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Influence of water sorption of the underlying abutment on fracture resistance of zirconia copings.

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Source

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Abstract

OBJECTIVE:

To investigate the influences of abutment water sorption and various aging parameters on the fracture resistance of zirconia copings.

METHODS:

Using a master die, identical replicas were made from three resin materials. The first was a melamine resin with very high water sorption (n = 48), the second an experimental resin core build-up composite with moderate water sorption (n = 40) and the third a commercially available core build-up composite with low water sorption (n = 40). On the abutment replicas, zirconia copings (n = 128) were made using a computer-aided design-computer-aided manufacturing system. The copings were luted onto the abutments using zinc oxide phosphate cement. In the melamine group, a subgroup of samples (n = 8) was cemented with a composite cement as controls. The forty specimens in every abutment material group were randomly divided into one of five subgroups, as follows: (i) not aged; (ii) mechanically (dry) loaded only (50 N; 1.2 × 10(6) cycles); (iii) stored for 10 days in water; (iv) thermally cycled (TC; 6000 × 5/55°C); and (v) TC and mechanically loaded (TCML; 50 N, 1.2 × 10(6); 6000 × 5/55°C). After aging, all copings were loaded to fracture.

RESULTS:

A statistically significant difference was found between the three abutment-die groups if the samples were aged by TCML. The zirconia copings cemented on abutments with high water sorption fractured during TCML, and the subgroup with moderate water sorption had significantly lower fracture resistance. A change of luting material had no impact on this behavior.

CONCLUSION:

Only the simultaneous combination of all chosen aging factors (TCML) was able to detect a difference in fracture behavior of a zirconia coping luted on abutments with varying water sorption.