

An Investigation of the Effect of Metal primers on the Retention of Acrylic Resin to Noble Metal Frameworks.

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Aims: Acrylic resins bond poorly to noble metal alloy frameworks and tedious surface treatments are often required to aid retention to avoid adhesive failure and micro-leakage. Achieving predictable good adhesion between resin-based materials and noble metal alloys using simple time saving clinical techniques has many clinical implications in the construction and repair of cast dental temporary and definitive restorations. The use of metal primers could improve acrylic resin bonding to noble metal surfaces. The purpose of this study is to determine the shear bond strengths of three metal primers: GC Metal Primer II (GC Corporation), Signum Metal Bond (Haraeus Kulzer) and Alloy Primer (Kuraray Medical Inc.), evaluate their effectiveness and compare their bond strengths when used to bond acrylic resin to type III Gold alloy. **Methods:** Gold alloy type III was cast into discs 10mm in diameter and 3.5mm thick. The adherend surfaces were polished with 1000 grit silicon-carbide paper for 15 seconds at 5N force and 300rpm on a Knuth Struers Rotary Polisher in order to achieve uniform flat surfaces. They were then steam cleaned and blasted with Aluminium Oxide 50µm in size. A piece of tape with a circular hole of 6mm was used to mark off the adherent area. The three primers were applied to the surfaces according to manufacturers' instructions. Auto-polymerising acrylic resin was bonded to the surfaces through a silicone impression (President) mould to form cylinders. The specimens were stored in water at 37°C for 24 hours.

Shear bond strength was tested using The Instron Universal Testing machine at a crosshead speed of 1.0 mm/minute and the surfaces observed using an optical and scanning electron microscope to determine the mode of failure. **Results:** For each group, the mean and standard deviation was calculated. A one-way analysis of variance (ANOVA) was performed. A post hoc comparison of the means was carried out using the Bonferroni multiple comparison procedure. Use of primers significantly ($p < 0.05$) enhanced the bond strength between Type III gold alloy specimens and Vita Zeta acrylic resin. The mean strength for GC Metal Primer II was 19.6MPa, Signum Metal Bond 20.6MPa, Alloy Primer 27.1MPa and the control group 4.6MPa. Microscopic observation revealed that bond failure was predominantly adhesive occurring at the primer-metal interface. **Conclusion:** The application of three metal primers significantly improved the shear bond strength of acrylic resin to cast Type III gold alloy and Alloy Primer exhibited greater bond strength than either GC Metal Primer II or Signum Metal Bond.

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