Bonding Effectiveness of Luting Composites to Different CAD/CAM Materials.

J Adhes Dent. 2016 May 23;

Authors: Peumans M, Valjakova EB, De Munck J, Mishevska CB, Van Meerbeek B

Abstract

PURPOSE: To evaluate the influence of different surface treatments of six novel CAD/CAM materials on the bonding effectiveness of two luting composites.

MATERIALS AND METHODS: Six different CAD/CAM materials were tested: four ceramics – Vita Mark II; IPS Empress CAD and IPS e.max CAD; Celtra Duo – one hybrid ceramic, Vita Enamic, and one composite CAD/CAM block, Lava Ultimate. A total of 60 blocks (10 per material) received various mechanical surface treatments: 1. 600-grit SiC paper; 2. sandblasting with 30-μm Al2O3; 3. tribochemical silica coating (CoJet). Subsequent chemical surface treatments involved either no further treatment (control), HF acid etching (HF), silanization (S, or HF acid etching followed by silanization (HF+S). Two specimens with the same surface treatment were bonded together using two dual-curing luting composites: Clearfil Esthetic Cement (self-etching) or Panavia SA Cement (self-adhesive). After 1 week of water storage, the microtensile bond strength of the sectioned microspecimens was measured and the failure mode was evaluated.

RESULTS: The bonding performance of the six CAD/CAM materials was significantly influenced by surface treatment (linear mixed models, p < 0.05). The luting cement had a significant influence on bond strength for Celtra Duo and Lava Ultimate (linear mixed models, p < 0.05). Mechanical surface treatment significantly influenced the bond strength for Celtra Duo (p = 0.0117), IPS e.max CAD (p = 0.0115), and Lava Ultimate (p < 0.0001). Different chemical surface treatments resulted in the highest bond strengths for the six CAD/CAM materials: Vita Mark II and IPS Empress CAD: S, HF+S; Celtra Duo: HF, HF+S; IPS e.max
CAD: HF+S; Vita Enamic: HF+S, S. For Lava Ultimate, the highest bond strengths were obtained with HF, S, HF+S. Failure analysis showed a relation between bond strength and failure type: more mixed failures were observed with higher bond strengths. Mainly adhesive failures were noticed if no further surface treatment was done. The percentage of adhesive failures was higher for CAD/CAM materials with higher flexural strength (Celtra Duo, IPS e.max CAD, and Lava Ultimate).

CONCLUSION: The bond strength of luting composites to novel CAD/CAM materials is influenced by surface treatment. For each luting composite, an adhesive cementation protocol can be specified in order to obtain the highest bond to the individual CAD/CAM materials.

(27222889)
.- as supplied by publisher]