CFAO GRADUATE STUDENT POSTERBOARD ABSTRACTS

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Frictional resistance in contemporary self-ligating appliance systems

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Background: Resistance to tooth movement is multifactorial, with friction one of many important components. There is limited data comparing contemporary passive and active self-ligating bracket (SLB) systems in terms of friction created by arch wire engagement.

Aim: To compare static and kinetic friction in contemporary passive and active SLB systems *in vitro*.

Hypothesis: Active and passive SLB systems produce different degrees of friction and in differing amounts on varied arch wire sizes and dimensions.

Materials & Methods: Nine bracket systems of .022 in slot size were tested; control (3M Victory with elastic ligature); passive SLB (Ormco Damon Q, Ortho Classic H4, HS Carriere SLX, RMO Altitude SL, AO Empower2 passive); active SLB (AO Empower2 active, 3M Victory SL, Speed System Orthodontics Speed). Single upper right central incisor brackets were mounted on a custom metal fixture allowing an .0215 x .025-in SS wire to passively fit. Straight sections of various round and rectangular Nickel Titanium (NiTi) arch wires (.016, .018, .018 x .018, .020 x .020, .016 x .022, .017 x .025, .019 x .025, and .021 x .025-in) were ligated to the bracket and resistance to sliding was measured with an Instron Universal Testing Machine. Ten unique tests utilizing a new bracket and new arch wire were conducted for each group in the dry state. A two-way ANOVA with Bonferroni adjustment for multiple comparisons was used to compare significant differences between groups.

Results: Friction was significantly different between control, passive SLB and active SLB systems. Passive SLB groups had close to zero friction with no significant differences between bracket systems regardless of the arch wire. However, active SLB groups exhibited significant differences in friction depending on the bracket system and arch wire shape and dimension.

Conclusions: Friction between the arch wire and bracket slot differs significantly between passive and active SLB systems. Understanding the different bracket-wire interactions of SLB systems helps the clinician understand and plan biomechanics with the bracket system of their choice.