Dry-bonding Etch-and-Rinse Strategy Improves Bond Longevity of a Universal Adhesive to Sound and Artificially-induced Caries-affected Primary Dentin.

Abstract

PURPOSE: To evaluate the effect of the etching strategy on the immediate and 1-year microtensile bond strength (μTBS) and structural reliability of a universal adhesive to sound and artificially-induced caries-affected dentin of primary teeth.

MATERIALS AND METHODS: Flat midcoronal dentin surfaces were exposed in 50 primary molars, which were then randomly assigned to 10 groups according to substrate (sound dentin [SD] and artificially-induced caries-affected dentin [CAD] with pH cycling for 14 days) and etching approach using Scotchbond Universal Adhesive (self-etching or dry or wet-bonding etch-and-rinse strategies) with Adper Single Bond Plus (two-step etch-and-rinse adhesive) and Clearfil SE Bond (two-step self-etching system) as controls. Composite buildups were constructed and sectioned to obtain bonded sticks (0.8 mm2) to be subjected to microtensile testing immediately or after 1 year of water aging. Data were analyzed using three-way repeated measures ANOVA and Tukey’s test (α = 0.05). Weibull modulus and characteristic strength were also determined.

RESULTS: A decrease in bond strength was observed after 1 year of water aging, except when the universal adhesive was used in the dry-bonding etch-and-rinse and self-etching approaches. However, the self-etching approach resulted in lower μTBS values in SD, while no difference among experimental groups was
observed in CAD. Overall, higher Weibull modulus values were achieved in the groups with higher bond strength. The relationship between characteristic strength and bond strengths was not linear for all groups.

CONCLUSION: The bond longevity of the universal adhesive using the dry-bonding etch-and-rinse approach on sound and artificially-induced caries-affected primary dentin was better than the other bonding agents and approaches tested.

(27532067)
.- as supplied by publisher]

Bonding Performance of a Multimode Adhesive to Artificially-induced Caries-affected Primary Dentin.

J Adhes Dent. 2015 Apr 21;

Authors: Lenzi TL, Raggio DP, Soares FZ, Rocha RO

Abstract

PURPOSE: To investigate the bonding of a new universal adhesive applied using different etching strategies on sound and caries-affected dentin of primary teeth. MATERIALS AND METHODS: Flat dentin surfaces from 50 primary molars were randomly assigned to 10 groups according to substrate (sound dentin [SD] vs caries-affected dentin [CAD] pH cycled for 14 days) and bonding approach (Scotchbond Universal Adhesive: self-etching, vs dry or wet-bonding etch-and-rinse strategies; Adper Single Bond Plus [two-step etch-and-rinse adhesive] and Clearfil SE Bond [two-step self-etching system] as controls). After 24 h of water
storage, bonded sticks with cross-sectional areas of 0.8 mm² were tested for microtensile bond strength (μTBS). Two sticks from each tooth were immersed in silver nitrate solution in order to evaluate nanoleakage (NL) with SEM. The μTBS means were analyzed using two-way ANOVA and Tukey’s tests. For NL, the Kruskal-Wallis and Mann-Whitney tests were used (α = 0.05).

RESULTS: The influence of the etching strategy on the bonding performance of the universal adhesive was substrate dependent. The self-etching approach resulted in lower μTBS values and higher silver nitrate uptake into hybrid layers for Scotchbond Universal Adhesive on SD, while no difference among experimental groups was observed in CAD.

CONCLUSION: It is preferable to use the universal adhesive following either a dry- or wet-bonding etch-and-rinse approach on both sound and caries-affected primary dentin.

(25901300)
- as supplied by publisher]

Shortening the Etching Time for Etch-and-Rinse Adhesives Increases the Bond Stability to Simulated Caries-affected Primary Dentin.

J Adhes Dent. 2014 Mar 25;

Authors: Lenzi TL, Braga MM, Raggio DP
Abstract
Purpose: To evaluate the influence of shortening the etching time on the bond degradation of one etch-and-rinse and one two-step self-etching adhesive system to sound (SD) and caries-affected (CAD) dentin of deciduous teeth. Materials and Methods: Flat dentin surfaces from 48 deciduous molars were assigned to 8 groups according to substrate (SD and CAD, pH cycling for 14 days), adhesive system (Adper Single Bond 2 [SB] and Clearfil SE Bond [CSEB]), and etching time (recommended by manufacturers and half the recommended etching time). Composite buildups were constructed and sectioned to obtain bonded sticks (0.8 mm²) to be subjected to microtensile testing immediately or after 12 months of water aging. Two sticks from each tooth at each time were immersed in silver nitrate solution to qualitatively assess nanoleakage. The microtensile bond strength (µTBS) values of each adhesive were submitted to three-way repeated measures ANOVA and Tukey’s post-hoc tests (α = 0.05). Results: The etching time influenced the bond strength only for SB. The highest µTBS values and lowest silver nitrate uptake were observed when half the recommended acid-etching time was used, regardless of substrate. Water storage for 12 months reduced bond strengths, except to CSEB bonded to SD. The µTBS values obtained for CAD were lower than for SD, irrespective of adhesive system. Nanoleakage was more pronounced in CAD. Conclusion: The effect of shortening the etching time is material dependent and results in better bond stability for sound and caries-affected dentin of deciduous teeth when an etch-and-rinse adhesive system is employed.

(24669366) - as supplied by publisher]
Composite bond strength to intact enamel with current simplified adhesives.

J Adhes Dent. 2011 Feb;13(1):31-7

Authors: Kahveci O, Belli S

Abstract

PURPOSE: This study compared microtensile bond strength (μTBS) of six simplified adhesive systems and an etch-and-rinse, one-bottle adhesive system to intact enamel.

MATERIALS AND METHODS: Twenty-eight sound incisor teeth were cut at the cementoenamel junction (CEJ) under water cooling. The enamel surfaces were cleaned with pumice, randomly assigned to seven groups and treated with one of the following adhesives: Hybrid Bond (Sun Medical); AdheSE One (Ivoclar/Vivadent); One Coat 7.0 (Coltene/Whaledent); Danville Experimental (Danville Materials); Clearfil S3 Bond (Kuraray); G Bond (GC); and Prelude Total-etch (Danville Materials) as control. Composite resin (Clearfil AP-X, Kuraray) buildups were created and after 24 h, the teeth were sectioned into beams of 1.0 mm² cross-sectional area. Each beam was tested in a microtensile tester (Bisco) at a crosshead speed of 1 mm/min. Data were calculated as MPa and analyzed by one-way ANOVA. Multiple comparisons were done using the Tukey test.

RESULTS: μTBS values of adhesives to intact enamel were as follows (mean ± SD; different letters indicate statistically different groups, p < 0.05): Hybrid Bond: 15.62 ± 3.90a; AdheSE One: 17.29 ± 3.88ab; One Coat 7.0: 19.59 ± 3.95abc; Danville Experimental: 18.65 ± 5.33abc; Clearfil S3 Bond:20.89 ± 2.96bcd; G Bond: 23.49 ± 4.21cd; Prelude Total-etch: 25.79 ± 5.24d.

CONCLUSIONS: Clearfil S3 Bond and G Bond showed bond strength similar to Prelude Total-etch (p = 0.064). The other simplified adhesives showed a similar performance (p = 0.239), however, μTBS values to intact enamel of these systems were lower than those obtained by Prelude Total-etch (p < 0.05).

(21403934)
.- indexed for MEDLINE]
Mechanical testing of indirect composite materials directly applied on implant abutments.


Authors: Andriani W, Suzuki M, Bonfante EA, Carvalho RM, Silva NR, Coelho PG

Abstract
PURPOSE: To test the strength to failure and fracture mode of three indirect composite materials directly applied onto Ti-6Al-4V implant abutments vs cemented standard porcelain-fused-to-metal (PFM) crowns.
MATERIALS AND METHODS: Sixty-four locking taper abutments were randomly allocated to four groups and were cleaned in ethanol in an ultrasonic bath for 5 min. After drying under ambient conditions, the abutments were grit blasted and a custom 4-cusp molar crown mold was utilized to produce identical crowns (n = 16 per group) of Tescera (Bisco), Ceramage (Shofu), and Diamond Crown (DRM) according to the manufacturer’s instructions. The porcelain-fused-to-metal crowns were fabricated by conventional means involving the construction and a wax pattern and casting of a metallic coping followed by sintering of increasing layers of porcelain. All crowns were loaded to failure by an indenter placed at one of the cusp tips at a 1 mm/min rate. Subsequently, fracture analysis was performed by means of stereomicroscopy and scanning electron microscopy. One-way ANOVA at 95% level of significance was utilized for statistical analysis.
RESULTS: The single load to failure (± SD) results were: Tescera (1130 ± 239 N), Ceramage (1099 ± 257 N), Diamond Crown (1155 ± 284 N), and PFM (1081 ± 243 N). Stereomicroscopy analysis showed two distinct failure modes, where the loaded cusp failed either with or without abutment/metallic coping exposure. SEM analysis of the fractures showed multiple crack propagation towards the
cervical region of the crown below a region of plastic deformation at the indenter contact region.

CONCLUSION: The three indirect composites and PFM systems fractured at loads higher than those typically associated with normal occlusal function. Although each material had a different composition and handling technique, no significant differences were found concerning their single load to fracture resistance among composite systems and PFM.

(20157657)
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Shear bond strength between a polyester-based root canal filling material and a methacrylate-based sealer with an intermediate layer of fiber-reinforced resin-based material.

Shear bond strength between a polyester-based root canal filling material and a methacrylate-based sealer with an intermediate layer of fiber-reinforced resin-based material.


Authors: Nagas E, Cehreli ZC, Durmaz V, Vallittu PK, Lassila LV

Abstract
PURPOSE: To investigate the effects of an interfacial fiber-reinforced resin-based material (FRRM) application and different light-curing modes on the bond
strength of a thermoplastic synthetic polymer-based root canal filling material (Resilon) to a methacrylate-based sealer (Epiphany).

MATERIALS AND METHODS: One hundred Resilon disks were prepared and divided into two experimental groups: 1. application of FRRM (EverStick Net) on the Resilon surface, and 2. Resilon alone (control). Following subsequent application of the Epiphany sealer, the specimens were randomly assigned into 3 subgroups according to the curing method employed: 1. chemical curing, 2. quartz-tungsten-halogen (QTH) light, and 3. light-emitting diode (LED). The latter two groups were further subdivided to test the effects of two different polymerization modes for each light-curing unit. Cured specimens were subjected to shear bond strength testing and the failure modes were examined. The data were analyzed with three-way analysis of variance (ANOVA).

RESULTS: Regardless of the curing method tested, application of FRRM at the interface significantly increased the bond strength of Resilon to Epiphany (p < 0.001). Bond strength values (MPa) were as follows (mean +/- SD): 1. chemical curing with FRRM= 3.0 +/- 0.4, without FRRM = 1.2 +/- 0.3; 2. QTH: a) standard mode with FRRM = 8.6 +/- 0.6, without FRRM = 5.5 +/- 0.9; b) ramp mode with FRRM = 8.0 +/- 1.0, without FRRM = 5.3 +/- 1.4; 3. LED: a) standard mode with FRRM = 8.8 +/- 1.1, without FRRM = 5.4 +/- 1.0; b) exponential mode with FRRM = 8.5 +/- 1.0, without FRRM = 4.6 +/- 0.6. Although light curing of specimens significantly increased the bond strength of Resilon to Epiphany (p < 0.001), the type of light-curing unit and different curing modes had no significant influence on bond strength (p = 0.852 and p = 0.776, respectively).

CONCLUSION: The highest bond strength values were obtained when the FRRM was used at the interface and the sealer was light cured.

(19701515)
.- indexed for MEDLINE]
bond strength of self-etching adhesives to dentin.

Effect of ultrasonic agitation on bond strength of self-etching adhesives to dentin.


Authors: Bagis B, Turkarslan S, Tezvergil-Mutluay A, Uctasli S, Vallittu PK, Lassila LV

Abstract

PURPOSE: The aim of this study was to evaluate the influence of ultrasonic treatment on the microtensile bond strength of self-etching adhesives to dentin.

MATERIALS AND METHODS: Forty-two human molars were wet ground occlusally until dentin was exposed. Clearfil S3 Bond, Futurabond NR (one-bottle) and Clearfil SE Bond (two-bottle) self-etching bonding systems were used in this study. In control groups, bonding procedures were performed according to the manufacturers’ instructions. In the experimental groups, bonding materials were applied with an ultrasonic scaler. When using Clearfil SE Bond, the ultrasonic device was used either during priming or the bonding stage. The composite was then built up to 5 mm in height. Each tooth was serially sectioned into rectangular beams. The beams were categorized also according to positional status as marginal or central. Beams were subjected to microtensile testing after 24 h of water storage. Failure modes were observed with a stereomicroscope and classified. Randomly selected tested beams from each group were examined with SEM.

RESULTS: Three-factor ANOVA results indicated that the adhesive bonding system had a significant effect on bond strength (p < 0.001), whereas ultrasonic agitation and the position of the tested beam (marginal vs central) had no effect on bond strength (p > 0.05). Failure after the test was commonly due to adhesive breakdown associated with partial cohesive failure in the dentin. The mean (SD) microtensile bond strengths to dentin for S3 Bond, Futurabond NR, Clearfil SE Bond in the control group were 44.3 (11.7), 35.3 (12.0), 25.1 (8.8), resp, and in the ultrasonic group 39.3 (14.2), 31.3 (13.5), 35.5 (13.5) at priming and 32.6 (16.2) at bonding.
CONCLUSION: Ultrasonic agitation during application of self-etching adhesives had no effect on bonding performance of the self-etching adhesive.

(19189674) - indexed for MEDLINE

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Effects of resinous monomers used in restorative dental modeling on the cohesive strength of composite resin.

J Adhes Dent. 2008 Oct;10(5):351-4

Authors: Barcellos DC, Pucci CR, Torres CR, Goto EH, Inocencio AC

Abstract

PURPOSE: The purpose of this study was to evaluate the cohesive strength of the composite using different resinous monomers to lubricate instruments used in the Restorative Dental Modeling Insertion Technique (RDMIT).

MATERIALS AND METHODS: The composite specimens were made by using a prefabricated Teflon device. Different resinous monomers were used at the interface to lubricate the instruments, for a total of 72 specimens divided into 6 groups: (1) control group, no resinous monomer was used; (2) Composite Wetting Resin; (3) C & B Liquid; (4) Scotchbond Multi-Purpose Adhesive; (5) Adper Single Bond Adhesive; (6) Prime & Bond NT. Specimens were submitted to the circular area tensile test to evaluate the cohesive strength at the composite interfaces. Data were analyzed using ANOVA and Tukey’s test (alpha = 0.05).

RESULTS: ANOVA showed a value of $p < 0.0001$, which indicated that there were...
significant differences among the groups. The means (SD) for the different groups were: Adper Single Bond Adhesive: 26 (12) a; control group: 28 (3) ab; Prime & Bond NT: 32 (12) ab; Composite Wetting Resin: 36 (9) abc; C&B Liquid: 38 (7) bc; Scotchbond Multi-Purpose Adhesive: 46 (10) c. Groups denoted with the same letters were not significantly different. Only Scotchbond Multi-Purpose Adhesive, used for direct restorations, had a statistically significantly higher bond strength than the control group, Adper Single Bond Adhesive, and Prime & Bond NT. Adper Single Bond with Adhesive showed a statistically significantly lower mean value than C & B Liquid.

CONCLUSION: The results of this study indicate that the resinous monomers used for lubricating the instruments in the RDMIT did not alter the mechanical properties of the composite, and therefore did not reduce the cohesive bond strength at the composite interfaces.

(19058680)
- indexed for MEDLINE]

Marginal adaptation after aging of a self-etching adhesive containing an antibacterial monomer.

Marginal adaptation after aging of a self-etching adhesive containing an antibacterial monomer.

J Adhes Dent. 2007 Jun;9(3):311-7

Authors: Bortolotto T, Doudou W, Stavridakis M, Ferrari M, Krejci I

Abstract

PURPOSE: To evaluate the marginal adaptation of mixed Class V cavities restored with Clearfil Protect Bond (Kuraray), Clearfil SE Bond (Kuraray), and two experimental combinations of both marketed adhesives, after fatigue and water
MATERIALS AND METHODS: Four groups (Clearfil Protect Bond, Clearfil SE Bond, Exp. 1 and Exp. 2) of Class V cavities were restored with a microhybrid restorative composite (Clearfil APX, Kuraray). The marginal quality of these restorations was quantified by evaluation of gold-coated epoxy replicas with scanning electron microscopy before loading, after loading, and after a 12-month period of water storage. Data from marginal adaptation along the total margin length, on enamel, and on dentin were analyzed with the Wilcoxon signed rank test for differences within a group and with Kruskal-Wallis in order to assess the differences between groups. The Bonferroni test was used for post-hoc comparisons, and the confidence level was set to 95%.

RESULTS: The mean percentages (+/-SD) of “continuous margin” of the total marginal length ranged from 79.5% (+/-13.3) to 62.2% (+/-10.4) and from 70% (+/-11) to 61% (+/-15.1) after loading and after storage, respectively. No significant differences could be detected among the different groups. However, the marginal adaptation of Clearfil Protect Bond remained the most stable of all materials tested, as no significant differences were detected between the percentages of continuous margins before loading, after loading, or after storage.

CONCLUSIONS: The use of an antibacterial adhesive system was as effective as the conventional two-step self-etching adhesive in the marginal adaptation of Class V restorations.

(17655071)
.- indexed for MEDLINE]
Abstract

PURPOSE: The aim of this in vitro study was to evaluate the shear bond strength of two conventional glass-ionomer cements to bovine dentin when using the air-abrasion technique for cavity preparation.

MATERIALS AND METHODS: Forty bovine central incisors were selected, embedded in polyester resin, and ground until the dentin surface was exposed. The teeth were randomly assigned to four groups: I and II–rotating instrument with a carbide bur; III and IV–an air-abrasion system. Groups I and III were restored with Fuji IX and groups II and IV with Ketac Molar. A 3-mm-diameter bonding site was delimited and treated with 10% polyacrylic acid for 10 s in the Fuji IX subgroups and with 25% polyacrylic acid for 10 s in the Ketac Molar subgroups. After surface treatment, a glassionomer cylinder was prepared for each specimen, using a split bisected Teflon matrix. The finished specimens were submitted to the shear bond strength test in a universal testing machine at a crosshead speed of 0.5 mm/min. The data were analyzed using ANOVA and Scheffé statistical tests. The dentin bonding areas were analyzed under a stereoscopic optical magnifier (40X) to assess the type of failure.

RESULTS: The mean (SD) shear bond strengths in MPa were: group I-3.49 (+/- 3.77), group II-7.17 (+/- 2.93), group III-7.55 (+/- 2.99), group IV-5.67 (+/- 3.90). Ketac Molar showed higher bond strength values in bur-prepared cavities, while on the air-abraded preparations, Fuji IX showed superior results.

CONCLUSION: It can be concluded that the air-abrasion system used for cavity preparations may influence the bonding performance of conventional glass-ionomer cements to dentin.

(16958288)
.- indexed for MEDLINE]