

**Republic of Iraq
Ministry of Higher Education
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University of Baghdad
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Evaluation of chlorhexidine application on shear bond strength in different brackets and different etching techniques (In vitro study)

A Thesis Submitted to the Council of the College of
Dentistry/University of Baghdad in Partial Fulfillment of the
Requirements for the Degree of Master of Science in Orthodontics

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C.E 2020

A.H 1441

Abstract

One of the most important complications of fixed orthodontic treatment is the formation of white spots, which are initial carious lesions. Addition, of antimicrobial agents into orthodontic adhesive material might be well way out for prevention of white spots formation. The aims of this study were evaluating and compare the shear bond strength (SBS), in different etching technique (acid etching and laser etching Er: Cr, YSGG, on stainless steel and ceramic bracket) after application chlorhexidine. Also, the amount of adhesive material that would remain on the tooth surface.

(82) premolar teeth were selected and randomly distributed into eight groups. Each group includes ten of the sample, (Groups A, B/metal bracket. C, D /ceramic bracket). These groups were prepared with using 37% orthophosphoric acid gel (SDI, California, USA) for 30 second then rinsed by spray water for 15-20 seconds and dried for 10 seconds. The other of the samples (Groups E, F/metal bracket. G, H/ceramic bracket) were conditioned with Er: Cr YSGG laser system. Parameter used are Power: 2W, Wave length: 2,780, energy: 250 mJ, Pulse duration: 140 μ s Frequency: 20 Hz. , Cooling system: (90%- 80% air-water spray) , Mode of application: swiping motion (Waterlase,1 plus from Biolase USA) and then washed and dried.

The groups (B, D, F, H) sealant was applied with CHX varnish. The two drops of CHX were added to every one drop of primer 2:1 and then mixed .Thin uniform layer of mixture Transbond XT primer is applied to etched tooth surface and then lighted cure for 15 second . The brackets were bonded by Transbond XT adhesive past on the teeth surface. Then, after 24 hours of storage the specimens in normal saline in the incubator at 37°C, then thermal cycling was performed between 5 °C and 55 °C for 500 cycles. The shear bond strength was measured by Instron testing machine. After that, the adhesive remnant index were examine under 10X magnification. The remain two teeth

are chosen, without etching or bonding only for observation by scanning electron microscopy (SEM) to decide the topography and morphology of the treated tooth surface. However, samples of SEM were assessed according to the criteria of (**Silverstone *et al.*, 1975**).

These are:-

Type 1: honeycomb image because of dissolved central part of enamel prism. Type 2: pebble image because of dissolved periphery of enamel prism. Type 3: type 1 and type 2 images together. Type 4: reticular, uncomplicated, pattern and similar map image of enamel surface. Type 5: flat and smooth image of enamel surface.

Results: statistical analyses present that SBSs of laser radiation are significantly different than that of acid etching. Adhesive enamel interface failure is the predominant mode of bond failure in all laser groups, which is considered as the most preferable.

Conclusion: laser etched resulted the bond Strength accepted clinically in the metal, & ceramic bracket. It could be a substitute to the acid etching. CHX sealant does not significant affect in orthophosphoric acid etching but it is more weaker in the laser etching. SEM examination revealed etching pattern similar to type 1 for acid etching and type3 for lase etching.