

Republic of Iraq
Ministry of Higher Education
And Scientific Research
University of Baghdad
College of Dentistry



Effect of Air Abrasive Polishing on Friction and Surface Micromorphology of Ceramic and Stainless Steel Brackets (An in vitro comparative study)

A Thesis

**Submitted to the Council of the College of Dentistry -
University of Baghdad in Partial Fulfillment of the
Requirement for the Degree of Master Science
in Orthodontics**

By

Waleed Khalid Hareeja
B.D.S.

Supervised by

Prof. Dr. Akram F. Al-Huwaizi
B.D.S., M.Sc., Ph.D.

2014

Baghdad-Iraq

1435

Abstract

Fixed orthodontic appliances increase the risk of caries. Since many patients are unwilling or unable to conduct adequate teeth cleaning, professional cleaning is often essential. Air abrasive polishing offers the advantage to remove in a short time deposits in hard to reach places.

The aim of the present study was to evaluate the in vitro effect of air abrasive polishing of mono crystalline ceramic (sapphire) and stainless steel brackets on frictional resistance and surface micromorphology.

Two commercial brands of stainless steel brackets (UltiMiM, Ortho Classic Co.; and Mini Sprint, Forestadent Co.) and one brand of sapphire brackets (Perfect Clear, Hubit Co.) were evaluated. The specimens were randomly divided into twelve groups each group with eleven specimens which classified according to bracket type and air abrasive time (0, 5, 10 and 20 seconds).

The air abrasion was performed with an NSK airflow appliance using calcium carbonate powder. Universal testing machine was used to simulate the movement of retraction in sliding mechanics, measuring the traction force needed to slide 10 mm of 0.019 x0.025 inches stainless steel arch wire over the test specimen brackets. The surface micromorphology of one sample from each group was examined by Scanning electron microscope. The data were analyzed by ANOVA and LSD tests.

Calcium carbonate air abrasive polishing on the stainless steel brackets caused a statistically significant increase in friction for both stainless steel bracket types (72% for Mini Sprint and 57% for UltiMiM). But, it caused a non-significant increase in friction of sapphire brackets (7%). However, the relation between abrasion time and the friction didn't reach the degree of significant difference for sapphire and stainless steel brackets.

Scanning electron microscope showed that air abrasive polishing caused great alterations in the surface micromorphology of metal brackets due to the

removal of the polished (glazed) surface area, leaving it rougher; but, did not cause any noticeable alterations in the surface micromorphology of sapphire brackets except the retention of these abrasive particles on its porous and irregular surface.

In conclusion, calcium carbonate air abrasive polishing should be used with caution on metal brackets. However, it can be used with minimal adverse effects on sapphire brackets which need prophylaxis most because of their transparent nature; but abundant washing with water must be performed to remove the residue retained in their irregular porous surface.