Reconsidering the double etching of enamel: do self-etching primers contaminate phosphoric acid-etched enamel?

To evaluate the composite-to-enamel bond following double etching of the enamel using phosphoric acid and different self-etching (SE) bonding systems with and without the application of their respective acidic primers. The enamel surfaces of 90 human molars were ground (600 grit) flat and randomly divided into nine groups (n = 10). Three two-step SE systems (AdheSE, ASE; Clearfil SE Bond, CSE; OptiBond Solo Plus SE, OSE) were tested, both with and without primer application on enamel pre-etched with phosphoric acid under dry bonding conditions. As the controls, the SE systems were applied according to their original directions without pre-etching. All the specimens were built up with a microhybrid composite resin (Arabesk Top). After water storage for 24 h at 37°C, the bonded specimens were sheared to failure in the Zwicki 1120. Etching and failure patterns were evaluated using a scanning electron microscope (SEM). Shear bond strength was analyzed with two-way ANOVA and Tukey’s test. Failure modes were analyzed with Fisher’s exact test. Without pre-etching, CSE showed significantly higher bond strengths than ASE and OSE (p < 0.05), 36% for CSE (p < 0.05), and 75% for OSE (p < 0.05). SEM analysis showed that omission of the priming step significantly increased the number of cohesive failures within the resin for OSE (p < 0.0001). Additional etching with phosphoric acid before the application of SE systems does
not necessarily result in better enamel bonding, since unavoidable primer contamination of the pre-etched enamel was shown to significantly reduce the bond strength for two of the three systems tested.