

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



**In vitro Comparative Assessment of Composite  
Nanoleakage using Various Dentine Surface  
Treatments**

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  
Conservative Dentistry

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January/ 2016

Rabi Al-Thani/ 1437

## **Abstract**

The treatment of dental tissues preceding to adhesive procedures is a very important step in the bonding protocol and decides the clinical success of restorations. This study was conducted *in vitro* with the aim of evaluating the nanoleakage on the interface of adhesive system and the dentine with five different dentine surface treatments using scanning electron microscopy and energy-dispersive X-ray spectrometry.

Twenty five sound maxillary first premolar teeth have been selected. Standardized class V cavities were prepared on the buccal and lingual surfaces and the teeth were then divided into five main groups of (5 teeth in each group/ n=10 cavities) according to the type of dentine surface treatment that was used:

Group (A): dentine was conditioned with Er,Cr:YSGG laser.

Group (B): dentine was conditioned with (Er,Cr:YSGG laser + acid etch).

Group (C): dentine was conditioned with (acid etch + Er,Cr:YSGG laser).

Group (D): dentine was conditioned with acid etch.

Group (E): dentine was conditioned with acid etch + 10% sodium hypochlorite.

For all the teeth Scotchbond multi-purpose adhesive was used and teeth were restored with Z250 composite restoration then all specimens were subjected to thermocycling (500 cycles, at 5 to 55 degree Celsius), then the entire tooth, except for the tooth/ restoration interface and 1 mm of the tooth surface adjacent to the borders of the restoration, was coated with two layers of nail varnish. The teeth were then soaked in a 50% (weight/volume) silver nitrate suspension in total darkness for 24 hours, rinsed in running water for 5 minutes, immersed in photo-developing solution, and subjected to a fluorescent light for 8 hours. Teeth were then sectioned buccolingually across the centre of the restorations by using a low speed diamond disk.

The nanoleakage assessment was done by scanning electron microscopy and energy-dispersive X-ray spectrometry.

Data were analyzed statistically by one way ANOVA test and least significant difference tests (LSD). The results showed that there were statistically highly significant differences among all groups of the present study. Acid and laser (group **III**) exhibited the lowest mean value of nanoleakage at around (6.14 %), whereas the highest mean value of nanoleakage (12.83 %) was determined by the only acid (group **IV**). In conclusion treating the acid etched dentine with Er: Cr: YSGG laser resulted in a significant decrease in the nanoleakage score of the adhesive bonding system.