In vitro evaluation of the long-term bond strength of two resin cements to enamel and dentin

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Background and Aims: In this in vitro study, the long-term bond strength of a self-adhesive resin cement and conventional resin cements to human enamel and dentin was compared.

Materials and Methods: 80 sections of intact human third molars were randomly assigned into eight groups according to the cement type [Rely X Unicem (RXU), Rely X ARC (RXA)], bond substrate (enamel, dentin) and the duration of water storage (24 h or 1 year). Rods of cements (0.75×1 mm) were prepared on the top surface of specimens using Tygon tubes. The micro-shear bond strengths of specimens were measured by a micro-tensile tester. Data were analyzed using Wilcoxon signed ranks and Mann Whitney tests (α=0.05).

Results: The bond strengths of RXA and RXU cements to enamel after 24h were 18.56±4.08 MPa and 14.99±4.17 MPa, and after 1 year were 19.41±6.24 MPa and 15.51±6.17 MPa, respectively. The bond strengths of RXA and RXU cements to dentin were 13.36±4.02 MPa and 14.16±4.69 MPa after 24h, and 14.63±5.96 MPa and 14.08±6.72 MPa after 1 year, respectively. Tooth substrate had significant effect only on the shear bond strength of RXA cement after 24h (P=0.01), while no other significant differences were found in this study (P>0.05).

Conclusion: According to the results of this study, one-step self-adhesive and multi-step conventional resin cements were similarly effective in bonding to enamel and dentin after 1 year water storage.

Key Words: Resin cement, Rely X Unicem, Bond strength

Journal of Dental Medicine-Tehran University of Medical Sciences 2014;27(1):37-43
چکیده

زمینه و هدف: در این مطالعه یازدهگاهی، استحکام باند طولانی مدت دو نوع سمان رزینی- اهدزیوی به میان و عاج ناشی دندان دکتر زهرا جابری انصاری و همکاران

مقدمه

ترمیم‌های غیرمستقیم باند شونده، تبدیل به جزیی اساسی در دماسUUXXUUUUUUXXUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUUU
روش بررسی

دانهای مواد سوسن آسانی سالم پس از جمع آوری و به مدت یک هفته در محلول کلر آمین 1/2 تهیه گردیدند. سپس ریشه دانه‌ها را در ناحیه قطع شد و پس از مدتی در بلکهای اکریلی (Aco Pars 2000, Malic Medical industries Co, Tehran, Iran) hamco machines Inc. توسط ماسنگین برش (87) تحت جریان آب سرد، به موانع محور طولی (Rochester) دانه به برش‌های 2 میلی متری تقسیم گردید و از مجموع دانه‌ها 80 پلاسکه به‌شکل شکل قطعات بر شش توان عملکرد. ضمن آنها که بر روی دستگاه ﻣﯿﮑﺮوﺑﺮاش اعمال ﮔﺮدید. سپس به‌طور باز هم از میان دانه‌ها به دست آمد. ژرria برای آزمایش pooya ﺑﻪ آزمایشگاه دندانپزشکی دانشگاه علوم پزشکی و خدمات بهداشتی درمانی تهران (دوره 17، شماره 1، بهار 1393)

شکل 1- تصویر دستگاه Micro-tensile tester و استوانه‌های فلزی لحیم شده به فک دستگاه
بررسی آزمایش‌گاهی استحکام باند طولانی مدت دو نوع سمان رزیشی به مینا و عاج دندان

دکتر زهرا جابری انصاری و همکاران

جدول 1- لیست مواد مصرفی در مطالعه

<table>
<thead>
<tr>
<th>ماده</th>
<th>ترکیب اجزای سازنده</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rely X Unicem (256887)</td>
<td>Powder: Glass fillers, Silica, Calcium hydroxide, Self-curing initiators, Pigments, Light cure initiators, Inorganic filler (72% wt.), Particle size&lt;12.5 mm</td>
</tr>
<tr>
<td>Rely X ARC (3415A1)</td>
<td>Resin: BisGMA, TEGDMA, Zirconia/silica filler,Dimethacrylate polymer Paste A: Photo-initiator&amp;Amine system, Pigments Paste B: Benzoyl peroxide</td>
</tr>
<tr>
<td>Scotch bond etchant</td>
<td>35% Phosphoric acid gel, PH=0.6</td>
</tr>
<tr>
<td>Single bond adhesive (Adper) (1122)</td>
<td>Ethanol, HEMA, BisGMA, Polycarboxilic acid copolymer, Water, Photo-initiator system</td>
</tr>
</tbody>
</table>

جدول 2- مقادیر استحکام باند (مکاپاسکال)

<table>
<thead>
<tr>
<th>سوئسترا سمان</th>
<th>مدت نگهداری در آب</th>
<th>میانگین استحکام باند برشي</th>
<th>انحراف معیار</th>
</tr>
</thead>
<tbody>
<tr>
<td>مینا RXU</td>
<td>24 ساعت</td>
<td>14/99</td>
<td>4/17</td>
</tr>
<tr>
<td>عاج RXU</td>
<td>24 ساعت</td>
<td>13/16</td>
<td>4/22</td>
</tr>
<tr>
<td>مینا RXA</td>
<td>24 ساعت</td>
<td>16/56</td>
<td>3/24</td>
</tr>
<tr>
<td>عاج RXA</td>
<td>24 ساعت</td>
<td>13/65</td>
<td>3/20</td>
</tr>
</tbody>
</table>

که استحکام باند سمان RXA به عاج پس از 24 ساعت به طور معنی‌داری کمتر از مینا بود (P<0.01). بررسی اثر زمان نگهداری در آب 24 ساعت و 13 سال نگهداری در آب و عاج از سوئسترا سمان RXA و RXU و پزشکی سال نگهداری در آب و عاج سوئسترا سمان RXA و RXU و پزشکی سال نگهداری در آب و عاج (P=0.00/0.00 و P=0.05/0.00) نشان داد.

بحث و نتیجه‌گیری

در این مطالعه استحکام باند رزیشی سمان و رزیشی سمان ریزشی از 24 ساعت به مینا و عاج بعد از 24 ساعت پیک مربوط‌های ریزشی سمان و ریزشی سمان ریزشی از اب اندازه‌گیری و با سمان سه مربوط‌های مربوطه یکسان و پیک Rely X Unicem کنترل Rely X ARC نشان داد که نوع سوئسترا سمان RXA میکرو ریزشی مورد استفاده قرار گرفته. این

یافته‌ها

مقادیر استحکام باند رزیشی در جدول 2 ارائه شده است. براساس نتایج آزمون Mann Whitney، هیچ تفاوت آماری مایع در بين استحکام باند دو سمان RXA و RXU در زمان‌های 24 ساعت و 13 سال نگهداری در آب و عاج پس از پزشکی și سال نگهداری در آب و عاج مشابه با RXU به عاج مشابه با RXU مقدار رزیشی باند تهیه و تفاوت معنی‌دار مشاهده نشد (P=0.71)

در مورد استحکام باند سمان‌ها به مینا پس از 24 ساعت و پیک سال نگهداری در آب فاقد نهایی است. این نتیجه در بررسی تأثیر سوئسترا بر استحکام باند دو سمان، تهیه نشان داد که نوع سوئسترا سمان RXA تهیه در 24 ساعت، انجام به ناحیه Rely X Unicem Rely X Arc روز. این
روش، تهیه نمونه‌ها را تسهیل کرده و نتایج دقیقی با انحراف معیار نسبتاً کم حاصل می‌کند (11).

تیم‌بندی این مطالعه نشان داد که استحکام بند پریمکس‌های RXU به عاج در دو زمان نگهداری تفاوت معناداری با RXU سمان کنترل ندارد. نتایج Piwowarczyk و همکاران (13) نشان دادند که تفاوت Calibra, RXA, Panavia F و همکاران (13) نشان دادند که مطالعه RXA و Panavia F. Linmax به عاج مشابه RXU نمی‌باشد. نتایج مشابهی نیز در سایر مطالعات به دست گرفته شد (13).

در این مطالعه نشان داده شد که تفاوت در استحکام بند پریمکس‌های RXU به عاج در دو زمان نگهداری مشابه با RXU سمان کنترل ندارد. نتایج Piwowarczyk و همکاران (13) نشان دادند که مطالعه RXA و Panavia F. Linmax به عاج مشابه RXU نمی‌باشد. نتایج مشابهی نیز در سایر مطالعات به دست گرفته شد (13).
20- Tomoko A, Asmussen E, Uno S, Tagami J. short and long-term in vitro study of the bonding of eight


