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FIBER POST PULL OUT TESTS USING DIFFERENT CEMENTATION AND BONDING METHODS

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INTRODUCTION:

The restorative treatment of compromised teeth due to caries, trauma or defective large restorations could have poor retention attributed to insufficient crown height and remaining sound tooth structure. Fiber posts are used to restore compromised endodontic teeth to aid in the retention of final restorations, therefore their retention within the root canal is dependent on the cement and adhesive system used to retain the post. Multiple studies have been carried out to understand the effect of cement type on the pull-out bond strength of fiber posts. Self adhesive cementation systems have shown successful retentions[1,2] but combining them with an adhesive application on the dentin surface showed increased strength.[3]

OBJECTIVES:

The aim of this study is to evaluate the shear forces when pulling a cemented fiber post from a root canal of a human tooth using self-curing cement systems with either a chemically-curing (cc) or light-curing (lc) mode bonding system or no extra adhesive system at all.

MATERIALS AND METHODS:

A total of 60 maxillary and mandibulary canines were used in this study. The crowns were cut of perpendicularly to the long axis and at the most coronal portion of the proximal DEJ. The canines were individually embedded in acrylic resin exposing the coronal flat surface of the cut root using a mold. The dimension of the round specimens was 2.5cm in diameter and 2cm in height.
Each specimen underwent the same post space treatment using a miniature drill press with digital depth finder. The UniCore (Ultradent) post drills were pressed slowly into the canal space to create a 5mm space in length. For each specimen three bur sizes were used consecutively: white (Ø0.6mm), yellow (Ø 0.8) and red (Ø 1mm). The size 2/red fiber post (UniCore, Ultradent) was cemented with different cementation and bonding protocols.

Method A: Scotchbond Universal (lc) with RelyX Ultimate cement (cc) [3M ESPE];
Method B: RelyX Unicem (cc)[3M ESPE];
Method C: Clearfil SE Bond (cc) with Clearfil DC Core Plus (cc)[Kuraray Noritake Dental];
Method D: Optibond Universal (lc) with Maxcem Elite Chroma (cc)[Kerr];
Method E: Panavia V5 with primer (cc)[Kuraray Noritake Dental];
Method F: Peak SE+Peak Universal with PermaFlow DC (cc)[Ultradent];
Method G:Scotchbond Universal (lc)[3M ESPE] with MultiCore Flow (cc)[Ivoclar];

Method H: Prelude (cc)[Zest Dental Solutions]with Multicore Flow (cc)[Ivoclar];
Method I: Clearfil Universal Bond (lc) with Clearfil DC Core Plus (cc)[Kuraray Noritake Dental];
Method J: Prelude (cc)[Zest Dental Solutions] with Anchor (cc)[Apex Dental Materials].

After cementation the samples were stored at 37°C and 100% humidity for 24h prior to testing with an Instron 110 Universal Testing unit at 1mm/min using a fixture that holds on to the post and pulls the post along the long axis of the tooth while securing the specimen in place. The post is pulled until failure and the force is determined in kg force. A paired t-test is performed among the specimen.

Method A : Scotchbond Universal (lc) with RelyX Ultimate Cement

MethodB: RelyX Unicem (cc)[3M ESPE];

Method C :Clearfil SE Bond (cc) with Clearfil DC Core Plus (cc)[Kuraray Noritake Dental]

Method D : Optibond Universal (lc) with Maxcem Elite Chroma (cc)[Kerr]

Method E: Panavia V5 with primer (cc)[Kuraray Noritake Dental]

Method F: Peak SE+Peak Universal with Perrma Flow DC with PermaFlow DC (cc)[Ultradent]; Scotchbond Universal (lc)[3M

Method G Scotchbond Universal (lc)[3M ESPE] with MultiCore Flow (cc)[Ivoclar]

Method H: Prelude (cc)[Zest Dental Solutions]with with Multicore Flow (cc)[Ivoclar]

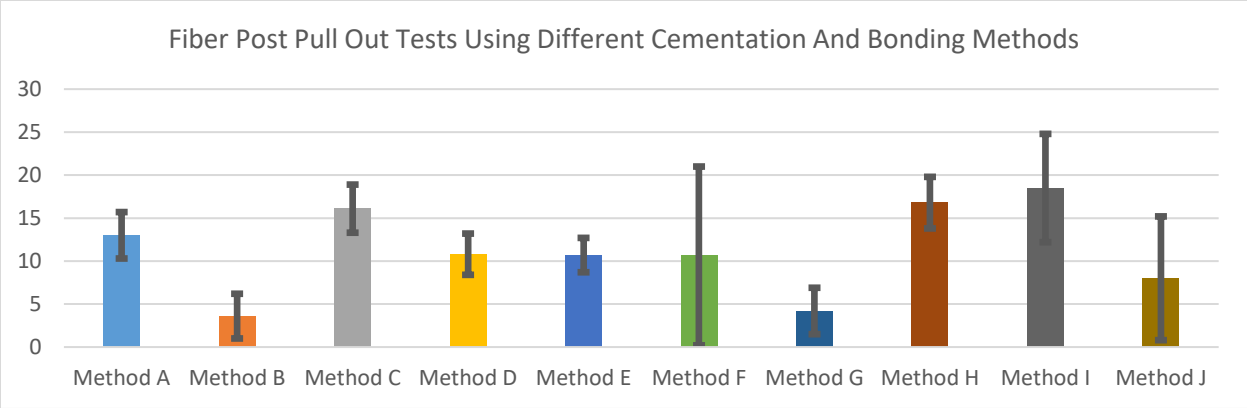
Method I: Clearfil Universal Bond (lc) with Clearfil DC Core Plus (cc)[Kuraray Noritake Dental

Method J: Prelude (cc)[Zest Dental Solutions] with Anchor (cc)[Apex Dental Materials

RESULTS:

Method I Clearfil Universal Bond (lc) with Clearfil DC Core Plus (cc) [Kuraray Noritake Dental] showed highest average shear forces as well as highest individual pull out forces. The mean value was statistically significant different ($p<0.05$) than group B,D,E,G and J.
It was followed by groups H,C and A. Methods I and A were cemented in conjunction with a light curing adhesive system. The results are shown in the graph and the significant differences are shown in the table.

Groups	Method A	Method B	Method C	Method D	Method E	Method F	Method G	Method H	Method I	Method J
Mean (stdev)	13 (±2.7)	3.6 (±2.6)	16.1 (±2.8)	10.8 (±2.4)	10.7 (±2.0)	10.6 (±10.4)	4.2 (±2.7)	16.8 (±3.0)	18.5 (±6.3)	8.0 (±7.2)
Significant difference	B,G,H	A,C,D,E,H, I	B,D,G,J	B,D,G,H,I	B,G,H,I		A,C,D,E, H,I	A,B,D,E,G,J	B,D,E,G,J	C,H,



CONCLUSION:

High bond strength was achieved with light curing adhesives in the root canal (method I) as well as with chemically curing adhesives (method H). The cement without bonding or priming procedure showed the lowest bond strength (method B).
This study showed how the use of light cure and self-curing adhesives increased the retention of the cemented fiber posts compared to using only cements without bonding to retain the fiber posts in the treated canals.

REFERENCES:

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