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Research paper

Efficacy of 4 surface treatments in increasing the shear bond strength of orthodontic brackets bonded to saliva-contaminated direct composites

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Abstract

Background

Orthodontists might encounter situations in which the brackets must be bonded onto saliva-contaminated composite veneered **anterior teeth**. The contamination might reduce the shear bond strength (SBS) or cause staining beneath the brackets. Certain composite surface treatments may increase the SBS. However, no previous studies have assessed them in the orthodontics field.

Methods

One-hundred discs of light-cured composite resin (Z250, 3M) were divided into 5 groups of 20. The experimental groups were intentionally contaminated with natural saliva and underwent 4 surface treatments (which all included rinsing–drying) as the following conditions: (1) only rinsing–drying, (2) applying the bonding agent (Z250), (3) disking, etching (with 35% **phosphoric acid**, Ultradent), followed by the application of the bonding agent; and (4) etching, applying a **silane** (Ultradent), and the bonding agent (Z250). All the specimens were bracket-bonded (using central brackets, Dentaaurum), incubated (37 °C, 96 h), and thermocycled (3000 cycles, 5–55 °C, dwell time = 30 s, transfer time = 15 s), respectively. The SBS was tested at 0.5 mm/min crosshead speed. Also, the adhesive remnant index (ARI) was scored under 10× magnification.

Results

The mean SBS values of the groups control, 1, 2, 3, and 4 were 20.7 ± 3.64 , 11.81 ± 2.18 , 17.10 ± 2.09 , 19.27 ± 2.8 , and 17.12 ± 2.76 MPa, respectively. The one-way ANOVA showed a significant difference between these values ($P = 0.000$). According to the Tukey's test, except for the groups 2 and 4, all the groups showed significant differences regarding their SBS levels ($P < 0.05$). Also, the ARI scores were significantly different ($P = 0.000$ [Kruskal–Wallis]).

Conclusion

All the surface treatments provided sufficient SBS levels. However, the rinsing–drying method had the least SBS improvements. Disking–etching–bonding method provided the highest SBS value. Using the silane might be unnecessary when a bonding agent is going to be used.

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Keywords

Shear bond strength (SBS); Saliva contamination; Surface treatments; Direct composite veneer

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