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Frictional resistance of aesthetic (brackets, coated archwires and coated ligaturewires)

(An in vitro study)

A thesis submitted to the council of the College of Dentistry at the University of Baghdad, in Partial Fulfillment of the requirements for the Degree of Master in science of Orthodontics.

By

Farah Ghanim Agha

B.D.S.

Supervised by:

Assist. Prof. Dr. **Mushriq Fawzi Al-Janabi**

B.D.S., M.Sc

Baghdad – Iraq

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ABSTRACT

Most fixed appliance techniques involve some degree of sliding between bracket and archwire. Whenever sliding occurs, frictional resistance is encountered, which affect treatment outcomes and duration in a negative way. Friction is a clinical challenge, particularly with sliding mechanics, and must be dealt with efficiency to provide the best orthodontic results.

The aim of the present in vitro study was to evaluate and compare the static frictional forces produced by monocrystalline ceramic (sapphire) bracket and polycrystalline ceramic bracket coupled with three different types of aesthetic coated archwire (teflon, epoxy and polymer) under dry condition.

The brackets, wires and ligation methods used were: one hundred and twenty brackets has been used in this study divided into sixty monocrystalline ceramic (sapphire) bracket 0.022″ pre-adjusted Roth brackets and sixty polycrystalline ceramic bracket 0.022″ pre-adjusted Roth brackets too, used with Teflon coated stainless steel ligaturewires all were (Ortho Technology, USA).

Each bracket was tested with three different types of aesthetic archwires coating material (teflon, epoxy and polymer) with two different size of archwire (0.014″ aesthetic coated nickel titanium archwire and 0.019″× 0.025″aesthetic coated stainless steel wire). Resistance to sliding of the bracket/wire systems was measured with an experimental model mounted on the crosshead of an Instron testing machine with a 10 Newton load cell and speed of 6 mm/min.

Each sample was tested 10 consecutive times under a dry state for a total of 120 readings.

Monocrystalline (sapphire) ceramic bracket is able to produce a statistically lower static frictional forces compared with polycrystalline ceramic bracket when coupled with all types of aesthetic archwire.

Polymer coated (nickel titanium, stainless steel aesthetic archwire) produce a statistically lower static frictional forces compared with Teflon and epoxy coated (nickel titanium, stainless steel) aesthetic archwire.