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2549 Differential permeability reduction in single-bottle adhesives with an oxalate desensitizer

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Objective: This study examined the changes in hydraulic conductance and ultrastructure of dentin bonded with simplified etch-and-rinse adhesives to oxalate desensitizer pre-treated acid-etched dentin.

Methods: Human dentin disks were acid-etched, treated with an oxalate desensitizer (BisBlock, Bisco), and bonded with One-Step (OS), Single Bond (SB), OptiBond Solo Plus (OB) or Prime and Bond NT (PB). Similar disks from each group were acid-etched, and bonded without oxalate pre-treatment. Hydraulic conductance of the specimens was measured at 20cm of water pressure and analyzed with nonparametric statistical methods. Epoxy resin replicas of the smear layer-covered dentin and bonded dentin were examined with SEM for the extent of fluid transudation. Specimens bonded under perfusion were examined with TEM after tracer immersion.

Results: OB and PB exhibited a highly significant reversal of the reduced hydraulic conductance obtained with Bisblock on unbonded acid-etched dentin. Profuse water transudation across the bonded dentin was observed from the replicas. Adhesive interfaces were covered with spherical globules that interfered with dentin hybridization. Conversely, no significant difference in hydraulic conductance was observed in SB, between Bisblock pre-treated, unbonded and bonded acid-etched dentin. Significantly lower hydraulic conductance was shown on application of OS to Bisblock-treated acid-etched dentin. Water transudation was sparse, interfering surface globular structures were absent, and only angular subsurface crystals were seen in the dentinal tubules.

Conclusions: Convective water flux through dentin may be reduced by applying Bisblock to acid-etched dentin before bonding with One-Step or Single Bond. However, reducing adhesive permeability with the use of oxalate desensitizer is not applicable to low acidity adhesives such as OptiBond Solo Plus and Prime and Bond NT.

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