Title: In vitro shear bond strength of lutting agents to polyetheretherketone core materials

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Background: PEEK has superior mechanical strength, heat resistance, chemical resistance and can be easily used. PEEK can also be used as an alternative rigid material in partial dentures and fixed dental prostheses. The adhesion between luting materials and materials used in crowns and fixed dental prostheses is an indispensable property of dental restorative materials. Currently, there is no established protocol for cemention of crowns and fixed dental prostheses using PEEK. To the best of our knowledge, the bond strengths between PEEK and the luting materials used in this study has not previously been evaluated.

Objectives: The purpose of this study was to evaluate the bond strength of polyetheretherketone (PEEK) to luting material.

Materials and Methods: Prepolymerized resin composite cylinders (3.5 mm internal diameter, n=45) were bonded to the pretreated surfaces of polyetheretherketone. The cementing agents tested were zinc-phosphate cement (Richer & Hoffmann,Berlin, Germany), resin cements (Panavia V, Panavia F). After bonding, all specimens were stored in distilled water at 37ċ for 24 hours and then thermal cycled 1000 times between 5ċ and 55ċ prior to testing. Bond strength was measured with a shear test, and failure modes were assessed by VMN machine(Easson,China).

Statistical analysis was performed by SPSS software and one-way ANOVA.

Results: The highest bond strength was observed in panavia F_2 (10.84 ± 6.05) and zinc phosphate (10.50 ± 2.88) the lowest bond strength was observed in panavia V_5 (4.02 ± 2.87) and there was no statistically significant difference between shear bond strength of panavia F_2 and zinc phosphate. (p=1**)** But There was a statistically significance difference between panavia F_2 and panavia V_5 (p=0.001) and zinc phosphate and panavia V_5(p<0.001). Among PEEK groups, all failure mode was adhesive failure between the material and the luting material.

Conclusion: According to the results of this study, Panavia F_2 cement is recommended due to the highest shear bond strength for cementing PEEK surface.

Key words: PEEK, shear bond strength, lutting agents, fixed prosthodontics restorative materials