Ceramic Surface Treatment with a Single-component Primer: Resin Adhesion to Glass Ceramics.

J Adhes Dent. 2018 Apr 19;:1-7

Authors: Prado M, Prochnow C, Marchionatti AME, Baldissara P, Valandro LF, Wandscher VF

Abstract

PURPOSE: To evaluate the microshear bond strength (μSBS) of composite cement bonded to two machined glass ceramics and its durability, comparing conventional surface conditioning (hydrofluoric acid + silane) to a one-step primer (Monobond Etch & Prime).

MATERIALS AND METHODS: Machined slices of lithium disilicate ceramic (LDC) (IPS e.max CAD) and feldspathic ceramic (FC) (VITA Mark II) glass ceramics were divided into two groups (n = 10) according to two factors: 1. surface treatment: HF+S (ca 5% hydrofluoric acid [IPS Ceramic Etching GEL] + silane coupling agent [SIL; Monobond Plus]) or MEP (single-component ceramic conditioner; Monobond Etch & Prime); 2. storage condition: baseline (without aging; tested 24 h after cementing) or aged (70 days of water storage + 12,000 thermal cycles). Composite cement (Multilink Automix, Ivoclar Vivadent) was applied to starch matrices on the treated ceramic surfaces and photoactivated. A μSBS test was performed (0.5 mm/min) and the failure pattern was determined. Contact angle and micromorphological analyses were also performed. Data were analyzed with Student’s t-test (α = 5%).

RESULTS: For both ceramic materials, HF+S resulted in higher mean μSBS (MPa) at baseline (LDC: HF+S 21.2 ± 2.2 > MEP 10.4 ± 2.4; FC: HF+S 19.6 ± 4.3 > MEP 13.5 ± 5.4) and after aging (LDC: HF+S 14.64 ± 2.31 > MEP 9 ± 3.4; FC HF+S: 14.73 ± 3.33 > MEP 11.1 ± 3.3). HF+S resulted in a statistically significant decrease in mean μSBS after aging (p = 0.0001), while MEP yielded no
significant reduction. The main failure type was adhesive between composite cement and ceramic. HF+S resulted in the lowest contact angle.
CONCLUSIONS: Hydrofluoric acid + silane resulted in higher mean μSBS than Monobond Etch & Prime for both ceramics; however, Monobond Etch & Prime had stable bonding after aging.

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**Fiber post cementation strategies: effect of mechanical cycling on push-out bond strength and cement polymerization stress.**

Fiber post cementation strategies: effect of mechanical cycling on push-out bond strength and cement polymerization stress.


Authors: Bergoli CD, Amaral M, Boaro LC, Braga RR, Valandro LF

Abstract

PURPOSE: To evaluate the effect of mechanical cycling and cementation strategies on the push-out bond strength between fiber posts and root dentin and the polymerization stresses produced using three resin cements.

MATERIALS AND METHODS: Eighty bovine mandibular teeth were sectioned to a length of 16 mm, prepared to 12 mm, and embedded in self-curing acrylic resin. The specimens were then distributed into 8 groups (n = 10): Gr1 – Scotchbond Multi Purpose + RelyX ARC; Gr2 – Scotchbond Multi Purpose + RelyX ARC + mechanical cycling; Gr3 – AdheSE + Multilink Automix; Gr4 – AdheSE + Multilink Automix + mechanical cycling; Gr5 – phosphoric acid + RelyX U100 (self-adhesive
Comparison of alternative adhesive cementation concepts for zirconia ceramic: glaze layer vs zirconia primer.

Comparison of alternative adhesive cementation concepts for zirconia ceramic: glaze layer vs zirconia primer.

J Adhes Dent. 2012 Feb;14(1):75-82

Authors: Cura C, Özcan M, Isik G, Saracoglu A
PURPOSE: Zirconia-based ceramics offer strong restorations in dentistry, but the adhesive bond strength of resin cements to such ceramics is not optimal. This study evaluated the bond strength of silane/adhesive/resin cement and zirconia primer/resin cement combinations on non-glazed and glazed zirconia surfaces before and after aging.

MATERIALS AND METHODS: Disk-shaped zirconia ceramic specimens (diameter: 8 mm; thickness: 2 mm) (N = 80, n = 10 per group) were randomly divided into 2 groups. While half of the specimens received one coat of glaze and were later finished by grinding, the other half was only ground using 1200-grit silicone carbide abrasives under water. The glazed specimens were then conditioned with 9.5% HF acid gel for 60 s, rinsed with water for 90 s, and neutralized. The glazed and non-glazed specimens were further divided into two groups. Two resin cements, namely, Variolink II and Multilink Automix were adhered onto the zirconia surfaces with their corresponding adhesive systems. In the Variolink II group, zirconia surfaces were silanized (Monobond-S), and adhesive resin (Heliobond) was applied and photopolymerized. In the Multilink Automix group, one coat of Metal/Zirconia Primer was applied with a microbrush, left to react for 180 s, and dried using oil-free air. Half of the specimens in each cement group were subjected to 5000 thermocycles (5°C to 55°C) and the other half was kept in the dark for 24 h at 37°C prior to testing. Specimens were mounted in the jig of the universal testing machine, and force was applied to the ceramic/cement interface until failure occurred (1 mm/min). After evaluating all debonded specimens under SEM, the failure types were defined as either “adhesive” with no cement left on the zirconia (score 0) or “mixed” with less than half of the cement left on the surface with no cohesive failure of the substrate (score 1). Data were analyzed using three-way ANOVA and Dunnett-T3 post-hoc tests.

RESULTS: Application of a glaze layer significantly improved the bond strength in the silane/adhesive/Variolink II group (p < 0.05), but no significant effect was found in the zirconia primer/Multilink Automix group (p > 0.05) (three-way ANOVA). Interaction terms were also significant (p < 0.05) (Dunnett-T3). Thermocycling did not decrease the results significantly in any of the groups (p > 0.05). Failure analysis revealed exclusively adhesive failures (score 0: 40 out of 40) in the non-glazed groups, but predominantly mixed failures (score 1: 34 out of 40) in the glazed groups.

CONCLUSION: The silane (Monobond S)/adhesive (Heliobond)/Variolink II resin cement combination benefitted from glazing the zirconia surface, but the zirconia
primer/Multilink Automix resin cement combination alone also provided sufficient bond strength to zirconia.

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**Water sorption and solubility of four self-etching, self-adhesive resin luting agents.**


Authors: Vrochari AD, Eliades G, Hellwig E, Wrbas KT

Abstract

PURPOSE: To evaluate and compare the water sorption and water solubility of four self-etching, self-adhesive resin luting agents.

MATERIALS AND METHODS: Four self-etching, self-adhesive resin luting agents (RelyX Unicem, Maxcem, Biscem, Multilink Sprint) and one classic resin luting agent (Multilink Automix) as a control group were used. Twelve disks (8 mm x 1 mm) of each material were prepared according to ISO 4049. Water sorption and solubility were calculated, using the formulae which the ISO 4049 specification provides.

RESULTS: Maxcem and Biscem were found to have very high water sorption values. RelyX Unicem and Multilink Sprint exhibited water sorption values only slightly higher than the control group. Regarding water solubility, the greater mass loss was found for Maxcem. Multilink Sprint exhibited no mass change. Biscem was found to have low solubility values, whereas RelyX Unicem and Multilink Automix exhibited negative solubility.
CONCLUSION: Multilink Sprint and RelyX Unicem were found to comply with the ISO requirements regarding water sorption and solubility, while Maxcem and Biscem did not. Materials of the same group exhibited very different behavior during their interaction with water.

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Durability of resin bonding to zirconia ceramic using different primers.

J Adhes Dent. 2009 Dec;11(6):479-83

Authors: Lehmann F, Kern M

Abstract

PURPOSE: The purpose of this in vitro study was the evaluation of the bond strength and its durability to zirconia ceramic after using two phosphate monomer-containing primers.

MATERIALS AND METHODS: Plexiglas tubes filled with composite resin were bonded to zirconia ceramic disks (Cercon) which were air abraded (50 microm Al2O3 at 2.5 bar pressure) and ultrasonically cleaned in isopropanol for 3 min. Groups of 16 specimens each were bonded with Multilink Automix using either no primer (NO) or using a metal primer (AP: Alloy Primer, Kuraray) or a metal and zirconia primer (MZ: Metal/Zirconia Primer, Ivoclar Vivadent). Another group bonded with a phosphate monomer (MDP) containing resin (PF: Panavia F, Kuraray) served as control for an established bonding method to zirconia ceramic. Prior to tensile bond strength testing, subgroups of 8 bonded specimens were stored in distilled water (37 degrees C) for either 3 or 150 days. Additionally, the
150-day specimens were thermocycled (TC) between 5 degrees and 55 degrees 37,500 times. Statistical analyses were conducted with the Wilcoxon rank sum test.

RESULTS: Without primer, the median initial bond strength of Multilink Automix to zirconia ceramic was relatively low (12.4 MPa). The primers improved the bond strength significantly (p <or= 0.05), increasing them to 38.5 MPa (Metal/Zirconia Primer) and 53.6 MPa (Alloy Primer). The Alloy Primer group did not differ significantly from the control group Panavia F with 51.8 MPa. After 150 days storage and TC, specimens without primer (NO) debonded spontaneously, while the other groups showed significantly reduced bond strengths ranging from 19.7 to 37.2 MPa.

CONCLUSION: Using phosphate monomer-containing primers on air-abraded zirconia ceramic improves bonding to zirconia ceramic significantly.

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