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THE EFFECT OF CROSSHEAD SPEED, LOAD CELL CONFIGURATION AND CURING TIME ON THE SHEAR BOND STRENGTH OF ORTHODONTIC BRACKETS

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Objective: The purpose of this study was to evaluate the effect of crosshead speed, load cell configuration and curing time on the shear bond strength of orthodontic brackets.

Materials and Methods: One hundred and eighty human molars were randomly divided into 20 second and 40 second photopolymerization time and stored in artificial saliva at 37°C in incubator for two weeks before bonding. The teeth in both groups were bonded using regular primer and Transbond XT (R) adhesive and adhesive curing time was either 20 or 40 seconds. Each group was further divided into 10kN or 1kN load cell groups and each of those groups were divided into 0.5mm/min or 5mm/min crosshead speeds. Teeth were then stored in artificial saliva and subjected to shear-testing 24 hours after using a Zwick Universal Test Machine.

Pre- Liminary Results: In the photopolymerization subgroups, the mean shear bond strength were 19.22 ± 4.14 MPa and 21.01 ± 3.43 MPa for the 20 seconds and 40 seconds, respectively. Meanwhile, in the crosshead speed subgroups, the mean shear bond strength were 23.61 ± 2.87 MPa and 21.66 ± 4.42 MPa for 0.5mm/min and 5mm/min, respectively. Lastly, in the load cell configuration subgroup, the mean shear bond strength were 21.11 ± 3.47 MPa for 1kN load cell and 10kN load cell subgroup results will be analyzed in near future. The data collection is ongoing.

Conclusion: The 24-hour debonding results indicated that slower cross-head speeds with longer photopolymerization times produced higher shear bond strengths.