

A New Enamel Restoring Agent for Use after Bleaching

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Professional bleaching is widely practised and appears to have little adverse effect on the teeth. But hypersensitivity and relapse of discoloration often occur, requiring regular follow-up to ensure patient well-being. Postulating that sensitivity and relapse of discoloration result from microstructural changes to the enamel surface during the bleaching process, we developed a new enamel-restorative finishing agent and examined its effect on the post-bleach enamel surface. Specimens of extracted human anterior teeth without previous restorative treatment, caries or white-spot lesions were bleached with Hi-Lite (Shofu), according to the maker's instructions. After bleaching, the teeth were lightly polished with the newly developed finishing agent, containing nanoparticle hydroxyapatite. The microstructure of the enamel surface was observed before and after bleaching, and also after post-bleach treatment with the finishing agent, using a scanning electron microscope (SEM) (S-4500, HITACHI) and a scanning probe microscope (SPM) (SPI4000, Seiko Instruments). SPM observation allowed both qualitative (three dimensional) and quantitative (computed) evaluation of the enamel surface at each stage of processing. We also tested the susceptibility of the enamel surface to discoloration, by immersing bleached specimens, and post-bleach specimens treated with the finishing agent, in a Rhodamine dye. SPM observation showed some roughness in the enamel surface prior to bleaching, believed to result from toothbrushing and other normal abrasion. In comparison, the enamel surface after bleaching was much rougher, suggesting that damage to the microstructure had occurred. After post-bleach treatment with the finishing agent, the surface resembled that of the original enamel prior to bleaching, suggesting that restoration of the microstructure had occurred. SEM observation showed similar results : the enamel surface was rougher after bleaching than before, but after post-bleach treatment with the finishing agent, the surface resembled that of pre-bleach enamel. Cross-sectional observation of the Rhodamine-immersed specimens showed that dye penetrated deeply into the enamel of bleached specimens but only superficially into that of bleached specimens treated with the finishing agent. We concluded that treatment of bleached enamel with the nanoparticle hydroxyapatite-based finishing agent was effective in (1) restoring the enamel to a condition similar to that of pre-bleach enamel, and (2) reducing the likelihood of relapse of discoloration after bleaching.