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**Effect of cement space thickness setting on
the retention of monolithic zirconia crowns
using different luting agents
(A comparative *in vitro* study)**

A thesis

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Abstract

Retentive strength is considered as one of the essential elements which determine the clinical success of dental restorations. The objective of this *in vitro* study was to evaluate and compare the effect of difference in cement-space thickness on the retentive strength of monolithic zirconia crowns cemented with two types of luting agents (self-adhesive resin cement and conventional glass ionomer cement).

Forty eight sound human maxillary first premolar teeth extracted for orthodontic purposes were selected in this study. All the teeth were prepared to receive ceramic crown restoration according to the guidelines recommended for InCoris TZI C with the following features: (0.8mm deep chamfer finishing line, 4 mm axial height with planar occlusal reduction and 6° total convergence angle).

The teeth were then scanned with CEREC Omnicam digital intraoral scanner. The preparations surface areas were measured using Auto CAD Architecture program. Prior to fabrication of the crown restorations, teeth were divided into three main groups according to the cement space thickness parameter selected during the designing phase (n=16): **Group A:** 80 µm; **Group B:** 100 µm and **Group C:** 120 µm.

Full contour zirconia crowns were then fabricated using Sirona In-Lab MC X5 milling device. Each group was then subdivided into two subgroups according to the type of luting cement used (n=8): (**A₁**, **B₁**, **C₁**) RelyX unicem self-adhesive luting cement; (**A₂**, **B₂**, **C₂**) RIVA luting glass ionomer luting cement.

The cemented ceramic crowns were pulled-out along its path of insertion using computer-controlled universal testing machine (Zwick Z010, Ulm, Germany) with a crosshead speed of 0.5 mm/min. Stress failures were

calculated for each specimen in MPa by dividing the failure force by the surface area of the corresponding tooth.

The data were then analyzed using two-way ANOVA and Post hoc Bonferroni tests at a level of significance of 0.05. The results of this study showed that the highest mean retentive stress value was recorded by Group A₁ (7.360) followed by Group A₂ (6.528), Group B₂ (6.123), Group B₁(5.909), Group C₂ (5.629) and Group C₁(5.580), respectively. Concerning the failure mode, the majority of samples of all groups showed adhesive failure between teeth and cement.

As a conclusion, increasing cement space thickness would result in a significant reduction in the retention value of zirconia crown restorations when RelyX unicem used as a luting agent, while it has no significant effect on the retention of crown restoration when RIVA luting was used as a luting agent. Thus, the retentive strength of crown restoration is luting agent-dependent.