

Priming time and enamel etching effect on shear bond strength of self-etching adhesive systems

In-Joo Kang*, Sung-Kyo Kim, Jeong-Won Park

Department of Conservative Dentistry, College of Dentistry, Kyungpook National University

I. Objectives

Recently, multi-functional primers, so-called self-etching primers(SEP), have been introduced for the conditioning/priming of both enamel and dentin with consequent simplification of clinical procedures.

In this study, the influence of different application time of self-etching primer and additional enamel etching before priming on the adhesion of resin composite to bovine enamel was examined by measuring the shear bond strength between resin composite and tooth substrate.

II. Materials and Methods

The labial surfaces of 135 bovine teeth were ground with a 600-grit abrasive paper under wet conditions so that flat enamel surfaces were exposed. The surfaces were treated with following groups: group NE 1 (no etch, 5 sec prime), group NE 2 (no etch, 20 sec prime), group NE 3 (no etch, 60 sec prime), group E 1 (15 sec etch, 5 sec prime), group E 2 (15 sec etch, 20 sec prime), group E 3 (15 sec etch, 60 sec prime), group E 4 (60 sec etch, 5 sec prime), group E 5 (60 sec etch, 20 sec prime), group E 6 (60 sec etch, 60 sec prime). Group E1 to E6 were pretreated with 32% phosphoric acid (UNI-ETCH, Bisco, Inc., Schaumburg, IL, USA) then Clearfil SE Bond (Kuraray Co., Ltd., Osaka, Japan) were used. After primed tooth surface was dried, bonding agent was applied to the surface and irradiated with curing unit (Spectrum™ 800, Dentsply DeTrey GmbH, Konstanz, Germany) for 10 seconds, with the intensity set at 400 mW/cm².

Then hybrid composite resin (Clearfil AP-X, Kuraray Co., Ltd., Osaka, Japan) was packed into the Ultradent mold (Ultradent Product Inc., South Jordan, Utah, U. S. A.) and light-cured for 40 seconds. After twenty-four hours storage in 100% humidity, the specimens were tested in shear bond strength using a chisel-shaped rod in an Instron testing machine (Type 4411, Instron Corp., Canton, Massachusetts, U. S. A.) at crosshead speed of 1 mm/minute.

The data for each group were subjected to one-way ANOVAs followed by the Duncan's multiple range test at $p < 0.05$ to make comparisons among the groups.

III. Results

1. The shear bond strength of etching groups (group E 1 - E 6) were significantly higher than priming only groups (group NE 1 - NE 3) ($p < 0.05$).
2. In non-etching groups, the shear bond strength of group NE 1 (5 seconds priming only) was significantly lower than other groups ($p < 0.05$).
3. In etching groups (group E 1 - E 6), priming time is no effect on shear bond strength and etching time also ($p < 0.05$).

IV. Conclusions

Additional etching before priming on enamel showed significant increase on shear bond strength of self etching adhesive system, and etching time or priming time was no significant effect if the surface was acid etched.