

Fatigue resistance of non-axially loaded fiber post supported crowns

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Objectives: To evaluate the fatigue resistance of different fiber post systems supporting metal crowns non-axially loaded. Little is known about the use of fiber posts under crowns having attachments for a removable partial denture (RPD). In these cases the stress is higher than in single crowns teeth: a post with a large emerging diameter, high strength and relatively high stiffness could compensate for this high-stressing condition.

Methods: 50 single-rooted human teeth were selected. After crown removal, they were endodontically treated and restored with different fiber post systems using PanaviaF and Photocore composite:

- 1) Prosthetic Over Post (Overfibers) #3;
- 2) Carbon fiber core-integrated prototypes;
- 3) DT Lightpost Illusion #2 (RTD);
- 4) Relyx Fiberpost #3 (3M ESPE);
- 5) FRC Postec Plus #3 (Ivoclar)

The build-up was standardized in shape using transparent vacuum-formed copings, and cast metal crowns were made with a dentin ferrule height of 2mm and luted with PanaviaF. The load was applied with a 45° angle on an extension of the crown having an off-set of 5mm from the core centerline. This arrangement generated both flexural and torsional stresses, simulating those created by a RPD extra-coronal prosthetic attachment. 1.2 millions, 100N fatigue cycles followed by 2 millions, 150N cycles were applied at 8Hz frequency under water irrigation. Data were statistically analyzed using Kaplan-Meier curves ($\alpha=0.05$).

Results: No failures were recorded after 1.2 millions cycles at 100N, whereas after 2 millions cycles at 150N records were: Group 1 and 3: one failure each; Group 2: two failures; group 4 and 5: five failures each. Failures in groups 1 and 3 involved root dentin, not the post. Groups 4 and 5 were significantly less resistant.

Conclusions: Post's stiffness and strength could affect the fatigue resistance of complete crown restoration simulating RPD abutment teeth: excessively low E-modulus seems to reduce fatigue resistance. At least 2mm ferrule height is recommended.

Failures after 2 millions cycles at 150N

