Retentive Strength of Adhesive Resin Cement Systems.

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Introduction
The adhesive fixation of gold casts plays a decisive role in modern restorative dentistry. Due to the possibilities of minimal invasive dentistry, cutting tooth hard tissues only because of getting friction surfaces for crown- and fixed adhesively.
The main problem of fixing gold casts adhesively is a complete and stable binding of the luting cement to dentin as well as to the gold cast. A lot of research has been carried out over the last years to evaluate optimal adhesive systems as well as particular dark curing, low viscosity luting composite resins which allows a correct setting procedure.
The binding to two different stress bearing interfaces (dentin and gold) is still the main problem of luting gold casts.

Aim of the present study
was to evaluate the retentive strength of different resin-cement systems and a compomer cement for luting gold casts. Special interest was taken in the influence of the solvent of the adhesive (acetone versus ethanol) and single versus multi-step adhesives (Gluma Solid Bond versus Gluma Comfort Bond).

Materials and methods
90 freshly extracted human molars and premolars, stored in a 1% chloramin-hydrolysate-solution, were randomly distributed into 6 groups of 10 teeth each and embedded in a resin-enforced plaster in film capsules. The crowns were prepared with water cooling for cast gold crowns in a parallel preparation unit (Combilabor CL-TF, Heraeus, Hanau, Germany) at a taper angle of 5° (fig. 1). A 125 μm and a 30 mm torpedo-shaped diamond bur (ISO 8063/41/55/40/14, 8063/41/151/40/14) Komet, Lemgo, Germany) was used for preparation and finishing. The teeth were reduced to a height of 3 mm (ISO 8063/4155/40/1525, 8063/41/55/40/2025). Tooth enameled was completely removed. Impressions were taken with the polyether-material Impregum Penta (Espe, Seefeld, Germany). Cast gold crowns (DeguDent, Degussa, Hanau, Germany, mass% Au: 73.8, Ag:9.2, Pt: 9.0, Cu: 4.4, Zn: 2.0, In: 1.5, Ir: 0.1) were manufactured on Fujirock EP Dental Stone (GC Belgium) lab models. A ring at the crowns' top was modelled in wax and cast as part of the crown to allow removal with the testing device. After sand-blasting the crowns' interior surfaces (150μm), all crowns were checked for fitting accuracy and were fixed according to the manufacturers' recommendations (including acid-etching, where indicated). The retentive surface was determined individually for each tooth (Dahl & Öhls, Dent Mater 2: 17-20, 1986). The resin-cements and adhesives used are shown in table 1.

Results
The mean retentive strength values obtained are shown in figure 4. The mean retentive strength values were 445.0 (SD 118.5) N/cm² for 2bond2/Solid Bond, 408.5 (SD 136.3) N/cm² for 2bond2/Gluma Solid Bond, 476.3 (SD 56.5) N/cm² for 2bond2/Gluma Comfort Bond, 798.0 (SD 286.6) N/cm² for C&B Metabond, 306.4 (SD 91.1) N/cm² for Panavia EX, 272.6 (SD 89.7) N/cm² for Compolute/EBIS Multi, 294.8 (SD 164.8) N/cm² for Calibra/P&B NT, and 392.4 (SD 122.0) N/cm² for Dyramt Cem/P&B NT. Statistically significant differences are shown by their respective p-values in table 2.

Conclusion
C&B Metabond showed the highest mean retentive strength. Compolute Aplicap showed comparable mean retentive strength values when used with Prompt L-Pop II as well as with EBIS Multi, but with a significantly higher standard deviation (56 % versus 33 %). There was no statistically significant difference between the three different adhesives used with 2bond2. 2bond2/Gluma Comfort Bond showed the lowest standard deviation (12 %) of all materials investigated.

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