

Fracture resistance of fiber-reinforced composite restorations with different framework design.

[Behr M](#), [Rosentritt M](#), [Taubenhansl P](#), [Kolbeck C](#), [Handel G](#).

Department of Prosthodontics, University of Regensburg Dental School, Regensburg, Germany.
michael.behr@klinik.uni-regensburg.de

OBJECTIVES. Veneer fracture and bond deficiency between framework and veneer are typical failures of fiber-reinforced inlay fixed partial dentures (FPD). An eccentric load point on the pontic was used in this study to investigate the fracture resistance of FPDs with different framework designs. As null hypothesis, it was assumed that fracture resistance was not influenced by the fiber framework supporting the veneer. **METHODS.** Four groups of Vectris/Adoro FPDs (4 x n=10 each) were manufactured. Beams (25 mm length) of Vectris Pontic (parallel aligned) with (a) rectangular (3 x 3) sectional view and (b) circular sectional view (theta 3 mm) were directly veneered using Adoro. (c) Circular beams like "b" were modified, i.e. those on the upper side were coated with two layers of the cross-sectioned fiber mat Vectris frame. (d) Vectris Pontic fibers were "anatomically" placed in the pontic area and wrapped using Vectris Frame. The frameworks were constructed in a vacuum/pressure process. All FPDs were mounted in a restrained-end apparatus and thermally cycled and mechanically loaded (TCML: 6000 x 5 degrees C/55 degrees C; 1.2 x 10(6) x 50 N, 1.66 Hz). After TCML, the FPDs were loaded to fracture. **RESULTS.** All FPDs surpassed TCML, with no visible damage to the veneer or framework. Without transversal enlargement of the framework, additional cross-sectioned fiber mats alone did not improve resistance to fracture (a: 573+/-158 N (mean, standard deviation given); b: 737+/-66 N; c: 694+/-93 N; d: 902+/-149 N). Fracture lines occurred only in the veneer; the fiber frameworks were never affected. **CONCLUSIONS.** Anatomical enlargement of the fiber framework at the pontic area (height, width) to support the veneer material improves the fracture resistance of fiber-reinforced FPDs.

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