



ISSN Print: 2394-7489
ISSN Online: 2394-7497
IJADS 2021; 7(3): 482-484
© 2021 IJADS
www.oraljournal.com
Received: 08-05-2021
Accepted: 30-06-2021

Tangutoori Trinath
Senior Resident, Department of
Conservative Dentistry & Amp,
Endodontics, Government
Dental College & AMP; Hospital,
Hyderabad, Telangana, India

Priyanka Yeligati
Post Graduate Student,
Department of Conservative
Dentistry Endodontics,
Government Dental College &
Amp Hospital, Hyderabad,
Telangana, India

Shanmukhi Sesha
Private Practitioner,
Department of Conservative
Dentistry Endodontics,
Government Dental College &
Amp, Hospital, Hyderabad,
Telangana, India

Mounika Veeriyani
Post Graduate Student,
Department of Conservative
Dentistry, Endodontics,
Government Dental college &
Amp; Hospital, Hyderabad,
Telangana, India

Joice Jhonny
Post Graduate Student,
Department of Conservative
Dentistry, Endodontics,
Government Dental college &
AMP; Hospital, Hyderabad,
Telangana, India

Yesh Sharma
Senior Lecturer, Department of
Conservative Dentistry
Endodontics, Pacific
Dental College, Udaipur,
Rajasthan, India

Corresponding Author:
Tangutoori Trinath
Senior Resident, Department of
Conservative Dentistry & Amp,
Endodontics, Government
Dental College & AMP; Hospital,
Hyderabad, Telangana, India

Comparison of two different dentin pretreatment protocols on bond strength of glass fiber post using self-etch adhesive

Tangutoori Trinath, Priyanka Yeligati, Shanmukhi Sesha, Mounika Veeriyani, Joice Jhonny and Yesh Sharma

DOI: <https://doi.org/10.22271/oral.2021.v7.i3g.1341>

Abstract

Aim and objectives

Aim: Is to evaluate the two different natural crosslinking agents citric acid and grape seed extract.

Objective: To know the difference between the two agents on bond strength of fiber post on to root dentin using self-etch adhesive.

Materials and Methods

1. 30 Single rooted maxillary anterior teeth with similar root segments and fully developed apices were selected.
2. Root canal treatment is performed and post space preparation is done using #2 peeso reamers and irrigated with 2.5% NaOCl and 17% of EDTA and dried with paper points and then divided in to 3 groups according to pretreatment used.

Group 1: No pretreatment, only conventional self-etching & bonding. (Control Group).

Group 2: Pretreatment with 10% citric acid for 5 Minutes.

Group 3: Pretreatment with 6.25% Grape seed extract for 5 Minutes.

3. The post space treated with self-etch adhesive and fiber post is bonded using flowable composite
4. Bond strength evaluation is done by transversely sectioning the roots of each group of 1.0 MM, thickness and 3 sections were obtained and embedded in acrylic resin block.

Micro push-out bond strength was measured using universal testing machine and SEM analysis is done to classify the fracture pattern.

Keywords: Push out bond strength, grape seed extract, citric acid

Introduction

Endodontically treated teeth are more prone to fracture than vital teeth because of loss of tooth structure and structural integrity as a consequence of decay, change in dentin and access preparation. The use of intraradicular post is often essential for rebuilding these teeth. Cementation of fiber post over metal post is advantageous due their flexural strength and elasticity modulus that are similar to those of dentin.

The recent trend has been towards self-etch primers because of easily manageable clinical procedure related to them. Self-etch adhesives modify the smear layer that contributes to form complex hybrid layer. Most of the tooth fractures with restored fiber post are associated with root/cement/resin de-bonding. Resin dentin adhesion is a complex procedure and lack of bond strength and stability is observed.

Loss of integrity of resin dentin bonds over time because of combined hydrolytic deterioration of resinous compounds and host derived degradation of collagen fibrils because of proteolytic system involving the active metalloproteinase found in coronal and radicular dentin [13].

CHX has a beneficial effect on preservation of resin dentin bonds by inhibiting MMPS but the disadvantage is that CHX will leach out the hybrid layer within 18 months and 24 months [2]. Another option is to use natural cross linkers such as grape seed extract and an antioxidant citric acid which stimulate interfibrillar, intrafibrillar and microfibrillar crosslinks in the collagen matrix and inhibits MMP's and CT's to reduce dentin resin matrix degradation [3].

The present invitro study was carried out to compare two different pretreatment protocol i.e citric acid and grape seed extract on bond strength of fiber post to root dentin using self etch adhesive.

Materials and Methodology

Thirty extracted Maxillary Central Incisors with no root fractures or cracks and external debris was removed using ultrasonic scaler was selected.

After the selection of the teeth access opening was done with No 2 Round bur using High speed airtar. The roots were instrumented at working length 1mm short of apex using protaper Gold rotary instruments. Finally canals were rinsed with distilled water and dried with paper points and obturated with Gutta percha cones using seal apex. Root canal filling material was removed using #2 peeso reamer and 5mm of filling material was left in the root canal. Post space was irrigated using 5.25% NaOCl and 17% EDTA after that canals were dried with paper points.

30 teeth were divided into 3 groups 10 in each group. Control group: No Pretreatment

Group 1: Root canal was pre treated with 5% Grape seed extract for 5 minutes.

Group 2: Root canal was pretreated using 10% citric acid solution for 5 minutes

Then Self etch adhesive (Ivoclar tetric N cream) is applied to root canal and cured for 15 seconds Fiberpost (Hi-Rem) was bonded using Dual cure resin (Kerr Max cem Elite) and cured for 40 seconds. Specimens were embedded in a resin mold and the teeth were cross sectioned in to apical, middle and coronal third using low speed diamond saw using copious irrigation of 1mm thickness.



Fig 1: Cross section of the specimens embedded in resin mold in coronal, middle and apical third

Measurement of Bond Strength

Push out bond strength values was measured using Universal testing Machine (Dak Series 7200) at cross head speed of 1mm/min. The peak force was applied at point of extrusion of post segment and that point of extrusion was taken as bond failure and recorded in MPa.

After measuring the push out bond strength, the slices were observed Under Stereomicroscope (Lawrence and Mayo) to classify failure patterns.



Fig 2: Specimens observed under stereomicroscope

Results

One-way ANOVA revealed that post space pretreatment was a significant factor affecting the push-out strength ($P = 0.019$), and the interaction between the post-space pretreatment and the canal region was significant ($P = 0.024$)

Table 1: Push out Bond Strength values for interaction between post space treatment in root canal region in MPa

pretreatment	Coronal	Apical
Control Group	1.20 ± 0.70 MPa	0.69 ± 0.19 MPa
Group 1	1.62 ± 0.84 MPa	1.77 ± 0.70 MPa
Group 2	1.66 ± 0.74 MPa	1.74 ± 0.84 MPa

The experimental groups showed significantly higher apical push-out strength values than the control group ($P < 0.05$). When all the data were pooled, the highest push-out strength was recorded in the Group 1 and Group 2, which was significantly higher than that in the control group (1.20 ± 0.70 Mpa ($P < 0.05$)). But there was no significant difference in between two experimental groups (Group1 1.62 ± 0.84 MPa; Group 2, 1.66 ± 0.74 ; $P > 0.05$).

The chi-square test presented no significant differences in the failure mode within the groups tested ($P > 0.05$). Stereomicroscopic examination revealed that the most frequent mode of failure was at the cement-dentine interface, followed by the post-cement interface in both the regions.

Discussion

In this study, the effect of pretreatment of radicular dentin with 5% Grape seed extract and 10% Citric acid on bond strength of self Etch adhesive to fiber post are evaluated. Application of mild acid of self etch adhesive will activate MMP's and CT's resulting in proteolytic degradation of exposed collagen fibrils with in the Hybrid layer and resin dentin failure overtime [5].

GSE and Citric acid have capability to inhibit MMP's and CT's. Therefore high stability of GSE and Citric acid can be explained by inhibition of proteolytic activity of such enzymes. However the specific mechanisms of inhibition of proteolytic enzymes by PAC is unknown. This agent may interact non covalently to collagen fibrils and may increase the mechanical properties of dentin, thus enhancing the quality of the hybrid layer [6].

PAC extract increases the biomechanical properties and bio stability of demineralized dentin matrix and improves the resin dentin bond strength [7]. Anti oxidant agent will strengthen the hybrid layer and reaction with products of degradation leading to late polymerization process and consequently improve the resin dentin bond strength over time [4].

Conclusion

In this study, pretreatment with GSE and citric acid preserves

the bond strength of fiber posts to root dentin. Our results indicate that GSE and Citric acid can be used as a biocompatible pretreatment alternative to improve bond strength stability of dentin-adhesive interfaces in root canals.

References

1. Hashimoto M, Ohno H, Kaga M, *et al.* Over-etching effects on micro-tensile bond strength and failure patterns for two dentin bonding systems. *J Dent* 2002;30:99-105.
2. Ricci HA, Sanabe ME, de Souza Costa CA, *et al.* Chlorhexidine increases the longevity of in vivo resin-dentin bonds. *Eur J Oral* 2010;118:411
3. Al-Ammar A, Drummond JL, Bedran-Russo AK. The use of collagen cross-linking agents to enhance dentin bond strength. *J Biomed Mater Res B Appl Biomater* 2009;91:419-24.
4. Gotti VB, Feitosa VP, Sauro S, Correr-Sobrinho L, Leal FB, Stansbury JW, *et al.* Effect of antioxidants on the dentin interface bond stability of adhesive exposed to hydrolytic degradation. *JAdhes Dent* 2015;17:35-44.
5. Carrilho MR, Tay FR, Donnelly AM, *et al.* Host-derived loss of dentin matrix stiffness associated with solubilization of collagen. *J Biomed Mater Res B Appl Biomater* 2009;90:373-80.
6. Vidal CM, Leme AA, Aguiar TR *et al.* Mimicking the hierarchical functions of dentin collagen cross-links with plant derived phenols and phenolic acids. *Langmuir* 2014;16:14887-93.
7. Khamverdi Z, Rezaei-Soufi L, Rostamzadeh T. The effect of epigallocatechin gallate on the dentin bond durability of two self-etch adhesives. *J Dent (Shiraz)*. 2015;16:68-74.
8. André Luis Faria-e-Silva *et al.* Intra-radicular dentin treatment and retention of fiber posts with self adhesive resin cements. *Braz Oral Res.*, (São Paulo) 2013;27(1):14-9.
9. Douglas Cecchin *et al.* Bond Strength between Fiber Posts and Root Dentin Treated with Natural Cross-linkers. *J Endod* 2015.
10. XIA Yong, CHENG Xiangrong. Effect of Different Pretreatments to Post-space on Bonding Strength of Fiber Posts Luted with a Self-adhesive Resin Cement.
11. Nimet Gençoglu The Effect of Surface Treatments on the Bond Strength of Fiber Post to Root Canal Dentin. *Marmara Dental Journal* 2013;1:35-38.
12. Frederico C Martinho, DDS *et al.* Comparison of Different Dentin Pretreatment Protocols on the Bond Strength of Glass Fiber Post Using Self-etching Adhesive. *J Endod* 2014.
13. Jorge Perdigão, Dentin Adhesion and MMPs: A Comprehensive Review *JERD* 2013.
14. Resende LM, Rached-Junior FJ, Versiani MA, *et al.* A Comparative Study of Physicochemical Properties of AH Plus, Epiphany, and Epiphany SE Root Canal Sealers [J]. *Int. Endod. J.* 2009;42:785-793.
15. Toman M, Toksavul S, Sankant M, *et al.* The Evaluation of Displacement Resistance of Glass FRC Posts to Root Dentine Using a Thin Slice Push-out Test [J]. *Int. Endod. J* 2009;42:802-10.
16. Baldissara P, Zicari F, Valandro LF *et al.* Effect of Root Canal Treatments on Quartz Fiber Posts Bonding to Root Dentin [J]. *J. Endod.* 2006;32:985-988.
17. Goracci C, Tavares AU, Fabianelli A, *et al.* The Adhesion between Fiber Posts and Root Canal Walls: Comparison between Microtensile and Push-out Bond Strength Measurement [J]. *Eur. J Oral Sci* 2004;112:353-361.
18. Kreimeier K, Fasen L, Klaeber B. Influence of Endodontic Post Type (Glass Fiber, Quartz Fiber or Gold) and Luting Material on Push-out Bond Strength to Dentin *in vitro* [J]. *Dent. Mater* 2008;24:660-666.
19. Cecchin D, Farina AP, Souza MA. Effect of Root Canal Sealers on Bond Strength of Fibreglass Posts Cemented with Self-adhesive Resin Cements [J] *Int. Endod. J* 2011;44:314-320.
20. Zicari F, Couthino E, DE Munck J. Bonding Effectiveness and Sealing Ability of Fiber-post Bonding [J] *Dent. Mater.* 2008;24:967-977.
21. Gerth HU, Dammaschke T, Züchner H *et al.* Chemical Analysis and Bonding Reaction of RelyX Unicem and Bifix Composites-a Comparative Study [J] *Dent. Mater* 2006;22:934-941.
22. Zehnder M. Root Canal Irrigants [J]. *J Endod* 2006;32:389-398.