

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 and also reduces the chances for post-operative sensitivity as the smear layer is not removed and only one-step cementation is involved.

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 Gold alloy, Rexillium alloy, Lava (3M ESPE) and Vitablocs Mark II (Vident) in self-cure mode, along with several commercial self-adhesive resin cements: G-Cem (GC America), Maxcem (Kerr), MonoCem (Shofu), and Unicem Clicker (3M ESPE).

MATERIALS

Maxcem Elite	Kerr
Maxcem	Kerr
Unicem Clicker	3M ESPE
MonoCem	Shofu
G-Cem	GC America

METHOD

For Vitablocs Mark II substrate, the blocks were cut into 2mm thick slices. For LAVA substrate, discs (ϕ x h = 6mm x 2mm) were milled and sintered according to the manufacturer's instructions. Gold alloy, Rexillium alloy, Vitablocs and Lava specimens were embedded in cold cure acrylics. The substrate surfaces were polished with 600 grit sandpaper, and air-abraded with 50 μ m aluminum oxide. The samples were then cleaned in an ultrasonic bath for 5 minutes. All metal substrates (Gold alloy, Rexillium alloy, and Lava) received no further treatment before bonding. 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 (Φ = 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

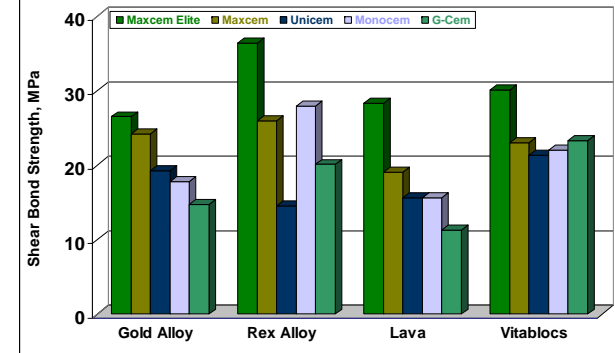
	Shear Bond Strength (SBS), MPa				
	Maxcem Elite	Maxcem	Unicem	MonoCem	G-Cem
Gold Alloy	26.5±1.1 ^a	24.2±3.7 ^{a,b}	19.3±3.2 ^{b,c}	17.8±2.7 ^c	14.7±3.0 ^c
Rexillium Alloy	36.4±3.9 ^a	26.0±4.9 ^{b,c}	14.5±4.2 ^d	27.9±4.0 ^b	20.1±3.1 ^{c,d}
Lava (Zirconia)	28.3±4.1 ^a	19.1±1.9 ^b	15.6±4.7 ^{b,c}	15.6±2.2 ^{b,c}	11.3±1.4 ^c
Vitablocs Mark II	30.1±1.7 ^a	23.0±4.0 ^{b,b}	21.3±4.2 ^b	22.0±4.3 ^b	23.3±5.9 ^{a,b}

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

DISCUSSION

ANOVA analysis revealed that, for the Gold substrate, the shear bond strength (SBS) of Maxcem Elite was significantly ($p < 0.05$) higher than those of other cements with the exception of Maxcem. For Rexillium substrate, the SBS of Maxcem Elite was significantly ($p < 0.05$) higher than those of other cements. For Lava substrate, the SBS of Maxcem Elite was significantly ($p < 0.05$) higher than those of other cements. For Vitablocs substrate, the SBS of Maxcem Elite was significantly ($p < 0.05$) higher than Unicem and MonoCem, but not statistically ($p > 0.05$) different from Maxcem and G-Cem. For all four substrates, Maxcem Elite had the highest SBS among all self-adhesive resin cements tested in this study. 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.

SBS of Self-Adhesive Cements to Various Substrates



CONCLUSION

The shear bond strengths of Maxcem Elite to all four substrates are comparable to or better than those of other self-adhesive cements.