

Dentin Bond Strength of a New Self-Adhesive Resin Cement

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INTRODUCTION

A self-adhesive resin cement combines the essential functions of an etchant, a primer/adhesive, and a luting cement into a single material, thereby combining the steps of etching, priming and cementing into one. This greatly simplifies the restorative procedures, resulting in significant time savings for the dental practitioners. The use of a self-adhesive resin cement should also make the restorative procedure less technique sensitive, reducing the occurrence of post-operative sensitivity since the smear layer is not removed and only one step cementation is involved.

Recently, a new dual-curable paste/paste self-adhesive resin cement Maxcem Elite (Kerr) was introduced that offers enhanced adhesion to various dental substrates by incorporating GPDM adhesive monomer, an optimized resin matrix, a patented redox initiator system and 4:1 ratio automixing delivery system. Besides enhanced adhesive property, Maxcem Elite also offers exceptional color stability, translucency, and increased radiopacity.

OBJECTIVE

This study was conducted to evaluate the shear bond strengths (SBS) of a new paste/paste dual-curable self-adhesive resin cement Maxcem Elite (Kerr) along with several commercial self-adhesive resin cements.

MATERIALS

- | | |
|------------------|------------|
| Maxcem Elite | Kerr |
| Maxcem | Kerr |
| Unicem (Capsule) | 3M ESPE |
| Unicem Clicker | 3M ESPE |
| Multilink Sprint | Ivoclar |
| MonoCem | Shofu |
| G-Cem | GC America |

METHOD

Extracted human teeth were embedded in cold-cure acrylics. A set of six specimens were prepared for each material. A low speed diamond saw was used to remove the crown and expose the occlusal dentin. The dentin substrates were polished with 240-grit and then 600-grit SiC paper, rinsed thoroughly with water, and air dried for a few seconds.

Each prepared substrate was then held securely by a bonding jig (Ultradent Inc.) with a cylindrical mold ($\Phi = 2.38$ mm). The mold was then filled with self-adhesive resin cements. The whole bonding assembly was conditioned at 37°C in a high humidity chamber (85-90% relative humidity) to allow the cement to self-cure for one hour before the bonding jig was removed. The prepared specimens were then stored in de-ionized water at 37°C for 24 hours before being subjected to debonding on an Instron mechanical tester (Model 4467, Instron Corporation) in shear mode using a notched (semi-circular) edge at a crosshead speed of 1.0 mm/min. Shear bond strength values in MPa were calculated by dividing the peak load by the bonding area.

Statistical analysis was performed using One-way ANOVA and Bonferroni's method for pair-wise comparison to determine significant differences among groups ($p < 0.05$).



Figure 1: Bonding Jig



Figure 2: Shear Bond Test Set-Up

CONCLUSION

Maxcem Elite had the highest dentin shear bond strength among all the self-adhesive resin cements tested in this study.

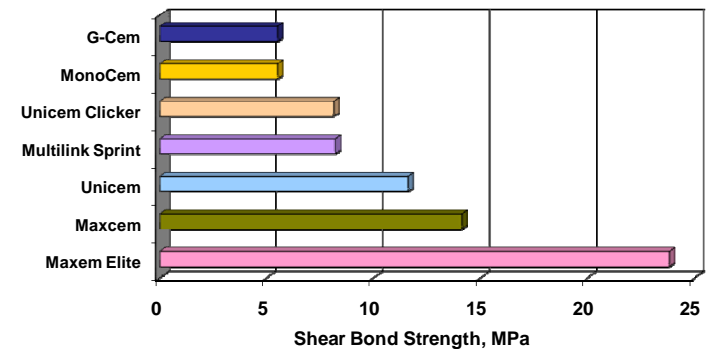
RESULTS

Dentin Shear Bond Strength (Self-Cured), MPa

Maxcem Elite	Maxcem	Unicem (Capsule)	Multilink Sprint	Unicem Clicker	MonoCem	G-Cem
23.8 ± 3.8 ^a	14.1 ± 1.2 ^b	11.6 ± 3.7 ^{b,c}	8.2 ± 2.0 ^{c,d}	8.1 ± 2.5 ^{c,d}	5.5 ± 1.6 ^d	5.5 ± 4.0 ^d

* Means with different letters are statistically different at $p < 0.05$

Dentin Shear Bond Strength of Self-Adhesive Resin Cements (Self-Cured)



DISCUSSION

Maxcem Elite had the highest dentin shear bond strength (SBS) while G-CEM had the lowest dentin SBS among the cements tested. ANOVA analysis revealed that the dentin SBS of Maxcem Elite is significantly ($p < 0.05$) higher than those of other cements. The dentin SBS of Maxcem is not significantly ($p > 0.05$) different from Unicem (Capsule), but is significantly ($p < 0.05$) higher than those of Multilink Sprint, Unicem Clicker, MonoCem, and G-Cem.

The much enhanced dentin SBS of Maxcem Elite could be attributed to following contributing factors: (1) the incorporation of GPDM adhesive monomer for establishing a strong bond to tooth structure; (2) its optimized resin matrix system for enhanced wetting ability; and (3) its patented color-stable redox initiator system providing very efficient dark-cure mechanism.