Evaluation of Shear Bond Strength of Orthodontic Molar Tubes
Bonded Using Hydrophilic Primers

An In Vitro Study

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Abstract

**Statement of Problem:** Orthodontic bonding is an essential step that impacts greatly the success of the treatment. Attachment de-bonding during treatment is inconvenient and costly to both the orthodontist and the patient. Moisture contamination is considered the most common cause for bond failure especially in the posterior region. **Objective:** To evaluate and compare the shear bond strength (SBS) of orthodontic molar tubes bonded using two hydrophilic primers to dry and saliva-contaminated enamel surfaces and to assess the mode of their bond failure. **Design:** In vitro comparative experimental study. **Materials and Methods:** A total of 60 extracted human mandibular molars were randomly divided into three major groups according to the primer used, each consisting of 20 molars: XT group acts as a control and bonded with the conventional hydrophobic Transbond XT primer, OS group bonded with the hydrophilic Ortho Solo primer, AP group bonded with the hydrophilic Assure Plus all surface bonding resin. Each major group was further divided into two subgroups, of 10 molars each, according to presence or absence of saliva. All the specimens were thermocycled 500 cycles between 5°C and 55°C. Shear forces were applied to the specimens with a universal testing machine at a crosshead speed of 1mm/min and SBS was measured in megapascals. The mode of failure was determined using the adhesive remnant index (ARI). Data were analyzed using two-way analysis of variance (ANOVA) followed by univariate analysis and Bonferroni post hoc tests. The significance level was set at P ≤0.05. **Results:** The three tested primers did not show a significant difference in the mean SBS in dry conditions; the mean SBS of OS and AP primers were 15.60 ± 5.879 MPa and 12.51 ± 2.583 MPa respectively which were comparable to that of the hydrophobic XT primer (12.76 ± 2.952 MPa). In saliva-contaminated conditions, the mean SBS values were 10.41 ± 4.457 MPa and 9.22 ± 3.422 MPa for OS and AP primers respectively which were significantly higher than that of XT primer (4.82 ± 2.050 MPa). When comparing the mean SBS for each
group according to the bonding condition, it was significantly higher in dry bonding compared to saliva-contaminated bonding for the three primers. In dry field, most of the bond failures of the three primers were adhesive (score 3); whereas in saliva-contaminated field, most of the failures were cohesive (score 1). **Conclusion:** Bonding under dry conditions yielded the highest SBS for the three primers. Saliva contamination significantly decreased the bond strength of both hydrophilic primers compared with dry conditions; however, the values were above the clinically acceptable limit. The hydrophilic primers tested in the present study can be successfully used for bonding orthodontic molars tubes under dry and saliva-contaminated enamel surface conditions.

**Keywords:** Shear bond strength, Molar tubes, Hydrophilic primers, Saliva contamination, Thermocycling