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Comparison of bracket debonding force between two conventional resin adhesives and a resin-reinforced glass ionomer cement: An in vitro and in vivo study

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ABSTRACT

The purpose of this study was to compare the debonding force of orthodontic brackets bonded with two conventional resin adhesives (Resilience L3 and Light Bond) and a resin-reinforced glass ionomer cement (Fuji Ortho LC). For the in vitro part of the study, 80 extracted premolars were randomly divided into four groups. In groups A and B, brackets were bonded to unetched enamel using Fuji Ortho LC cement in wet and dry conditions, respectively. In groups C and D, brackets were bonded to etched enamel using Resilience L3 and Light Bond, respectively. Debonding force was determined using a servohydraulic testing machine at a crosshead speed of 1 mm / min. Data was analyzed using the ANOVA and Tukey-Kramer multiple comparison test at $p<0.05$. A significant difference was found in debonding force between unetched Fuji Ortho LC and the two conventional resins. There was no significant difference between the two conventional resins or between unetched resin-reinforced glass ionomer in the wet and dry conditions. For the in vivo part of the study, 30 patients were randomly assigned to one of the three bonding material groups. Bracket survival rates and distributions were obtained by following these patients for 1.2 years. Data was analyzed using the Kaplan-Meier product-limit estimates of survivorship function. Bond failure interface was determined using a modified adhesive remnant index (ARI). These results showed no significant difference between survival rates and distributions among the three bonding materials with respect to the type of

malocclusion, type of orthodontic treatment, or location of bracket. There were significant differences between survival distributions of males and females in the unetched Fuji Ortho LC group and among type of teeth in the conventional resin groups. The predominant mode of bracket failure for the unetched Fuji Ortho LC cement was at the enamel-adhesive interface, and for conventional resins, the enamel-adhesive interface and the bracket-adhesive interface. These results suggest that resin-reinforced glass ionomer cement can withstand occlusal and orthodontic forces despite having a bond strength lower than that of conventional resin adhesives.

KEY WORDS: Bond strength, Composite resins, Glass ionomer cement.

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