Influence of universal adhesives used for fiber post luting to push-out bond strength.

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Abstract

In Operative Dentistry, technical simplification is a current trend and there are few studies about universal adhesives used for fiber post luting. Therefore, this study aimed to compare different simplified fiber post luting approaches by push-out bond strength test. The results showed that the universal adhesives is not recommended to retain fiber post.

Key words:

Dental cements, cementation, dentin.

Introduction

The universal adhesives were developed to simplify bonding techniques, because these single bottle compound can be used with or without dentin etching.¹ However, little is known about its use for root dentin hybridization. Therefore, the aim of this study was to evaluate the effectiveness of universal adhesives used to fiber post luting. Forty standardized bovine roots were randomly divided into four groups (n=10), according to luting technique: G1: Scotchbond Multi-purpose + RelyX ARC; G2: RelyX U200; G3: Single Bond Universal + RelyX Ultimate; G4: All-in-One + NX3. After luting procedure, the roots were sectioned into 1mm thick discs (3 discs for each root part – cervical, medium and apical). The discs were submitted to push-out bond strength, under 50Kg load and 0,5mm/min speed at the post center, until the failure. Then, the discs were evaluated by optical estereomicroscopy under 40x magnification to failure pattern classification. The data were analysed by split-plot one-way ANOVA test and *post hoc* Tukey test to verify groups differences.

Results and Discussion

Chart 1. Mean and standard deviation of the push-out values (MPa) as a function to the luting technique and the root area.

Luting Technique	Root canal area		
	Cervical	Medium	Apical
G1	12,56 Aa (±4,67)	11,89 Aa (±3,17)	7,46 Ab (±2,49)
G2	13,90 Aa (±3,22)	13,67 Aa (±3,21)	8,63 Ab (±4,34)
G3	9,53 Ba (±5,98)	7,32 Ba (±2,77)	4,97 Bb (±4,12)
G4	12,45 Aa (±2,78)	9,32 Bb (±3,65)	5,56 Bc (±4,38)

* Uppercase letters indicate statistical differences between columns and lowercase letters indicate statistical differences between rows ($p < 0.05$), according to Tukey's HSD test.

The split-plot one-way ANOVA statistic test showed that the different adhesive approaches ($p < 0.05$) affect the push-out bond strength values. Furthermore, the greater

the depth into root canal, the worse is the fiber post retention. The groups that used universal adhesives showed lowest bond strength (Chart 1), probably due to their acidic nature that requires compatible resin cements. The new generation of resin cements are compatible to acidic adhesives, however, the adhesive curing prior to resin cement application increases their microshearbond strength.² This step is impaired during the fiber post luting, mainly because of difficult access to the root canal and poor light access during the resin cement polymerization.³ Note that in the controls groups (G1 and G2) the predominant failure was adhesive between cement and post and in the experimental groups (G3 and G4) was adhesive between dentin and resin cement, denoting poor bond strength in the dentin-adhesive-cement area.

Figure 1. Failure pattern distribution.

* 1) Adhesive failure between dentin and resin cement; 2) Adhesive failure between resin cement and fiber post; 3) Resin cement cohesive failure; 4) Fiber post cohesive failure and; 5) mixed failure.

Conclusions

The studied alternatives techniques is not recommended to fiber post luting. However, irrespective the luting technique, the bond quality in deeper root canal regions is still a challenge to be overcome.

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