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0027 Bonding of Some Self-etch Adhesives to Unground Enamel

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Objectives: Manufacturers of mild self-etch adhesives such as Clearfil SE Bond (SE: Kuraray) recommend adjunctive phosphoric acid-etching when bonding to unground enamel. Some of the recently introduced self-etch adhesives are more acidic in nature and are claimed to bond well to both enamel and dentin. This study examined the ultrastructure and microtensile bond strengths (μTBS) of two of these more aggressive versions, Xeno III (XE: Dentsply), a 1-step self-etch adhesive, and Simplicity (JK: Apex Dental Materials), a 2-step self-etch adhesive to unground enamel. SE was used as the negative control, and One-Step (OS: Bisco), a total-etch adhesive bonded to 32% phosphoric acid-etched unground enamel was used as the positive control. **Methods**: The adhesives were applied to unground enamel on the mesial and distal surfaces of extracted human molars, coupled with light-cured composites, and then thermocycled between 5-55°C for 1000X. For TEM, bonded specimens were sectioned without resin-embedding, producing separation of the enamel hybrid layer from the underlying unbonded enamel by a stiffness-toughness mismatch. For bond testing, composite-enamel beams (N=24) were sectioned and tested with a universal testing machine at a crosshead speed of 1 mm/min. **Results**: Enamel hybrid layer thickness (μm): OS $(9.6\pm1.3)^{A}$, JK $(3.3\pm 0.5)^{A,B}$, XE $(1.0\pm0.2)^{B,C}$, SE $(0.3\pm0.1)^{C}$ [$P<0.05$]. Dissolution of enamel crystallites on the surface of enamel hybrid layers varied from being barely dissolved (SE) to superficial dissolution (XE; JK) to internal dissolution with central hole regions (JK; OS). μTBS results showed that OS, JK and XE were not significantly different from each other, but were all significantly higher than SE [$P<0.001$]. There was no correlation between hybrid layer thickness and μTBS. **Conclusion**: The more aggressive self-etch adhesives exhibit similar bond strength as a total-etch adhesive to unground enamel, making them potentially useful as pit-and-fissure sealants and bonding of orthodontic brackets.

Seq #10 - Self-etching Adhesive Systems - I
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