Bond Strength of SE Adhesives with Acid Etching

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INTRODUCTION

Some clinical studies have suggested that bonding of uncut enamel with self-etching (SE) adhesives will result in inadequate bonding to enamel margins[1,2]. After extended periods, a significant amount of staining occurs at the enamel margins. Although no secondary caries were observed and the staining could be removed with polishing, the authors expressed concern that enamel bonding may have been compromised. Staining may have been prevented if the enamel margins were first etched with Phosphoric Acid (PA). However, there is concern that etching of uncut enamel with PA, will result in lower bond strength (BS) to peripheral dentin when bonding with SE adhesives.

OBJECTIVE

The purpose of this study is to determine the long-term BS of several SE adhesives to dentin after total-etching (TE) with Phosphoric Acid (PA). Long-term BS after six-months and one-year are reported along with previously reported 24 hrs. and one-month data.

MATERIALS

Kerr Gel Etchant, Lot 2774529
Clearfil SE Bond Primer, Lot 00702A
Clearfil SE Bond, Lot 01003A
Optibond FL Prime, Lot 2782099
Optibond FL Adhesive, Lot 2791786
Herculite XRV Enamel, Lot 2772839

METHOD

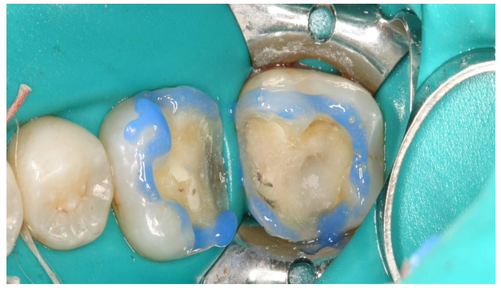
The test method for this study was previously been described in IADR Abst. # 827, 2008 along with 24 hrs. and one-month bonding data. Reviewing briefly, two adhesives, Clearfil SE Bond (CSE) and Optibond FL (OFL, which has previously been shown to work as an SE adhesive[3]), were evaluated in 4 groups. In Group 1, PA was applied to dentin surface for 15 sec., rinsed with water for 5 sec. and air dried for 5 sec. CSE was applied as directed and then Herculite XRV (XRV) was applied and cured as directed. In Group 2, dentin surface was bonded with CSE per directions but not etched. In Group 3, PA was applied as in Group 1 and OFL was applied as directed. In Group 4, dentin surface was not etched. OFL Primer was applied with agitation for 30 sec., air flowed and light cured for 20 sec. (SE procedure for OFL). OFL Adhesive and XRV were applied and cured as directed. The samples (n=8) were stored in 37ºC water and tested up to one-year after thermocycling 2,500 X between 5-55ºC. In this study, the six-months and one-year data were compared with immediate and 1-month data previously presented. Anova analysis ($p<0.05$) was used to determine differences between the means.

RESULTS

Group	Description	24 Hrs.	One Month	Six Months	One Year
1	CSE PA Etch	27.5 (5.3)	25.6 (7.6)	32.6 (5.5)	31.5 (6.5)
2	CSE No Etch (Control)	34.4 (6.9)	27.6 (8.6)	29.9 (10.4)	31.5 (5.4)
3	OFL PA Etch	29.0 (5.4)	21.5 (6.1)	27.7 (5.8)	30.5 (6.5)
4	OFL No Etch (Control)	26.1 (9.0)	23.7 (9.5)	30.3 (8.1)	26.5 (7.0)

RESULTS AND DISCUSSION

The BS data, MPa (sd), are presented in the table. After one year, no significant differences were found between the groups. Bond strength of both adhesives remained high under all conditions. The data suggest that dentin bond strength of CSE or OFL is not affected by the use of PA etch. Etching with PA is a proven method of treating enamel for long term bonding success and is compatible with these self-etching adhesives. The clinician should carefully etch enamel when using SE adhesives and not be overly concerned about inadvertently etching dentin (Fig. 1 a,b). Furthermore, this study confirms that Optibond FL's primer is also a self etch primer giving the clinician clinical flexibility[3]. It may be used by clinicians with success as a self -etch primer or as a total-etch primer, based on specific clinical needs of preference.



CONCLUSION

Under the conditions of this study, two evaluated SE adhesives did not lose bond strength significantly after one-year. This study also confirms the unique character of Optibond FL, which may be used in both SE and TE procedures (funded by Kerr).

REFERENCES

1. J-L. Ruiz et al; "Clinical Performance of Bonded Ceramic and Resin Based Composite Inlays and Onlays Using a Self-Etch System: 51-Month Report."; Inside Dentistry, p. 2-4, May 2007.
2. N. Akimoto et al; "10-Year Clinical Evaluation of a Self-Etching Adhesive System."; Operative Dent. 32-1, p. 3-10, 2007.
3. A. Boghosian et al; "Clinical Evaluation of a Dentin Adhesive System: 13 Year Results."; IADR Abst. # 0228 March 2007.