Marginal Integrity of Sealants with Self-Etching Bonding Agents (12/03)


Pit and fissure sealants are more frequently placed with dentin bonding agents in situations where there is poor mechanical retention and/or isolation. This manuscript evaluated the marginal integrity of occlusal pit and fissure sealants on 48 intact, caries-free molars. An air abrasion unit (AirFlow Prep K1, Electro Medical Systems SA, Nyon, Switzerland) was used for debris removal and not for mechanical preparation of the tooth surface. Teeth were randomly placed in eight groups of six teeth. Half of the groups were initially treated with 40% phosphoric acid (K-etch, Kuraray, Osaka, Japan) while the others were treated with a two-step, self-etching bonding agent (Clearfil SE Bond, Kuraray). Sealants were then placed using unfilled (Teethmate F-1, Kuraray) and filled (Protect-Liner-F, Kuraray) sealants and cured with either a halogen-based visible light-curing unit (Optilux 500, Sybron/Kerr, Orange, CA) or a plasma-arc curing light (Apollo 95E, Dental and Medical Diagnostic Systems, Deurle, Belgium). Sealant marginal adaptation was quantitatively measured on epoxy replicas by a scanning electron microscope combined with a computer-based analysis program both before and after mechanical and thermal stressing. Results found that sealant marginal integrity worsened after thermal and mechanical stressing. However, there was no overall marginal integrity difference between the self-etching adhesive system and phosphoric-acid etching. Furthermore, the unfilled-sealant material exhibited better marginal adaptation than the higher-viscosity filled material except when the filled sealant was used in combination with the self-etching bonding agent. Finally, the halogen-based curing light provided better marginal adaptation than the plasma-arc curing unit.

DIS Comment: This complex study evaluated many parameters of pit and fissure sealant placement; the use of a self-etching dentin bonding system, the choice between filled or unfilled sealant materials, and the use of a halogen curing unit or a faster, plasma-arc curing unit. This study was innovative in that it attempted to replicate in vivo conditions by mechanically and thermally stressing samples in a chewing machine that used a natural tooth cusp as the stressing antagonist. This is also one of the few studies that has attempted to measure total margin integrity. The limitations of this study include the relative small number of sample size per group and the inability to standardize the margin length of the samples. Also, this study used Clearfil SE Bond, which in several studies have shown to provide adequate etching of prepared enamel. Although the air abrasion unit was intended for debris removal only, the authors admit that air abrasion does remove an outer enamel layer. It would have been interesting to see the results of this study if an unprepared enamel surface group was also evaluated. However, the major “take home” message from this study is that self-etching bonding agents may be used for pit and fissure sealant applications in certain situations if you are aware of the bonding agent’s limitations.

References