear layer upon acid-etching, self-etch adhesives rely on their ability to infiltrate through smear layers and partially dissolve hydroxyapatite to generate a hybrid layer with minerals and residual smear layer incorporated.[2] The lack of a hydrophobic bonding resin in one-step self-etch adhesives has been demonstrated to reduce their bonding efficacy—enhanced water sorption from the dentin with subsequent degradation of the resin–dentin interface by hydrolysis, formation of water blisters on the surface of the adhesive with compromised durability of enamel bonding, potential phase separation, reduced shelf life, lower polymerization conversion, and lower retention rates in clinical trials.[2–7] Two-step self-etch adhesives are more stable than one-step self-etch adhesives both in vitro and clinically. When adhesive/dentin interfaces formed by a two-step self-etch adhesive (Clearfil SE Bond, Kuraray America, Houston, TX, USA) were thermocycled for 100,000 cycles, microtensile bond strengths (μTBS) were not statistically different after thermocycling.[8] On the other hand, the same thermocycling regimen significantly decreased the μTBS of the one-step adhesives Clearfil S[3] Bond (Kuraray America, Houston, TX, USA), G-Bond (G-Bond, GC America Inc., Alsip, IL, USA), GC, and Absolute (Dentsply Sankin, Tokyo, Japan).[9] Clinically, the addition of a hydrophobic resin layer to one-step self-etch adhesives (transforming them into two-step self-etch adhesives) improved their clinical performance after 18 months of clinical use.[10]

In the present study, the authors compared the enamel ultra-morphology under the Field-Emission Scanning Electron Microscope (FESEM) and enamel/dentin shear bond strengths and of a new two-step self-etch adhesive (OptiBond XTR, Kerr Corporation, Orange, CA, USA) with those of Clearfil SE Bond, OptiBond FL, and Xeno IV (Dentsply Caulk, Milford, DE, USA). The one-step self-etch adhesive used in this study may well serve as a negative control. The inclusion of Clearfil SE Bond and OptiBond FL (Kerr) is of great relevance. While the former has been considered the reference for all self-etch adhesives,[11–13] the latter is considered by some authors as the top-performing etch-and-rinse adhesive.[14,15] Additionally, both Clearfil SE Bond and OptiBond FL have resulted in better enamel margins and excellent fatigue resistance compared with one-step self-etch adhesives.[16,17]

The results obtained with OptiBond XTR are very promising, taking into consideration that this new two-step self-etch adhesive matched the dentin bond strengths of Clearfil SE Bond and the enamel bond strengths of OptiBond FL. Additionally, the enamel-etching pattern obtained with OptiBond XTR resembled that obtained with 37.5% phosphoric acid. As stated by the authors, the performance of OptiBond XTR should be evaluated further with long-term storage in the laboratory and with clinical trials.

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*Professor, University of Minnesota, Division of Operative Dentistry, Department of Restorative Sciences, Minneapolis, MN 55455, USA

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