

[\[Print Version\]](#)

[\[PubMed Citation\]](#) [\[Related Articles in PubMed\]](#)

The Angle Orthodontist: Vol. 66, No. 3, pp. 215–222.

Frictional resistance between orthodontic brackets and archwires in the buccal segments

Nigel G. Taylor, MDS^c, BDS, FDS RCS(Ed), MORTH RCS(Ed);^a Keith Ison, MA, MSc, PhD, MBA, MIPSM^c

^aNigel G Taylor, Orthodontic Unit, The Royal Surrey County Hospital, Egerton Road, Guildford, GU2 5XX, United Kingdom. Nigel G. Taylor, Consultant, Department of Orthodontics, King's College Hospital Dental School, London, and The Royal Surrey County Hospital, Guildford.

^cKeith Ison, Consultant Scientist, Department of Medical Engineering and Physics, King's College Hospital, London.

ABSTRACT

Orthodontic sliding mechanics using preadjusted brackets is a popular approach for achieving incisor retraction. A distally directed force slides the archwire through brackets and tubes in the buccal segments. Friction in the buccal segments contributes resistance to the force required to achieve tooth movement, and techniques to reduce friction reduce the potential for anchorage loss. This in vitro study used an Instron testing machine to assess frictional forces for three types of 0.022 × 0.028 inch brackets: preadjusted stainless steel premolar brackets (Standard Straight Wire, "A" Company, Inc, San Diego, Calif), Activa brackets ("A" Company Inc, San Diego, Calif), and Speed brackets (Strite Industries Ltd), combined with five wire sizes (0.018, 0.020, 0.016 × 0.022, 0.018 × 0.025 and 0.019 × 0.025 inch). A model with one attached molar bracket and one or two premolar brackets simulated the buccal segments. Activa brackets produced the least friction for all wires tested. Speed brackets with round wires showed little frictional force while, rectangular wires gave rise to higher forces, at levels similar to those recorded with two Standard Straight Wire brackets. Static friction for round wires in standard brackets was found to be 178–275 gm-force. The ratio of static to dynamic friction was remarkably consistent in all tests. Different methods of ligation were compared for their effect on static friction. Ligation with loosely placed ligatures or stretched modules reduced frictional forces in Standard Straight Wire brackets, the reduction being greatest for round archwires. Frictional forces recorded from archwires secured with elastomeric modules showed a steady reduction over a 3-week period, depending on how long the module had been in position on the bracket.

KEY WORDS: Archwire, Friction, Bracket, Ligation.

Submitted: July 1994

Accepted: March 1995.