

Experimental design of FPD made of all-ceramics and fibre-reinforced composite.

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OBJECTIVES: This study was carried out to combine flexural properties of FRC materials with aesthetic values of ceramics. **METHODS:** The bonding strength of fibre-reinforced composite to ceramic was determined. Afterwards, 8 three unit and 8 four unit FPDs (fixed partial dentures) were manufactured based on the experimental design and were then adhesively luted onto human molars. After thermal cycling and mechanical loading in an artificial environment, the fracture strength and marginal adaptation was determined. FPDs made of FRC (fibre-reinforced composite) materials were used as a control. **RESULTS:** The most reliable bonding strength of ceramic to FRC material was achieved using acid etching in combination with adhesive luting techniques. Median fracture strength values of 575 N for three unit FPD and 876 N for four unit FPD were established. More than 85% of the experimental FPDs showed a perfect margin while less than 15% revealed a marginal gap, even after thermal cycling and mechanical loading (TCML). The strongest influence of TCML on the marginal adaptation of the experimental design FPD was determined within the four unit system showing approximately a 10% change in marginal gap and perfect margin. **SIGNIFICANCE:** Assuming an improvement in adhesive bonding between the ceramic and the FRC material and, in addition, an enhancement of the contact surface between pontic and abutment, the hybrid technique could represent an interesting procedure for further investigations and, eventually, clinical implication.

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