

**In vitro study of fracture strength and marginal adaptation of polyethylene-fibre-reinforced-composite versus glass-fibre-reinforced-composite fixed partial dentures.**

**[Kolbeck C](#), [Rosentritt M](#), [Behr M](#), [Lang R](#), [Handel G](#).**

Department of Prosthetic Dentistry, University of Regensburg, Regensburg, Germany.  
carola.kolbeck@klinik.uni-regensburg.de

This in vitro study was carried out in order to estimate the clinical usability of adhesively luted three-unit posterior fixed partial dentures (FPD) made of a polyethylene-fibre-reinforced-composite system (PFRC) in comparison with a glass-fibre-reinforced-composite system (GFRC). Therefore the fracture strength and marginal adaptation were examined. A total of 16 FPDs of each material combination were manufactured and adhesively luted to human molars. Before and after an artificial ageing process by thermal cycling and mechanical loading (TCML) the quality of the marginal adaptation was examined by evaluating epoxy replicas in a scanning electron microscope (SEM). After TCML the fracture strength of eight FPDs of each series was tested by mechanical loading them to failure. With the remaining eight FPDs the quality of deeper layers of the luting was examined with a dye penetration technique. The calculated median fracture strength values (25/75% percentiles) were 830 N (643/982) for the PFRC and 884 N (684/1,113) for the GFRC. The SEM analysis showed at least 80% of perfect marginal areas for both material combinations in dentine as well as in enamel before and after TCML. Looking at the cement-tooth interfaces the dye penetration technique showed statistically significant better results for the enamel finishing lines than for those in dentine. With finishing lines in dentine the two material combinations showed statistically significant differences for this interface. Fracture force results as well as marginal quality encourage further clinical investigations on both systems although the GFRC performed slightly better than the PFRC.

PMID: 12153457 [PubMed - indexed for MEDLINE]