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Influence of different cementation modalities on retention of fibre posts

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Introduction

The use of prefabricated posts in endodontically treated teeth has become widely accepted. Posts are placed in one or more prepared root canals and cemented to radicular dentin. The retention of these endodontic posts is believed to be a major factor in restoration survival. It depends on the shape of the dowel, the length of the post, the surface characters (1, 2) and the properties of the cement (3). Many studies in the international literature focus on the retention of metal and ceramic posts used with different cements (4). But only low information is available about retention of the recently introduced fibre posts.

Objectives

The aim of this in vitro study was to compare the retentive strength of fibre posts (Mirafit Carbon, Hager & Werken, Germany) cemented with two different cements (Ketac Cem, Espe, Germany; Panavia F, Kuraray, Japan) in combination with different pre-treatments.

Fig. 1: The Mirafit Carbon post system.

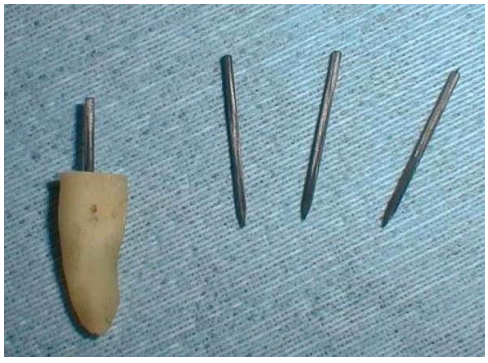

Fig. 2: Specimen after cementation of the Mirafit Carbon post (no. 2).

Material und Methods

Forty caries free human maxillary incisors were selected for standardized size and quality, endodontically treated and coronally reduced to the cemento-enamel junction. During the experimental period the teeth were stored in saline. All specimens were randomly assigned to four experimental groups of ten samples each. In group A the fibre posts were sand-blasted and cemented with Panavia F. In group B the posts were cemented without sand-blasting. Group C received sand-blasted fibre-posts cemented with Ketac-Cem. In group D the posts were cemented without sand-blasting. Post holes were prepared according to manufacturers' instructions. The fibre posts (Mirafit Carbon, size no. 2, length 10.0 mm, Fig. 1, 2) were then cemented with one of the two cements as recommended. Retentive strength was measured 24 hours after cementation using a universal testing machine (Fig. 3-7). For each group mean value and standard deviation were calculated. Statistical analysis was performed using ANOVA and Tukey's test.

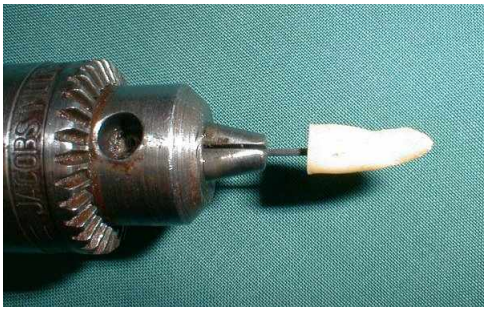

Fig. 3: Special designed apparatus to hold the posts and test retentive strength.

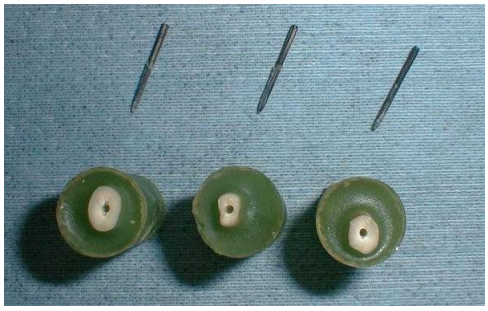

Fig. 4: Different specimen after testing the retentive strength.

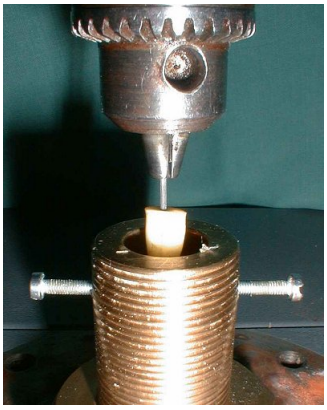

Fig. 5: Special designed apparatus mounted in the universal testing machine.

Fig. 6: Fixed tooth in acrylic resin, mounted in the universal testing machine.

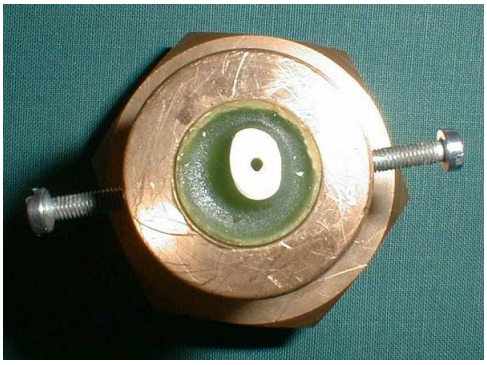

Fig. 7: Occlusal view of the testing device, after measurement.

Results

In all specimens a measurable retentive strength could be observed. The following mean retentive strength in Newtons for the different groups were evaluated and calculated: The highest values were recorded in group A (448.4 N ± 105.9 N) where Panavia F was used in combination with sand-blasting the post. In group B 395.7 N (± 99.9 N) could be observed. In the case of Ketac Cem 210.9 N (± 66.5 N) (group C) could be measured for the sand-blasted posts. In group D the mean retentive strength was the lowest from all groups (176.8 N ± 67.2 N)(Tab. 1, Fig. 8). Statistical analysis showed a significant influence of the used cementation system on strength within the four groups ($p < 0.001$, ANOVA). Retentive strength in group A and B (Panavia F) was significantly increased compared to group C and D (Ketac-Cem) ($p < 0.05$, Tukey's test). The influence of sand-blasting was for both cements not significant.

	Group A	**Group B**	**Group C**	**Group D**
Mean value (in N)	448.4	395.7	210.9	176.8
Standard deviation	(± 105.9)	(± 99.9)	(± 66.5)	(± 67.2)

Tab. 1: Mean value and standard deviation within the different groups.

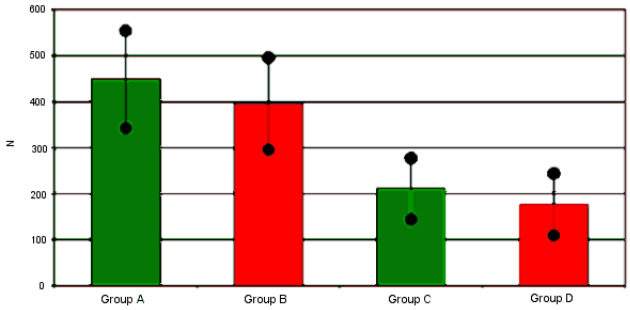

Fig. 8: Mean value and standard deviation within the different groups.

Discussion and Conclusions

The reconstruction of endodontically treated single rooted teeth with fibre posts showed acceptable retentive values for all cementation modalities used in this study. The values observed for the composite cement Panavia F were significantly higher compared to the conventional cement Ketac-Cem.

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This poster was submitted by Dr. Christian Gernhardt.

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