A LABORATORY EVALUATION OF THE SHEAR BOND STRENGTH OF RESIN SEALANTS INTACT ENAMEL USING A SELF-ETCHING AND TOTAL-ETCH SEALANT SYSTEMS

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INTRODUCTION

Materials and techniques facilitating bonding resin composites to dentin have become an important part of modern clinical practice. A variety of dentin and enamel surface preparations have been used in combination with hydrophilic primers to increase adhesion and improve the seal of the resin to the tooth structure. More recently some adhesive systems have been developed which use a "self-etching" mechanism eliminating a rinsing step and simplifying the bonding process. This technology has been applied to the clinical procedure of placing a pit and fissure sealant where time and control are critical. The purpose of this laboratory study was to evaluate the shear bond strength of 2 new pit and fissure sealants using a "self-etching" adhesive strategy compared to a total etch conventional sealant.

METHODS AND MATERIALS

30 intact anterior teeth with no caries or restorations will be selected for this study. After cleaning with flour pumice and water the teeth were divided into three groups:

Group 1: 36% phosphoric acid conditioning followed by UltraSeal XT.

Group 2: BJM self-etching prototype sealant-low viscosity.

Group 3- BJM self-etching prototype sealant-standard viscosity.

Each sealant system will be applied according to the manufacturer's instructions.

The Ulradent bonding jig was used. In this method a resin cylinder 2.3 mm in diameter is formed using a Teflon matrix. The sealants were visible light cured with three 20-second curing sequences each from opposite sides of the mold at an angle of 45 degree to the tooth surface. The specimens were be stored in distilled water at 37° C for 24 hours loaded to failure in an Instron Testing Machine (Model 1123, Instron Corporation, Canton, Mass.) equipped with a custom rod to deliver a shearing force. The specimens will be aligned with the shearing rod against and parallel to the bonding sites. Each resin cylinder will be placed under continuous loading at 1 mm per minute until fracture occurs. Shear bond strength will be calculated in megapascals units (MPa). The fracture sites were evaluated under light microscopy to determine the mode of failure at the sealant/enamel interface.

RESULTS

Mean shear bond strength in Megapascals (MPa) for each group is reported below:

Material	SBS Ground Enamel (MPa)
Ultraseal XT with 34% H_3PO_4 (30 seconds)	29.0 ± 5.2
Quick Seal Low Viscosity	21.0 ± 6.2
Quick Seal Standard Viscosity	15.5 ± 6.6

A one-way ANOVA ($p < 0.05$) revealed significant differences among the groups. Ultraseal generated the highest values to enamel. Next was the low viscosity Quick Seal followed by the standard viscosity.