Evaluation and comparison of frictional forces generated by three different ligation methods

(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

Assem Abbass Mohammed

B.D.S.

Supervised by:

Professor Dr. Ausama Al-Mulla

Baghdad – Iraq

December/2010 Thou Al-Hijjah/1431

ABSTRACT

Most of orthodontic treatments involve sliding mechanics particularly during overjet reduction or space closure; the major disadvantage with the use of sliding mechanics is the frictional forces resulting from the interaction between the bracket and the guiding archwire, which affect treatment outcomes and duration in a negative way.

The aim of the present in vitro study was to evaluate and compare the static and kinetic frictional forces produced by a passive self-ligating bracket and a conventional stainless steel bracket ligated with two different ligation methods under dry condition.

The brackets, wires and ligation methods used were: 10 passive self-ligating stainless steel 0.022″ pre-adjusted Roth brackets and 20 conventional stainless steel 0.022″ pre-adjusted Roth brackets too, used with stainless steel ligature wires and conventional figure "O" elastomeric ligatures (all were Ortho Technology, USA). Each bracket ligation system was tested with two types of arch wires (0.014″ nickel titanium wire and 0.019″ × 0.025″ stainless steel wire). Resistance to sliding of the bracket/wire/ligature systems was measured with an experimental model mounted on the crosshead of an Instron testing machine with a 10 Newton load cell and cross head speed of 6 mm/min. Each sample was tested 10 consecutive times under a dry state for a total of 300 readings.

1. Self-ligating bracket is able to produce a statistically high significant lower static and kinetic frictional forces compared with stainless steel ligature wire and conventional elastic ligature when coupled with both arch wire types.
2. Stainless steel ligature wire can produce a statistically high significant lower static and kinetic frictional forces compared with conventional elastomeric ligature when coupled with both arch wire types.