

# Clinical Study of the Effect of No Prophylaxis and Reduced Etching Time on Bond Strength

[TODD J. HUGHES, DDS, MS](#)

[STEPHEN KERR, DDS, MS](#)

[JOHN M. POWERS, PHD](#)

The purpose of the present study was to compare a bonding method of tooth preparation using no pumice prophylaxis and reduced acid etching time to the more traditional method in vivo.

In a previous in vitro study, St. Clair combined the prophylaxis and acid-etch steps.<sup>1</sup> The 35% phosphoric acid etchant was applied to a control group of teeth for five, 15, or 30 seconds after a pumice prophylaxis. The experimental teeth were etched with 35% phosphoric acid in a slow-speed rotary prophyl cup for two, five, or 15 seconds with no preliminary prophylaxis. The author concluded that there was no significant difference between the two techniques.

## Materials and Methods

Our sample consisted of 20 consecutively treated patients in the permanent dentition from the University of Texas Dental Branch at Houston orthodontic clinic. Four operators participated in the study, using the following standardized techniques.

Either the right or left side of each patient's mouth was randomly chosen as the control. On this side, each tooth was prepared for bonding with Transbond XT according to the manufacturer's recommendation: after a thorough pumice prophylaxis, the tooth was rinsed and dried, a 35% phosphoric acid etchant was applied for 30 seconds, the tooth was again rinsed and dried, the primer was applied, and the bracket was bonded.

In the experimental technique, on the opposite side of the mouth, the etchant was applied with a slow-speed rotary cup for five seconds, then the tooth was thoroughly rinsed and dried, the primer was applied, and the bracket was bonded.

The time required to bond each quadrant was recorded with a stopwatch. Patients were seen at four-to-six-week intervals, but were requested to return as soon as possible once a bond failure was detected. The incidence and sites of bond failures were recorded over the first six months of orthodontic treatment.

## Results

A total of 376 brackets were bonded. Seven out of 188 (3.7%) failed in the experimental group, and two out of 188 (1.1%) in the control group (Table 1). Chi-square analysis showed no statistically significant difference between these two groups ( $p > .05$ ).

In the maxillary arch, five out of 188 (2.7%) bonds failed; four out of 188 (2.1%) failed in the mandibular arch (Table 2). Chi-square analysis showed no statistically significant difference between these two groups ( $p > .05$ ). The highest incidence of bond failures was seen in the canines (3.8%). Five out of 188 (2.7%) bonds failed on the right side, and four out of 188 (2.1%) on the left

side. Chi-square analysis showed no statistically significant differences between these two groups ( $p > .05$ ).

A mean two minutes and 18 seconds of chairtime was saved using the experimental technique as compared to the control (Table 3). A Student' s-test showed a highly significant difference between the mean times of the two groups ( $p = .001$ ).

## Conclusion

The results of this study suggest that a five-second application of 35% phosphoric acid with a slow-speed rotary prophyl cup is sufficient to remove gross debris and pellicle, with no clinically significant difference in bond strength compared to the traditional method. This technique not only reduces chairtime for the doctor, staff, and patient by more than 50%, but also reduces exposure of the enamel to the acid etchant. •

## TABLES

**TABLE 1  
BOND FAILURE RATES**

	No. Quadrants	No. Brackets	No. Failed	% Failure
Control	40	188	2	1.1%
Experimental	40	188	7	3.7%
TOTAL	80	376	9	2.4%

**Table. 1**

**TABLE 2  
BOND FAILURE SITES**

	No. Quadrants	No. Brackets	No. Failed	% Failure
Maxillary arch	40	188	5	2.7%
Mandibular arch	40	188	4	2.1%
Right side	40	188	5	2.7%
Left side	40	188	4	2.1%
Incisors	NA	160	3	1.9%
Canines	NA	80	3	3.8%
Premolars	NA	136	3	2.2%

**Table. 2**

**TABLE 3  
MEAN BONDING TIMES (MINUTES)**

	Mean	S.D.
Experimental	1.62	0.07
Control	3.80	0.10

**Table. 3**

**REFERENCES**

1 St. Clair, J.T.: In vitro bond strength of resin adhesives using two modified enamel surface preparations to reduce chair time, thesis, University of Texas, Houston, 1999.

**FOOTNOTES**

1 Transbond XT: Trademark of 3M Unitek, 2724 S. Peck Road, Monrovia, CA 91016.

2 Student' s-test: SuperANOVA, Abacus Concepts, Berkeley, CA.