Dentin Bond Strength of Maxcem Elite Under Various Curing Modes
H. Lu*, H. Bui, X. Qian, D. Tobia - Kerr Corporation, Orange, CA

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INTRODUCTION

Self-adhesive resin cements combine 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 simplified cementation procedure results in significant time savings for the dental practitioner. The use of a self-adhesive resin cement should also make the restorative procedure less technique sensitive, reducing the occurrence of post-operative sensitivity because 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. In addition to enhanced adhesive property, Maxcem Elite also offers exceptional color stability, translucency, and increased radiopacity.

OBJECTIVES

To study the effect of various curing modes on the dentin shear bond strength of Maxcem Elite to determine if light-curing Maxcem Elite immediately after placement would negatively affect its bond strength.

MATERIAL

Maxcem Elite   **Kerr**

METHOD

Extracted human teeth were embedded in cold-cure acrylics. A set of six specimens were prepared for each group. 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). Maxcem Elite was condensed into the mold, directly onto the un-etched and un-primed dentin surface. The cement was allowed to cure in the following modes: (i) self-cure only; (ii) light-cure (for 30s) immediately without delay; (iii) light-cure after 2-minute delay; (iv) light-cure after 4-minute delay; (v) light-cure after 6-minute delay. The bonded specimens (n=6 for each group) were then stored in de-ionized water at 37ºC 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).
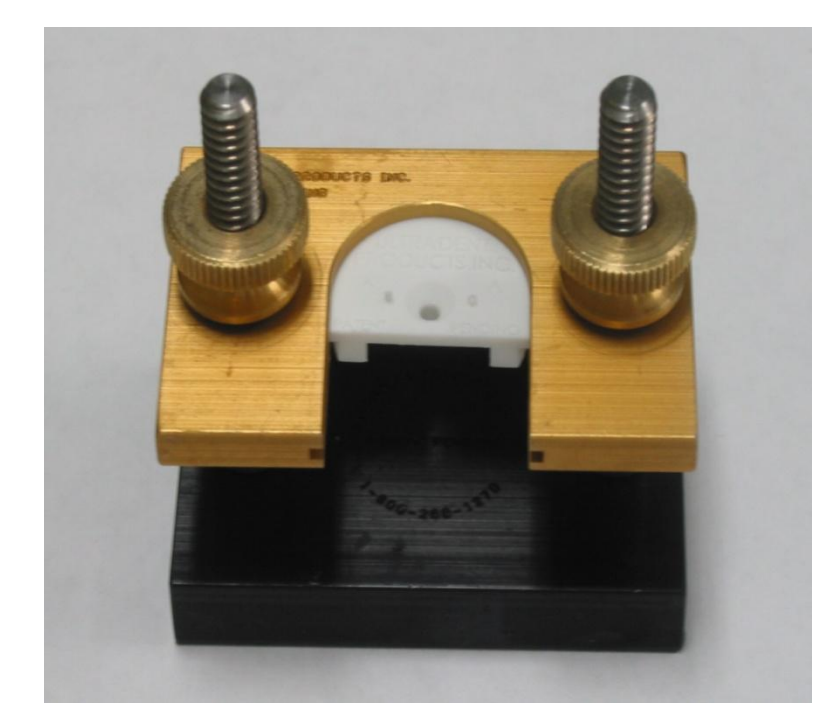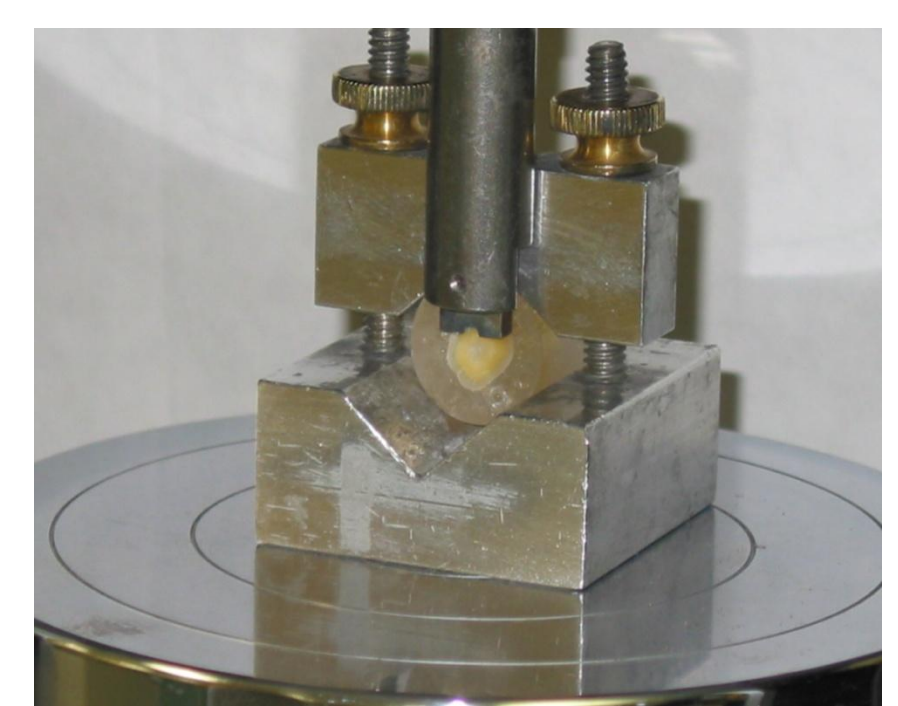

Figure 1: Bonding Jig   *Figure 2*: Shear Bond Test Set-Up

CONCLUSION

The dentin shear bond strength of Maxcem Elite was not influenced by various curing modes. Light-curing Maxcem Elite immediately after placement does not negatively affect its dentin bond strength.
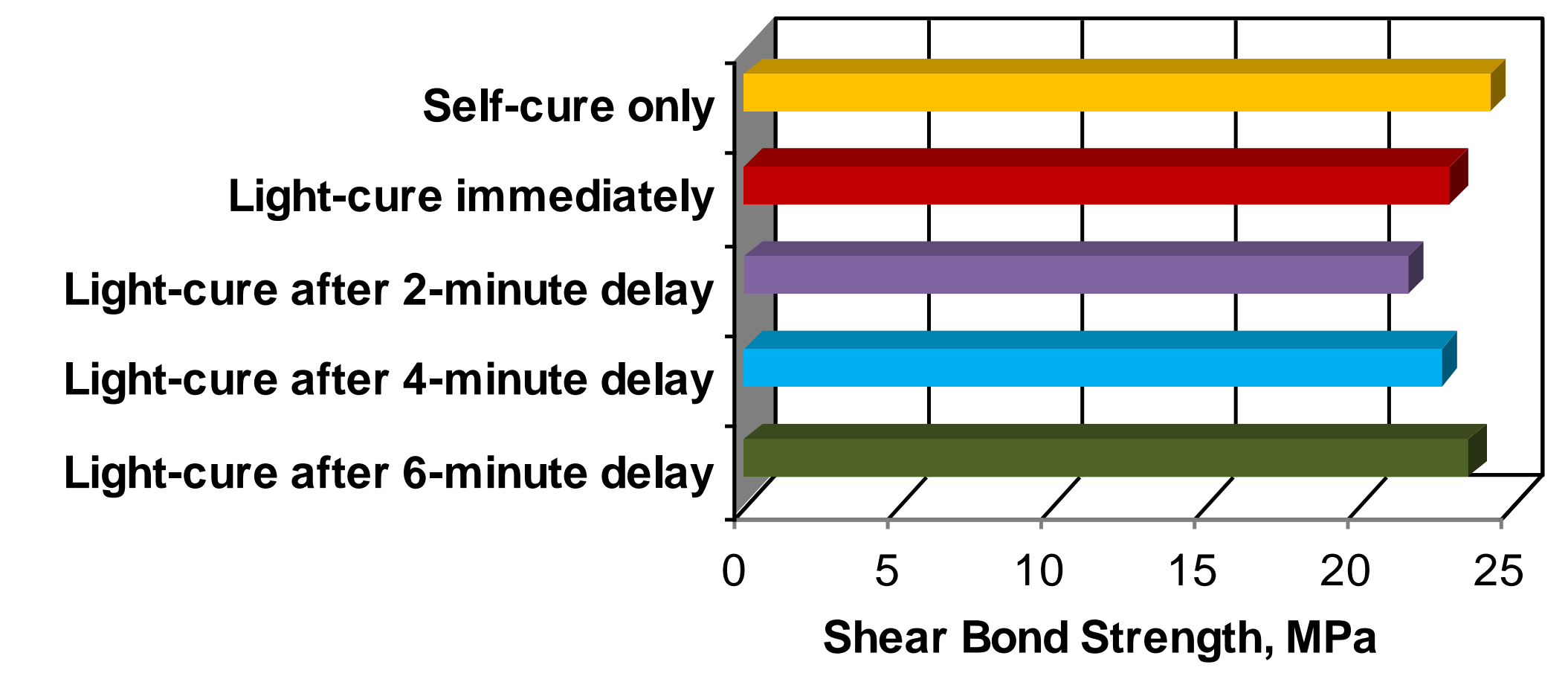
RESULTS

Dentin Shear Bond Strength, MPa

Self-Cure only	Light-cure immediately	Light-cure after 2-min.	Light-cure after 4-min.	Light cure after 6-min.
24.3 (3.4)[a]*	23.0 (3.2)[a]	21.6 (1.5)[a]	22.7 (1.7)[a]	23.6 (2.1)[a]

* Means with the same letter are not statistically different at p>0.05. Standard deviation for each group is noted in parentheses.

Dentin SBS of Maxcem Elite Under Various Curing Modes

DISCUSSION

Maxcem Elite had similar dentin shear bond strength (SBS) in self-cure mode and light-cure (for 30s) immediately without delay. Changing the delay time before light-cure, between 0 minutes to 6 minutes, did not affect the SBS. ANOVA analysis revealed that the dentin SBS of Maxcem Elite obtained under various curing modes were not statistically different (p > 0.05) from each other.

The similarity in 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.