Shear bond strength of two composite resin cements to multiphase composite resin after different surface treatments and two glass-ceramics

Maurits C. F. M. de Kuijper, MSc
University Medical Center Groningen, Center for Dentistry and Oral Hygiene, Department of Fixed and Removable Prosthodontics and Biomaterials, University of Groningen, Groningen, Netherlands

Marco M. M. Gresnigt, DMD, PhD
University Medical Center Groningen, Center for Dentistry and Oral Hygiene, Department of Fixed and Removable Prosthodontics and Biomaterials, University of Groningen, Groningen, Netherlands
Department of Special Dental Care, Martini Hospital, Groningen, Netherlands

Wouter Kerdijk, PhD
University Medical Center Groningen, Center for Dentistry and Oral Hygiene, Department of Public and Individual Oral Health, University of Groningen, Groningen, Netherlands

Marco S. Cune, DMD, PhD
University Medical Center Groningen, Center for Dentistry and Oral Hygiene, Department of Fixed and Removable Prosthodontics and Biomaterials, University of Groningen, Groningen, Netherlands
Department of Oral-Maxillofacial Surgery, Prosthodontics and Special Dental Care, St. Antonius Hospital Nieuwegein, Nieuwegein, Netherlands
Department of Oral-Maxillofacial Surgery, Prosthodontics and Special Dental Care, University Medical Center Utrecht, Utrecht, Netherlands

Correspondence: **Maurits de Kuijper, MSc**
Department of Fixed and Removable Prosthodontics and Biomaterials, Center for Dentistry and Oral Hygiene, University Medical Center Groningen, University of Groningen, Antonius Deusinglaan 1, 9713 AV, Groningen, Netherlands;
Tel: +31 50 361 6271, Fax: +31 50 363 2696; Email: m.c.f.m.de.kuijper@umcg.nl

Abstract

Aim: To compare the shear bond strength (SBS) after aging of two dual-curing composite resin cements to multiphase composite resin (experiment) and glass-ceramics (control).

Methods: Seventy computer-aided design/computer-aided manufacturing (CAD/CAM) blocks were prepared: 24 multiphase composite resin blocks (Lava Ultimate; experiment), and 12 control blocks (groups 5 and 6: 6 IPS e.max CAD, 6 IPS Empress CAD). Surface treatments of the experiment groups were: 1) Al_2O_3 airborne particle abrasion; 2) bur-roughening; 3) silica-coated aluminum oxide particle abrasion; and 4) hydrofluoric (HF) acid etching. Per study group, Variolink II (a) and RelyX Ultimate (b) were used as cements. Per treatment group, four cement cylinders were adhered to the conditioned blocks (n = 12). After thermocyclic aging (10.000x, 5°C to 55°C), notch-edge shear testing was applied. Modes of failure were examined. A *P* value of 0.05 was considered significant.

Results: Groups 1a (18.68 ± 3.81) and 3a (17.09 ± 3.40) performed equally to 6a (20.61 ± 4.10). Group 5a (14.39 ± 2.80) did not significantly differ from groups 1a, 3a, and 4a (15.21 ± 4.29). Group 2a (11.61 ± 3.39) showed the lowest bond strength. For the RelyX Ultimate specimens, mean bond strengths were: 1b (18.12 ± 2.84) > 4b (15.57 ± 2.31) > 2b (12.34 ± 1.72) = 3b (11.54 ± 2.45) = 6b (12.31 ± 1.87) > 5b (0.78 ± 0.89). Failure mode analysis showed a significant association between bond strength values and modes of failure (chi-square).

Conclusion: The SBS of the composite cements to the multiphase composite resin that was treated by Al_2O_3 or silica-coated aluminum oxide particle abrasion is comparable to the bond of the control groups.

(Int J Esthet Dent 2019;14:40–50)