



Fluoridated and nonfluoridated unfilled sealants show similar shear strength

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In recent years, resin-based fluoridated sealants have been introduced, the fluoride intended as a caries-preventive ingredient. Studies of prophylaxis pastes containing glycerine or fluoride that attribute poor retention to an impervious layer produced by the fluoride and other ingredients^{1,2} have been discounted by Bogert and García-Godoy³ and Koch et al.⁴ using newer generations of bonding systems and resins.

The type of prophylaxis medium used seems to be unimportant unless it has a very high (10,000 ppm) fluoride content,⁴ so the fluoride incorporated into the sealants may affect bond strength to enamel. This study compared the shear bond strengths to enamel of unfilled fluoridated and nonfluoridated pit and fissure sealants.

Methods and materials

The buccal enamel surfaces of 30 human, extracted, noncarious molars were ground flat with SiC paper ending with the 600 grit to obtain a uniform bonding surface, which was then etched for 20 sec with 37% phosphoric acid.

The teeth were divided randomly into three groups of 10 teeth each:

- Group 1: Helioseal™ (Vivadent, Schaan, Liechtenstein) nonfluoridated, control
- Group 2: AlphaSeal™ (DFL, Rio de Janeiro, Brazil)
- Group 3: Teethmate-F™ (Kuraray - J Morita, Tustin, CA).

The sealants were placed in plastic rings over the etched enamel surfaces and light-cured for two 20-sec exposures with an Optilux 400™ (Demetron, Danbury, CT) unit.

The specimens were stored in distilled water for 24 hr, thermocycled (500 cycles; 5–55°C), and mounted in dental stone to be tested in an Instron™ (Instron Corp, Canton, MA) at a crosshead speed of 1.0 mm/min using a knife-edged blade.

Immediately after debonding, the enamel surfaces and the sealant fitting surfaces were evaluated visually and with a stereomicroscope.

Statistical analysis was performed with ANOVA and Student-Newman-Keuls tests.

Results

The shear bond strength results (in MPa) are displayed in Table 1. There were no statistically significant differences in bond strength between the groups.

Table 2 presents the bond failure pattern after shear bond strength testing. Of 10 samples in the Helioseal

TABLE 1. SHEAR BOND STRENGTH (MPa ± SD) FOR THE DIFFERENT GROUPS

Group	N	MPa	SD	Range
1. Helioseal	10	14.00	3.36	10.17–20.93
2. Alpha Seal	10	13.51	2.72	7.18–16.74
3. Teethmate-F	10	12.77	4.35	7.18–19.73

ANOVA showed no statistically significant difference between the groups.

group, seven revealed sealant cohesive failures (sealant fractures) and three mixed failure patterns (a combination of sealant cohesive and adhesive failures). In the Alpha Seal group, five of 10 specimens displayed sealant cohesive failures, and five mixed failures. In the Teethmate-F group, one of the nine available samples had an adhesive failure, four showed sealant cohesive failures, and four mixed failures.

TABLE 2. SITE OF BOND FAILURE FOR THE DIFFERENT GROUPS

Group	N	Adhesive Failure	Sealant Cohesive	Mixed Failure
1. Helioseal	10	0	7	3
2. Alpha Seal	10	0	5	5
3. Teethmate-F	9*	1	4	4

* One sample lost during preparation.

Adhesive failure = Failure at the bonding site. No sealant remaining on the enamel surface.

Sealant cohesive = Sealant fracture. Sealant material remaining over the entire enamel surface.

Mixed failure = Combination of adhesive and sealant cohesive failures.

Discussion

A study comparing FluroShield (fluoride containing sealant) and Helioseal (nonfluoride containing sealant) demonstrated no statistical difference in the ability of the resin to penetrate fissures.⁵ Another study⁶ showed no clinical difference in retention at 1 year between the filled fluoridated (Helioseal-F) and the unfilled nonfluoridated sealant (Delton) evaluated.

A study⁷ evaluating Helioseal without fluoride reported that at 1 year, 94.1% of the sealed surfaces were intact. This figure is very similar to the 90.3% reported in another study evaluating Helioseal-F.⁶ Jensen et al.,⁸ evaluating FluroShield fluoride-releasing sealant, reported that at 12 months 82% of the sealants revealed complete retention. The difference between these studies could be attributed to operator's technique, sealant material, and the fact that in one of the studies⁶ a Prophy-Jet™ (Caulk/Densply, Milford, DE) prophylaxis was performed before placing the sealant as suggested by others.⁹⁻¹³ Also, the higher failure rate of occlusolingual grooves may have skewed the results.

The clinical studies by García-Godoy,⁷ Jensen et al.⁸ and Koch et al.⁶ show that incorporation of fluoride into the sealant matrix has no adverse effect upon sealant retention. Our laboratory study confirms these results with other pit and fissure sealants; therefore, similar clinical findings should be expected.

The long-term retention of fluoridated sealants and effect on caries development in the fissures and adjacent sound enamel needs to be determined.

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