

Caries-Affected Dentin and Bonding (11/03)

Dentin bonding: Effect of degree of mineralization and acid etching time. Lopes GC, Vieira LCC, Monteiro S, Coldeira de Andrada M, Baratieri CM. Oper Dent 2003;28:429-439.

Studies have shown that normal dentin is different from sclerotic dentin.¹ Researchers have suggested that etching sclerotic dentin of non-cariou lesions would be more difficult, resulting in a thinner hybrid layer with less resin tag formation.² Also, hypermineralized caries-affected dentin may cause a reduction in adhesive hybridization and therefore, a subsequent loss in dentinal bond strengths. The purpose of this study was to evaluate the bond strength to sclerotic occlusal dentin using a two-step etch&rinse adhesive (Single Bond, 3M ESPE, St. Paul, MN). Forty-two extracted human molars with chronic occlusal caries were sectioned, exposing the sclerotic and normal dentin. Single Bond adhesive was applied according to the manufacturer's instructions, which included a 15 second phosphoric-acid etch. Experimental groups included an extended etching time of 30 seconds. Z250 resin composite (3M ESPE, St. Paul, MN) was incrementally applied and cured and the teeth were then sectioned in preparation for microtensile bond-strength testing. **The authors found that the bond strength to sclerotic dentin was not as high as to normal dentin. Doubling the etching time to 30 seconds increased the bond strength to that of normal dentin. For normal dentin, increasing the etching time did not negatively affect bond strengths. Sclerotic dentin was found to have a higher hardness and a thinner hybrid layer than normal dentin.**



DIS Comment: The results of this study support the concept of increasing etching time for hypermineralized, sclerotic dentin to create a thicker hybrid layer and improve bond strengths. Hypermineralized dentin is harder and therefore more resistant to acid demineralization compared to normal dentin. Increasing the etching time of sclerotic dentin would potentially remove greater mineral content and expose the collagen fibers more adequately, allowing easier penetration of the adhesive. A three-year clinical study involving the restoration of non-cariou cervical lesions found that most failures occurred on those lesions classified as more sclerotic.³ Also, studies have found that increasing the etching time did not affect the bond strength to normal dentin.⁴ More in vivo studies are necessary to verify any clinical benefit of increasing the etching time when bonding to sclerotic, caries-affected dentin.

References

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