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1004 Bond Strength and ARI Evaluation of Anti-Cariogenic Bonding Materials

Friday, March 23, 2012: 3:30 p.m. - 4:45 p.m.

Location: East Hall (Tampa Convention Center)

Presentation Type: Poster Session

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Objective: With the increased potential for enamel demineralization during orthodontic treatment, a bonding material with anti-cariogenic properties and clinically acceptable bond strength could have a profound impact upon orthodontics. The purpose of this study was 1) to determine if the bond strength of anti-cariogenic orthodontic bonding materials is clinically acceptable, and 2) to evaluate the enamel-adhesive-bracket interface after bracket debonding.

Method: This study's sample consisted of sixty extracted human premolar teeth randomly assigned to 6 groups (n=10). Two types of anti-cariogenic orthodontic bonding materials, GAC's NeoBond® Light Cure Adhesive and SeLECT Defense's™ Light-Cure Orthodontic Adhesive, were compared against Transbond™ PLUS Color Change Adhesive by 3M. Victory Series mandibular first premolar brackets by 3M were bonded to all teeth which were mounted in epoxy resin. One half of each group was tested on an Instron 5566 universal debonding machine to assess the shear bond strength. The other half was debonded with the appropriate pliers and the tooth surface was examined at 3.5X magnification and scored according to the Adhesive Remnant Index (ARI). Teeth with an ARI grade of zero were examined on a SEM to determine any enamel fracture.

Result: No statistically significant differences in bond strength among the bonding materials were found ($F_{2,27} = 1.69$, $p=0.203$). The mean shear bond strength for GAC's NeoBond® Light Cure Adhesive was 7.13 ± 2.40 MPa. The mean shear bond strength for SeLECT Defense's™ Light-Cure Orthodontic Adhesive was 5.28 ± 2.08 MPa. The mean shear bond strength for Transbond™ PLUS Color Change Adhesive by 3M was 7.00 ± 2.95 MPa. There was no significant difference in the three groups' mean ARI (Kruskal-Wallis test = 0.86, $p=0.650$) with all samples except one testing either a 2 or 3.

Conclusion: There were no statistically significant differences in the shear bond strength or the ARI among the three adhesives tested, and all exhibited clinically acceptable bond strengths.

Keywords: Adhesion, Dental materials and Orthodontics

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