

Effect of nitrogen purging, number of application of bonding system on the microshear bond strength

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I. Objectives

The purpose of this study was to compare microshear bond strength of two commercially available resin bonding systems (Excite, Clearfil SE bond), to determine whether double applications of Excite would improve composite shear bond strength to dentin and to evaluate the effect of oxygen inhibition on the microshear bond strength.

II. Material & Methods

The human molars were cut a right angle to the long axis of the roots in two places using a low-speed diamond saw under running water, one just below the apical limits of the enamel and one just within the coronal limits of the pulp chamber. Then, the dentin surface was polished using 200-grit silicon carbide paper. Thus, thirty six dentin discs were prepared. Vinyl tape with four 1mm diameter holes was placed on the dentin surface to limit the bonding surface area. The dentin surfaces of the specimens were etched with 35% phosphoric acid gel for 15seconds. After water rinsing for five seconds, etched surfaces were gently air-dried.

The samples were divided into nine groups. There were sixteen samples in each group.

(group1-Excite, single application, room-air atmosphere; group2-Excite, double application, room-air atmosphere; group3-Clearfil SE bond, room-air atmosphere; group4-Excite, single application, continuous stream of nitrogen; group5-Excite, double application, continuous stream of nitrogen; group6-Clearfil SE bond, continuous stream of nitrogen; group7-Excite, single application, nitrogen atmosphere; group8-Excite, double application, nitrogen atmosphere; group9-Clearfil SE bond, nitrogen atmosphere)

Excite was applied using a brush. Then, it was light cured for 20seconds. When Excite was applied secondly, Excite was re-applied, and then light cured for 20seconds. Clearfil SE bond primer was applied using a brush for 10seconds. Clearfil SE bond adhesive was applied and then light cured for 20seconds.

Nitrogen stream was made from tube that was connected to the nitrogen gas container. For nitrogen atmosphere, nitrogen purged bag with an entrance door and gloves was prepared.

Microtube with 0.7mm inner diameter was laid on the bonded area. Tetric Ceram was filled in the tube, and then light cured for 40seconds. Tubes and vinyl tape were removed, excess bonding agent was removed by blade (#11).

The samples were stored in room-air for 24hours, then microshear bond strength were measured by universal testing machine (EZ-Test, Shimadzu, Kyoto, Japan).

The results were statistically analysed using ANOVA and Duncan's multiple range test.

III. Results

Table 1. Maximum stress (MPa)

- In a room air atmosphere Clearfil SE bond group (group3) had significantly higher shear bond strength than Excite group (group 1,2).

	Room-air atmosphere	Stream of nitrogen	Nitrogen atmosphere
Excite, single	28.4062±7.3049	28.2925±6.9567	26.7534±6.6123
Excite, double	33.4296±8.8976	34.7222±10.4481	30.2812±7.0868
Clearfil SE bond	41.2222±6.3473	39.4562±8.8107	37.8923±5.0876

2. Under a stream of nitrogen Clearfil SE bond group(group3) had significantly higher shear bond strength than Excite single application group(group1).
3. In a nitrogen atmosphere Clearfil SE bond group(group3) had significantly higher shear bond strength than Excite group(group 1,2).
4. No statistically significant differences were observed between single application(group 1,4,7) and double application(group 2,5,8).
5. No statistically significant differences were observed among room-air atmosphere, stream of nitrogen, nitrogen atmosphere.

IV. Conclusions

Clearfil SE bond had significantly higher shear bond strength to dentin than Excite.

Nitrogen purging and number of application of Excite did not have significant effect on microshear bond strength to dentin.