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Flexural strength of Fiber-reinforced FPD restorations

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Objective: Fracture of conservative resin fixed partial dentures restoration of concern. A number of different techniques for reinforcement of such restorations have been suggested. Determine the flexural strength of different designs of restoration resins reinforced with commercially available fibers.

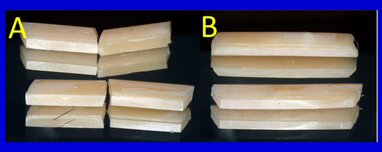
Methods: A total of 40 specimens were prepared for three differently designs for the flexural strength test. Composite without fibers was used as a control. The specimens (4x4x30 mm) were divided into 4 groups with addition of one full length of ribbond triacial. 1.5 of length and double and double full lengths of and no addition group. The specimens were tested using universal testing machine (Model 5500- Instron Engineering Corp. Canton MA) in compression mode with customized jig at cross head-speed of 5 mm/min (figure 1). The mean flexural strength (N) were compared by One-Way analysis of variance. Followed by Tudey standardized range test (alpha=.05).

Table:
Three-point bending test

	Mean Fracture Strength	Standard Deviation
Composite only (control)	164.4	13.7
1 full length	202.1	12.3
1.5 length w/0.5 length at center	203.8	11
2 full length	236.2	6.8

Three-point bending test set up

Conservative Inlay Fiber-reinforced FPD



A. Clean total fracture of the composite control group.
B. All reinforced groups show crack type of fracture With incomplete separation

Results: Mean flexural strength (n=40) ranged form 135.4 tp 250.2 Mpa for three point bending. All ribbond triacial reinforcements showed a significant increase (P<.0001) in mean flexural strength over unreinforced controls (table 1) Double full length was significantly stronger than all the other groups evaluated (P<.01). However, there was no significant difference between 1 and 1.5 length reinforcements in the degree of reinforcement. All control composite group showed clean total fractures (figure3A) while all three reinforced typed showed incomplete cracks (Figure 3B).

Conclusions: The addition of fibers in single or double length to resin FPDs increased flexural strength. Double full lengths was significantly stronger but may be limited by available clinical clearance. In light of this simulated clinical study, it would suggest that fiber-reinforced FPD restorations are viable medium-term management alternatives for patients.