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Reversal of compromised bonding in NaOCl or H_2O_2 treated etched dentin.*Lai SCN[1], Mak YF[1], Cheung GSP[1], Osorio R[2], Toledano M[2], Carvalho R[3], Tay FR[1], Pashley DH[4] ([1]Univ. of Hong Kong, [2]Univ. of Granada, [3]Univ. of São Paulo, [4]Medical College of Georgia)

This study examined the hypothesis that decrease in bond strength in sodium hypochlorite (NaOCl) or hydrogen peroxide (H_2O_2) treated etched dentin is caused by the oxidizing action of these chemicals. Acid-etched, deep coronal human dentin were bonded with Single Bond (3M, St. Paul, MN) after treatment with different chemical solutions for 60s each: [1] distilled water; [2] 5.25% NaOCl; [3] 10% H_2O_2; [4] 10% sodium ascorbate (SA); [5] 5.25% NaOCl followed by 10% SA; and [6] 10% H_2O_2 followed by 10% SA. Resin-dentin interfaces of these six groups were demineralized and processed for TEM examination. Restored teeth were trimmed to dumbbell-shaped specimens (n= 14-15) and evaluated for tensile bond strength. Failure modes and surface areas were further assessed using SEM. All specimen surface areas were statistically adjusted by Least Square Means to the correlated bond strengths at 0.8 mm^2. One way ANOVA and SNK test revealed that NaOCl, H_2O_2 or SA when used alone, produced significant ($p < 0.05$) reduction in resin-dentin bond strengths. When SA, a reducing agent, was used after NaOCl or H_2O_2, reduction in tensile bond strengths were effectively reversed. TEM and SEM showed that deproteinization of the demineralized collagen matrix was incomplete with NaOCl and absent with the use of H_2O_2. Failure modes were almost exclusively mixed failures in all groups. However, variation in extent of resin infiltration and resin tag integrity could be discerned along fractured hybrid layers. It is concluded that reduction in resin-dentin bond strengths in NaOCl and H_2O_2 treated etched dentin cannot be attributed to incomplete deprotenization. This is more likely related to changes in the redox potential of the bonding substrate that affect the polymerization of adhesive resin components. (Supported by DE06427 from the NIDCR)

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