

Sandblasting Effect on Flexural Properties of Fiber Posts

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INTRODUCTION Sandblasting of dental restorations with alumina particles is used to increase the roughness of the surface and the surface area. It has been shown that sandblasting of fiber posts increases their bond strength to composite restorations[1-2] but may initiate cracks in the posts. The purpose of this study was to evaluate the effect of sandblasting on the flexural properties of different fiber posts.

METHODS 4 prefabricated posts (table 1) 2 carbon fiber posts (Composipost, RTD, France; Carbopost, Carbotech, France) and 2 quartz and glass fiber posts (Aestheti-plus, RTD, France; FRC Postec Ivoclar-Vivadent, Liechtenstein) were used.

Table 1. Composition of fiber posts

	Fiber (% vol)	Matrix (% vol)
Composipost	Carbon (64)	Epoxy (36)
Carbopost	Carbon (60)	Epoxy (40)
Aestheti-Plus	Quartz (60)	Epoxy (40)
FRC Postec	Glass (53)	UDMA (47)

Sandblasting was performed perpendicular to the surface from a distance of 20 mm, at 4 bar for 10 sec with an extra-oral sandblasting device using alumina particles of 50 µm (Dento Prep, Ronvig, Denmark). Each experimental group was made of 10 posts. A three-point bending test was used at a cross-head speed of 1 mm/min to measure the fracture load of post specimens. The flexural strength (1) and the flexural modulus (2) were calculated from the formula [3] :

$$\sigma_f = 8F_{max}l/\pi d^3 \quad (1) ; \quad E_f = S4l^3/3\pi d^4 \quad (2)$$

Where F_{max} is the applied load (N) at the highest point of load-deflection curve, l is the span (mm), d is the diameter of the post (mm), $S=F/D$ and D is the deflection corresponding to load F at a straight-line portion of the trace (N/mm). One-way analysis of variance (Anova) followed by a multiple paired comparisons Student's t test were used to identify differences between pairs of groups.

RESULTS The flexural strength and the flexural modulus of test posts are presented in tables 2 and 3.

Table 2. Flexural strength of fiber posts

Flexural Strength (MPa)	Control (Mean±SD)	Sand-blasting (Mean±SD)	Statistical analysis
Composipost	1711±121	1735±56	NS
Carbopost	1292±82	1242±76	NS
Aestheti-Plus	1925±87	1934±62	NS
FRC Postec	1295±40	1262±34	NS

Table 3. Flexural modulus of fiber posts

Flexural Modulus (GPa)	Control (Mean±SD)	Sand-blasting (Mean±SD)	Statistical analysis
Composipost	142.1±3	141.3±2	NS
Carbopost	76±5	72.8±5	NS
Aestheti-Plus	54.7±1	53.4±1	NS
FRC Postec	45.7±1	43.6±2.1	NS

Sandblasting had no statistically significant effect on the flexural strength or flexural modulus of fiber posts ($p>0.05$)

DISCUSSION & CONCLUSIONS Sandblasting physically eliminates surface impurities and creates roughness by impinging on post material. The results suggest that it does not produce any further degradation of other properties. A recent study has shown the same results [4]. Sandblasting can be used safely and may be considered a clinically acceptable adjunctive approach to bonding fiber posts.

REFERENCES ¹ A. Sahafi, A. Peutzfeldt, E. Asmussen, K Gotfredsen (2004) *J Adhes Dent* **5**(2):153-62. ² A. Sahafi, A. Peutzfeldt, E. Asmussen, K Gotfredsen (2004) *Oper Dent* **29**(1): 60-8. ³ L. Lassila, J Tanner, A.M Le Bell, K. Nerva, P. Vallittu (2004) *Dent Mater* **20** (1):29-36. ⁴ C. Gardner, C.S. Petrie, M.P. Walker, R. Haj-Ali (2005) IADR/AADR/CADR 83 rd General session. Abstract material support.