

Factors determining the retentiveness of luting agents used with metal- and ceramic-based implant components.

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Source

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Abstract

OBJECTIVES:

To investigate the factors that determine the retentiveness of copings made of cobalt-chromium (CoCr)-alloy or zirconia luted with permanent (solid-body like) and provisional (viscous, elastic-body-like) luting agents.

MATERIALS AND METHODS:

We manufactured titanium implant analogs with four-, six-, and eight-taper degrees and copings of CoCr-alloy and zirconia and luted the copings according to a standardized protocol. Samples were thermally cycled, and we investigated the various degrees of roughness of the copings' inner surfaces as well as the various cement mixing ratios on the retentiveness. Copings were either pulled out slowly (by means of a universal testing machine) or knocked out quickly (using a CORONAflex crown replacement device).

RESULTS:

The highest level of retentiveness was achieved with a four-taper degree for polycarboxylates followed by zinc-oxide-phosphates and glass ionomers or composite cements. Provisional cements and composite cements containing a plastifier showed significantly lower retentiveness levels. The pull-out and knock-out tests showed a relationship between retentiveness level and taper degree. However, the influence of taper degree was reduced with higher taper degrees as well as with cements that do not set as a solid body due to ingredients such as oily liquids or plastifiers. Thermal cycling further reduced the retentiveness level of these cements. Higher degrees of roughness only improved the retention force of cements setting as a solid body. Mixing errors may alter retentiveness levels in an unpredictable manner. When used within the same group of cements, metal-alloy, and zirconia copings did not differ with regard to their level of retentiveness.

CONCLUSION:

Copings made of metal-alloy and zirconia showed no different level of retentiveness when set onto titanium abutments fixed with permanent or provisional cements.

CLINICAL RELEVANCE:

Only cements setting as a solid body showed a clear relationship between retentiveness level and taper degree. In contrast, the retentiveness of provisional (viscous, elastic-body-like) luting agents was less predictable.