

Comparative evaluation of micro-shear bond strength to different luting procedures of ceramics to dentin

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I. Objectives

The purpose of this study was to evaluate the effort of a modified luting procedure called “dual bonding technique” by compare micro-shear bond strength to different luting procedures of ceramics to dentin.

II. Materials and Methods

Eighty-four freshly extracted caries- and restoration-free human third molar were embedded in epoxy resin using acrylic ring. Flat superficial occlusal dentin surfaces were obtained, initially using a Low speed diamond saw and exposed dentin surface was ground with #600-grit SiC paper.

In DPA(group code : luting procedure, temporary cement, dentin bonding system), DPO, DPS, DFA, DFO, and DFS, three dentin bonding systems were applied to each dentin surface, according to manufacturer's instruction; All-Bond 2(BISCO, USA), One-Step(BISCO, USA), Clearfil SE Bond(Kuraray, Japan). In CPA, CPO, CPS, CFA, CFO, and CFS, dentin surfaces were left untreated. Dentin surface of all specimens were taken impression with silicon impression material(EXAFINE, GC, Japan) and were covered with each temporary cement; Propac (eugenol-containing, GC, Japan), Freegenol(eugenol-free, GC, Japan). All specimens were stored in distilled water at room temperature for 5 days.

The surface of the cylinders were sandblasted, cleaned and treated with a silane agent. The temporary cements were mechanically removed and dentin surfaces were cleaned with pumice. Each group was treated using one of three different dentin bonding system. An adhesive tape with a 1.1 mm diameter hole punched in the middle was placed on the dentin surface. A dual-curing resin cement was applied to the glass cylinder surface and the cylinder was bonded to the dentin surface and light-cured for 60 sec. Specimens were stored for 24 hours in distilled water at room temperature. The specimens were placed in testing jig of Universal testing machine(EZ Test, Shimadzu, Japan), and shear force was applied at a cross-head speed 1 mm/min until failure occurred. For the evaluation of the morphology at the resin/dentin interface, SEM examination(S-2300, Hitachi, Japan) was also performed. The data were analyzed using one-way ANOVA /Scheffes' post-hoc test at 95% significance level.

III. Results

1. In groups used All-Bond 2, One-Step, and SE Bond, there were no significant differences between luting procedures.
2. In groups used conventional luting procedure, there were no significant differences between dentin bonding systems.
3. In groups used dual bonding technique, SE Bond showed significantly higher micro-shear bond strengths in One-Step and All-Bond 2 ($p < 0.05$), but there was no significant difference between One-Step and All-Bond 2.
4. In SEM observation, with the use of total etching procedure(All-Bond 2 and One-Step), very long and numerous resin tags were observed.

IV. Conclusions

This study suggests that the micro-shear bond strengths of dual bonding technique and conventional luting procedure are no significant differences. As a result, there were no findings that the dual bond technique would be better than the conventional