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Shear Bond Strength between Lithium Disilicate Ceramic and Different Luting Cements With and Without Aging

(An in vitro study)

A Thesis

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Abstract

The clinical performance of ceramic restorations is directly related to the properties and type of luting agent employed. There are several varieties of cements, each with advantages and disadvantages and it is important to select the right material from the various luting agents available for the clinical longevity of the restoration. The purpose of this study was to evaluate and compare the shear bond strength of three different luting cements (glass ionomer cement, Variolink II and RelyX Ultimate) to lithium disilicate ceramic and to evaluate the effect of aging on the bond.

A total of 96 ceramic discs were fabricated from lithium disilicate ceramic (IPS e.max press) using the hot pressing fabrication technique. Forty eight discs were large (8.5 mm diameter and 3 mm thickness) and the other 48 discs were small (5.5 mm diameter and 3 mm thickness). The bonding surfaces of all discs were ground flat using wet 600 grit aluminum oxide abrasive papers and then ultrasonically cleaned for 5 minutes. The small discs were bonded to the large ones using three different luting cements (glass ionomer cement, Variolink II and RelyX Ultimate). Half of the bonded specimens were stored in distilled water at 37°C for 24 h before testing. The other half were stored for one month in distilled water at 37°C and then undergone thermocycling between 5°C and 55°C for 500 cycles before testing. A universal test machine at a crosshead speed of 1 mm/min was used for application of the shear load and the maximum load that cause bond failure was recorded for each specimen. One way ANOVA, LSD and student's t-test were used for analysis of the data ($P \leq 0.05$).

In the non-aged condition, the highest mean shear bond strength value was recorded for RelyX Ultimate (23.549 MPa) followed by Variolink II (19.396 MPa) and the lowest mean shear bond strength was of glass ionomer cement (4.745 MPa). After aging the shear bond strength values of the glass ionomer cement and RelyX Ultimate were

significantly lowered to (0.308 MPa) and (15.435 MPa) respectively, however the bond strength of Variolink II was not significantly changed.

Within the limitation of this study, it can be concluded that the composition of the luting cements and aging significantly affect the bond strength and the adhesive resin cement Variolink II is favorable to be used for luting lithium disilicate ceramic restorations.