

INTRODUCTION

A self-adhesive resin cement provides clinicians with a much simplified cementation procedure by combining the steps of etching, priming, bonding, and cementing into a single step. This simplified cementation procedure not only results in significant time savings for clinicians, it also makes the cementation procedure less technique sensitive as well as reduce the occurrence of post-operative sensitivity, as the smear layer is not removed.

Maxcem Elite (Kerr), a new paste/paste dual-curable self-adhesive resin cement with enhanced adhesive property, superior esthetics, and increased radiopacity, was recently introduced. Maxcem Elite achieves its enhanced adhesive property by employing GPDM adhesive monomer, an optimized resin matrix, a patented redox initiator system and 4:1 ratio automixing delivery system.

OBJECTIVE

The aim of this study was to measure the shear bond strengths of a new paste/paste dual-curable self-adhesive resin cement Maxcem Elite (Kerr) to Dentin, Enamel, Rexillium alloy, and Vitablocs Mark II (Vident) in self-cure mode, along with several commercial self-adhesive resin cements: iCem (Kulzer), SmartCem2 (Dentsply), and Unicem Clicker (3M ESPE).

MATERIALS

Maxcem Elite	Kerr
iCem	Kulzer
SmartCem2	Dentsply
Unicem Clicker	3M ESPE

METHOD

For Vitablocs Mark II substrate, the blocks were cut into 2mm thick slices. Dentin, Enamel, Rexillium alloy, and Vitablocs specimens were embedded in cold cure acrylics. The substrate surfaces were polished with 600 grit sandpaper. Dentin and Enamel substrates received no further treatment prior to bonding. Rexillium substrates were air-abraded with 50µm aluminum oxide prior to bonding. The samples were then cleaned in an ultrasonic bath for 5 minutes. For Vitablocs, the surface was further etched with HF etchant (9.5% hydrofluoric acid, Gresco Products Inc.) for 1 minute, rinsed, and air dried.

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 ($p < 0.05$).

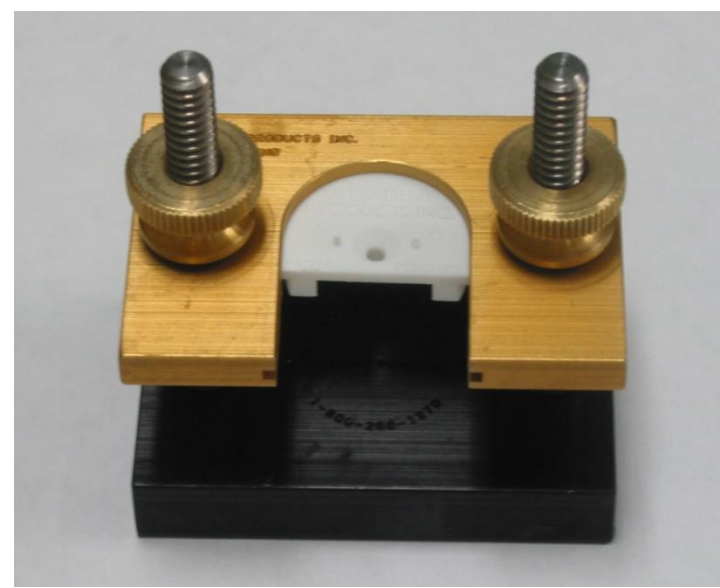


Figure 1: Bonding Jig

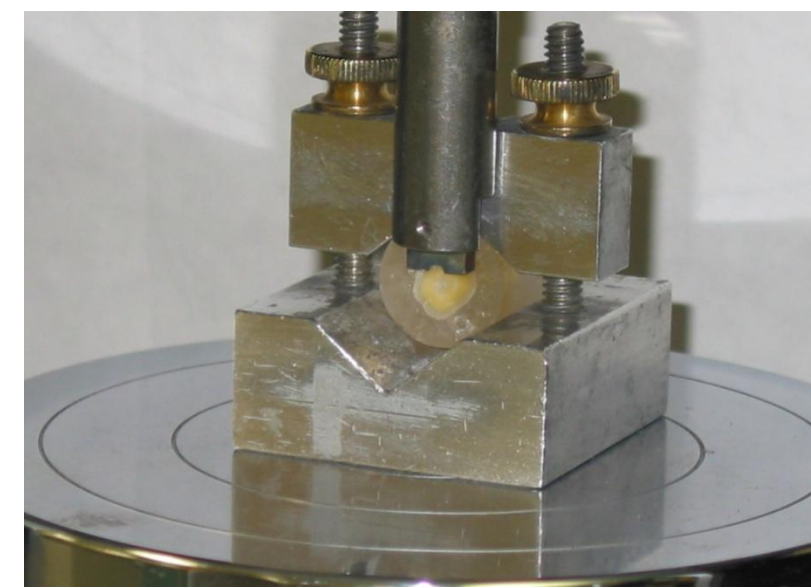


Figure 2: Shear Bond Test Set-Up

RESULTS

	Shear Bond Strength (SBS), MPa			
	Maxcem Elite	iCem	SmartCem2	Unicem
Dentin	23.5 (2.2) ^a	9.5 (3.1) ^b	7.5 (2.6) ^b	8.1 (2.0) ^b
Enamel	19.4 (2.0) ^a	9.3 (1.1) ^b	6.7 (4.2) ^b	5.7 (2.0) ^b
Rexillium	41.5 (5.0) ^a	34.1 (4.4) ^b	24.4 (2.0) ^c	14.5 (4.2) ^d
Vitablocs	31.3 (4.0) ^a	23.9 (3.0) ^b	22.5 (2.7) ^b	21.3 (4.2) ^b

*Values in the same row with different letters are statistically different at $p < 0.05$. Standard deviation is noted in parentheses.

DISCUSSION

ANOVA analysis revealed that the shear bond strength (SBS) of Maxcem Elite was significantly ($p < 0.05$) higher than those of other cements for all four substrates tested. For dentin, enamel and vitablocs, the SBS of iCem, SmartCem2 and UniCem were not significantly different ($p > 0.05$) from each other. The superior adhesive property of Maxcem Elite could be attributed to following factors: (1) incorporation of GPDM adhesive monomer, (2) optimized resin matrix for enhanced wetting ability, and (3) patented redox initiator system for efficient dark-cure mechanism for further adhesive property enhancement.

CONCLUSION

Maxcem Elite had the best adhesive properties among four new self-adhesive resin cements tested in this study.

SBS of Several New Self-Adhesive Resin Cements to Various Substrates

