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The Effect of Different Marginal Cement Space Thickness on the Fracture Strength of Monolithic Zirconia Crowns Using Different Luting Agents

Abstract

Objectives: The main objective was to investigate the effect of marginal cement space thickness on the fracture strength of full contour monolithic zirconia crowns using different luting agents. *Materials and methods:* 48 sound human upper first premolar teeth were selected and prepared following the guidelines recommended for KATANATM zirconia. The prepared teeth were divided according to thickness of cement space around the margin into two main classes (n=24) as follow: (Class I: 0 μ m) and (Class II: 25 μ m), additional cement space of 80 μ m starting 1mm above the finish lines of the teeth. Every class was subdivided into three subclasses according to the type of luting material(n=8): subclasses(AI,AII) cemented with RelyX™ Ultimate adhesive luting agent, subclasses(BI,BII) cemented with RelyX™ Unicem 200 self-adhesive luting agent and subclasses(CI,CII) cemented with resin-modified glass ionomer cement (RMGIC). CAD/CAM was used to fabricate monolithic zirconia crown restorations; the fabricated crown was then luted to respective prepared tooth using the selected cementing agent for each subgroup. Compressive axial loading was used to evaluate the fracture strength of crowns via a computer-controlled universal testing machine. The statistical analysis of data was done by using one-way (ANOVA) and LSD test.

Results: The tests revealed a significant impact of marginal cement space and luting agents on the fracture strength of zirconia crowns ($p \leq 0.05$).

Conclusions: The using of 25 μ m marginal cement space thickness results in better fracture strength of zirconia crowns. Additionally the Rely X™ Ultimate adhesive luting agent provided the highest fracture strength as compared with others.