Bond Strengths of Newly Developed Single-step Adhesives to Dentin

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Objectives
Newly developed adhesives are striving to obtain both adequate bond strength and simplicity of clinical procedure. The purpose of this study was to evaluate bond performance of single-step adhesives to human dentin using micro-shear bond test.

Materials

All-in-one adhesives
- Absolute (Abs) Dentsply-Sankin 387-003
  pH 0.6
  (a) mix liquids, (b) stir liquid with applicator, (c) apply, (d) rub with applicator, (e) air-dry gently, (f) air-dry strongly, (g) light-cure

Adper Prompt L-Pop (APL) 3M ESPE 213546
pH < 1
(a) mix liquids, (b) stir liquid with applicator, (c) apply, (d) air-dry strongly, (e) light-cure

AG Bond Plus (AQp) Sun Medical FW1
pH 2.5
(a) mix liquids, (b) stir liquid with applicator, (c) apply, (d) air-dry strongly, (e) light-cure

DCB-100 (DC) Kuraray Medical Inc DCBT1
pH 2.0
(a) mix liquids, (b) stir liquid with applicator, (c) apply, (d) air-dry strongly, (e) light-cure

G-bond (G) GC 0406161
pH 2.0
(a) mix liquids, (b) stir liquid with applicator, (c) apply, (d) air-dry strongly, (e) light-cure

Clearfil S³ (S³) Kuraray Medical Inc 00039A
pH 2.7
(a) mix liquids, (b) stir liquid with applicator, (c) apply, (d) air-dry strongly, (e) light-cure

XENO III (X III) Dentsply-Sankin 382-07
pH < 1
(a) mix liquids, (b) stir liquid with applicator, (c) apply, (d) air-dry strongly, (e) light-cure

Resin composite
- Clearfil AP-X (shade A-3) Kuraray Medical Inc 213546
- Clearfil AP-X (shade A-3) Kuraray Medical Inc

Methods

Tooth Preparation
- Create the dentin disk with Isomet
- Flat-grind the occlusal surface with #600 SiC paper

Bonding process
- Apply the adhesive on the dentin surface according to manufacturers' instruction
- Mount the resin composite and light-cure for 40sec to make resin cylinder

Micro-shear bond test
- Loop the thin wire around the resin cylinder
- Hold flush against the resin/dentin interface

Results

Micro-shear bond strengths (mean±SD in MPa)

<table>
<thead>
<tr>
<th>Adhesive</th>
<th>Abs</th>
<th>APL</th>
<th>AQp</th>
<th>DC</th>
<th>G</th>
<th>S³</th>
<th>X III</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strength</td>
<td>40.0±5.6</td>
<td>36.7±6.7</td>
<td>45.5±5.8</td>
<td>41.3±5.2</td>
<td>37.8±6.4</td>
<td>43.5±6.3</td>
<td>40.2±5.8</td>
</tr>
</tbody>
</table>

For each column, the same superscripts indicate no statistical differences (p>0.05).

Conclusion

AQp showed statistically higher bond strength than APL and G. Bond strength significantly varied between some of the adhesives used in this study. (This work was supported by grant-in-aid for Scientific Research, #15390573 from The Ministry of Education, Culture, Sports, Science and Technology, Japan.)