Influence of Using Calcium Phosphate Desensitizer for Vital Bleaching on Bleaching Effect

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Abstract
Purpose: Including mild cases, the incidence of dentin hypersensitivity during or immediately after bleaching is reported to be 55~75%. One causal factor may be enamel lamellae or microcracks in the enamel. The purpose of this study was to observe the enamel microcrack sealing performance of a newly developed calcium phosphate based desensitizer applied according to the manufacturer's directions, and to investigate the effects of desensitizers on bleaching performance.

Methods: The materials used in this experiment were Teethmate desensitizer ("TMD"; Kuraray Noritake Dental) for suppressing hypersensitivity and Shofu Hi-Lite (Shofu) and Shofu Hi-Lite Shade Up (Shofu) for bleaching vital teeth. In-office bleaching was performed using Shofu Hi-Lite on extracted human front teeth with cracks using the standard methods. Then, TMD was rubbed into the teeth for 30 seconds, and the crack sealing performance was observed under a stereomicroscope and scanning electron microscope. In another experiment, TMD was rubbed into only half of the front teeth with cracks to create a TMD coated surface and non-coated surface, and at-home bleaching trays were fabricated such that they covered each surface. Next, at-home bleaching was performed with Shofu Hi-Lite Shade Up for a total of 28 hours. Teeth were then observed with a spectral colorimeter (Spectro Color Meter SE-2000; Nippon Denshoku Industries). CIE L* a* b* values were calculated with a gray background of luminosity 5 and the color differences (∆E*ab) were compared. The results of ∆E*ab were statistically analyzed using Tukey's multiple comparison method (α = 0.05).

Results: Observation by scanning electron microscopy revealed that TMD had filled the enamel microcracks. In addition, the color difference ∆E*ab between before and after bleaching the TMD-coated surface on a gray background was 11.59±2.75, while ∆E*ab of the control surface between before and after bleaching was 12.48±1.10. There were no differences in ∆E*ab between the TMD-coated and control surfaces.

Conclusions: Calcium phosphate-based desensitizers can seal enamel microcracks and do not affect bleaching performance, indicating that they may be useful before or during bleaching.

Key words: Tooth sensitivity, Desensitizer, Vital bleaching