

# **Evaluation of Shear Bond Strength of Zirconia to Tooth Structure by Resin Cement After Zirconia Different Surface Treatment Techniques**

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

Submitted by

**Reem Mounes Dawood**

B.D.S.

Supervised by

**Prof. Dr. Adel F. Ibraheem**

B.D.S., M.Sc.

Conservative Dentistry

Baghdad-Iraq

2014 A.D.

1435 A.H.

# Abstract

**Aim of the study:** To evaluate the effect of zirconia different surface treatments (primer, sandblast with  $50\mu\text{m Al}_2\text{O}_3$ , Er,Cr:YSGG laser) on shear bond strength between zirconia surface and resin cement.

**Material and methods:** Sixty presintered Y-TZP zirconia cylinder specimens (IPS e.max ZirCAD, Ivoclar vivadent) will be fabricated and sintered in high temperature furnace of (1500 C for 8 hours) according to manufacturer's instructions to the selected size and shape of (5mm. in diameter and 6mm in height). All specimens were ground flat using 600.800.1000.1200 , aluminum oxide abrasive paper to obtain a standardized surface roughness. Surface roughness values were then recorded in  $\mu\text{m}$  using surface roughness tester (profilometer) to obtain a standardized data base line for all samples. The specimens were then randomly divided into three main groups (n=20); group A: no surface treatment (control group), group B: specimens in this group treated with  $50\mu\text{m Al}_2\text{O}_3$  and group C: specimens in this group treated with Er,Cr:YSGG laser.

Sixty sound human premolars were used in this study , after construction of acrylic blocks ,the occlusal surface of the teeth were ground flat, with diamond cutting disk to obtain a flat dentine surface .

Prior to cementation of zirconia cylinders to tooth specimens subgroups (A1,B1,C1) will receive a coat of metal/zirconia primer and left to react for three minutes. while the subgroups (A2,B2,C2) were left undisturbed.

Bonding surface of zirconia cylinder was then luted with SpeedCEM self adhesive resin cement under a static load of 2Kg. placed on the vertical arm of the surveyor and allowed to auto cure for 4minutes. The final cemented specimens were then stored in distilled water at room temperature for 24hours.

All specimens were subjected to shear loading force in a universal testing machine at crosshead speed of 1mm/min. The shear bond strength values were analyzed statistically with one-way ANOVA; the fractured surfaces of zirconia cylinders were examined with a stereo-microscope to observe the failure mode.

**Results:** The airborne-particle 50 $\mu$ m followed by primer application showed significantly the higher bond strength than other groups.

**Conclusion :** within the limitation of this study, the results showed that sandblasting the bonding surface of zirconium cylinders with 50 $\mu$ mAl<sub>2</sub>O<sub>3</sub> produced the highest values of shear bond strength , also the use of primer enhanced shear bond strength as well.