0719 Interaction of Conventional Glass-ionomer Cements with Hydrated Dentin

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GICs bond chemically to dentin via an ion exchange intermediate layer that is formed by interaction of calcium ions from partially demineralized dentin and polyacrylic acid. The ultrastructural characteristics and water content at the GIC-dentin interfaces have not been fully elucidated. Objective: The purpose was to examine, with scanning electron microscopy (SEM), field emission environmental scanning electron microscopy (FE-ESEM) and transmission electron microscopy (TEM), the interfacial ultrastructure of the fractured GIC-dentin surfaces of six conventional GICs when bonded to hydrated dentin, using as a control GIC specimens not bonded to dentin. Methods: Dentin surfaces from extracted third molars were abraded with 180-grit SiC paper. Six teeth were prepared for each material tested: Fuji IX GP and Fuji VII (GC), Chemflex and Experimental batch K-136 (Dentsply), Ketac-Molar Aplicap (ESPE) and Hy-Bond (Shofu). GIC buildups were made according to the manufacturers' instructions. After storage at 37°C, 100% humidity for 24 h, 4 bonded teeth from each group were fractured for SEM and FE-ESEM examinations. TEM was performed on 2 bonded teeth from each group, using unstained, undemineralized sections. Results: SEM analysis revealed numerous spherical bodies and dehydration cracks on the GIC sides of fractured GIC-dentin interfaces; the spherical bodies resembled eggshell crusts with a hollow internal structure. By contrast, when the spherical bodies were examined using FE-ESEM, in a hydrated state, they resembled a solid structure with a high Si content as shown by Energy Dispersive X-ray (EDX) analysis. TEM also revealed the distinct phases of spherical bodies. However, these spherical bodies were not observed in bonded specimens fractured 3 mm distant from GIC-dentin interfaces or in GIC specimens not bonded to dentin. Conclusion: It is hypothesized that these spherical bodies represent a continuation of a glass ionomer reaction within the matrix in the presence of fluid derived from the hydrated dentin.

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