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Bond Strength and Ultramorphological Evaluation After Simplified Immediate Dentin Sealing

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Objectives Traditionally, 3-step etch-and-rinse adhesive systems were proposed for performing Immediate Dentin Sealing (IDS) technique. In this study, the effect of "simplified" IDS technique achieved with more user-friendly, lightly-filled universal adhesives on microtensile bond-strength (μTBS) and dentinal endogenous enzymatic activity (MMPs) was investigated.
Methods The coronal dentin of 24 sound human molars was exposed. The following groups were formed according to the adhesive used for IDS (n=8): 1) Clearfil Universal Bond Quick (QB); 2) Scotchbond Universal Plus (SB); 3) no IDS (CTR). A provisional restoration (Caviton) was placed. After 1 week of artificial saliva storage, CAD/CAM hybrid ceramic onlays (Katana Avencia Block) were luted using a universal resin cement (Panavia SA Cement Universal) in self-adhesive mode. The specimens were cut into 1-mm^2 thick slices and subjected to μTBS test and scanning electron microscope (SEM) analysis after 24 h (T_0) or artificial aging (10.000 thermocycles 5-55°C; T_1). *In situ* zymography was conducted on 3 additional molars per group at T_0 and T_1. Data were statistically analyzed (α=0.05).
Results At T_0, QB showed a significantly higher μTBS than CTR and SB ($p<0.05$). Artificial aging negatively affected bond strength in QB and CTR, while bonding values increased in SB ($p<0.05$). Both experimental groups demonstrated higher bond strength compared with CTR after aging ($p<0.05$). Most failures were classified as mixed in nature. At T_0, the IDS with the tested adhesives significantly increased the level of MMPs (QB>SB>CTR; $p<0.05$). At T_1, only QB generated a higher gelatinolytic activity compared with CTR ($p<0.05$).
Conclusions The hereby proposed "simplified" IDS achieved with universal adhesive systems can have a positive impact on immediate- and aged μTBS, although it may lead to activation of MMPs within coronal dentin.