0499 Micro-tensile bond strength of self-etching adhesives to air-abraded tooth

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Objectives
To compare micro-tensile bond strengths (MTBS) of self-etching adhesives to air-abraded enamel and dentin with or without phosphoric acid treatment.

Materials and Methods
Two self-etching bonding systems were used: AQ Bond Plus (AQP: Sun Medical) and Brush&Bond (B&B: Parkell). Thirty-six extracted human teeth were ground flat to enamel or dentin with #180 SiC paper under water irrigation. Sixteen ground tooth surfaces were air-abraded with 50-micrometer alumina (Micro Prep: Sunrise Technologies). Half of these specimens were treated with phosphoric acid (PA: Red Activator; Parkell) for 5-10s followed by water rinse. Each bonding system was applied to ground or air-abraded surfaces with or without the PA treatment and photo polymerized for 10 seconds. Resin composite (EPIC-TMPT, Parkell) was placed on the cured bonding layer and photo-polymerized. The specimens were then stored in 37˚C water for 24 hours. In the MTBS tests, the resin-bonded teeth were sliced into 0.8mm thick, and bonded surfaces were trimmed to obtain a bonded area of 1mm². Historically, it is common for a portion of MTBS samples to fail during preparation; however, 100% of these samples survived and were tested. The bond strengths were measured and statistically analyzed by ANOVA (p=0.05, n=6).

Results and Discussion
It was concluded that PA treatment should be used after air-abrasion when AQ Bond Plus or Brush&Bond was applied on the teeth.

Conclusion
It was concluded that PA treatment should be used after air-abrasion when AQ Bond Plus or Brush&Bond was applied on the teeth.

Table 1: Test condition of Air-abrasion

<table>
<thead>
<tr>
<th>Condition of Air-abrasion Using Micro Prep (Sunrise Technologies)</th>
<th>Nozzle tip: Medium</th>
<th>Powder Flow Rate: Low</th>
<th>Distance: 2mm</th>
<th>Tip Angle to tooth surface: 90°</th>
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</thead>
<tbody>
<tr>
<td>Air Pressure: 95kg/cm²</td>
<td>50-micrometer Aluminum oxide Particles</td>
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</table>

Table 2: MTBS of self-etching adhesives to air-abraded tooth

<table>
<thead>
<tr>
<th>Evaluated Item / Materials</th>
<th>Enamel</th>
<th>Dentin</th>
<th>Enamel</th>
<th>Dentin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air-abrasion</td>
<td>19.3 ± 2.1</td>
<td>41.8 ± 8.1</td>
<td>19.1 ± 3.3</td>
<td>42.4 ± 8.1</td>
</tr>
<tr>
<td>Air-abrasion + PA</td>
<td>40.5 ± 6.2</td>
<td>48.8 ± 7.2</td>
<td>41.3 ± 5.8</td>
<td>49.3 ± 6.1</td>
</tr>
</tbody>
</table>

Values with same letters are not significantly different by Turkey’s test. The air-abrasion to enamel inhibited the bonding of both self-etching systems and PA treatment after air-abrasion enhanced MTBS of both bonding system (p<0.05).

Fig.1 Products provided in this study. AQ Bond Plus (A), Brush&Bond (B), Enamel Etchant Gel (C), EPIC-TMPT (D).

Fig.2 Procedure of micro-tensile bond strength test.

Fig.3 SEM images of enamel surface air-braded (a), AQP (EPIC-TMPT) / air-braded enamel interface (b) and B&B (EPIC-TMPT) / air-braded enamel interface (c). It was observed that a lot of aluminum oxide particles stuck into the enamel.

Fig.4  SEM images of air-braded and PA-etched enamel surface (d), AQP (EPIC-TMPT) / air-braded and PA-etched enamel interface (e), B&B (EPIC-TMPT) / air-braded and PA-etched enamel interface (f). Most aluminum oxide particles were took away from the surface by PA treatment.

Fig.5  SEM images of air-braded dentin (g), air-braded and PA-etched dentin surface (h), AQP (EPIC-TMPT) / air-braded and PA-etched dentine interface (i), B&B (EPIC-TMPT) / air-braded and PA-etched dentine interface (j). Most aluminum oxide particles were took away from the surface by PA treatment.

Fig.6  SEM images of air-braded dentin (g), air-braded and PA-etched dentin surface (h), AQP (EPIC-TMPT) / air-braded and PA-etched dentine interface (i), B&B (EPIC-TMPT) / air-braded and PA-etched dentine interface (j).