

29th Annual World Congress on

Dental Medicine & Dentistry

October 16-18, 2017 New York, USA

Microtensile bond strength and micromorphologic analysis of surface-treated resin nanoceramics

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Purpose: The aim of this study was to evaluate the influence of different surface treatment methods on the microtensile bond strength of resin cement to resin nanoceramic (RNC).

Materials & Methods: RNC onlays (Lava Ultimate) (n=30) were treated using air abrasion with and without a universal adhesive, or HF etching followed by a universal adhesive with and without a silane coupling agent, or tribological silica coating with and without a universal adhesive, and divided into 6 groups. Onlays were luted with resin cement to dentin surfaces. A microtensile bond strength test was performed and evaluated by one-way ANOVA and Turkey HSD test ($\alpha=0.05$). A nanoscratch test, field emission scanning electron microscopy, and energy dispersive X-ray spectroscopy were used for micromorphologic analysis ($\alpha=0.05$). The roughness and elemental proportion were evaluated by Kruskal-Wallis test and Mann-Whitney U test.

Results: Tribological silica coating showed the highest roughness, followed by air abrasion and HF etching. After HF etching, the RNC surface presented a decrease in oxygen, silicon, and zirconium ratio with increasing carbon ratio. Air abrasion with universal adhesive showed the highest bond strength followed by tribological silica coating with universal adhesive. HF etching with universal adhesive showed the lowest bond strength.

Conclusion: An improved understanding of the effect of surface treatment of RNC could enhance the durability of resin bonding, when used for indirect restorations. When using RNC for restoration, effective and systemic surface roughening methods and an appropriate adhesive are required.

Biography

Gyo-Zin Ahn has completed his Bachelor's Degree from College of Dentistry Dankook University. Currently, he is pursuing his Master's course in Dental Prosthodontics.

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