

RESEARCH ARTICLE

Effect of strong tooth-bleaching with 38% hydrogen peroxide on marginal seal of dental restorations using self-etch and total-etch adhesives

Morakot Piemjai DDS, MDS, PhD  | Spun Lenglerdphol DDS

Department of Prosthodontics,
Chulalongkorn University, Henri-Dunant
Road, Patumwan, Bangkok 10330, Thailand

Correspondence

Morakot Piemjai, Department of
Prosthodontics, Faculty of Dentistry,
Chulalongkorn University, Henri-dunant
Road, Patumwan, Bangkok 10330, Thailand.
Email: tmorakot@chula.ac.th

ABSTRACT

The purpose of this study was to evaluate the distance and/or thickness of dye penetration at enamel and cementum/dentin margins of restorations before and after vital bleaching. Class V cavities were prepared on extracted human premolars and restored with light-cured resin composite using either AQ-Bond or Single-Bond2 adhesives. Four conditions: no bleaching (control), restored before bleaching (RB), bleached and immediately restored (BIR), bleached and stored in artificial saliva for 7 days then restored (B7R), were used for each adhesive group. After soaking in basic fuchsin dye for 24 hours, all specimens were vertically sectioned through the middle of restorations to measure the distance and/or the thickness of dye penetration. No microleakage was found either on enamel and cementum/dentin margins of control group using AQ-Bond. Whereas leakage was found in the control group using Single-Bond2 and bleached groups. Statistically significant differences in leakage distance and/or thickness were found among groups at the cementum/dentin margin ($P < .05$). Dye could penetrate into the pulp chamber of BIR (60%) and B7R (15%) specimens.

Clinical Significance

The negative control or leakage-free group is very important when discussing the effects of bleaching on marginal seal or microleakage. Bleaching using 38% H₂O₂ increases the microleakage distance and dye penetration area of cementum/dentin margin more than that of enamel margin. The bleached tooth is not a good substrate for reliable bonding and complete seal and it is also a channel for external stimuli reaching the pulp.

KEYWORDS

marginal seal, microleakage, tooth-bleaching

1 | INTRODUCTION

Vital tooth bleaching has been shown to be an effective and conservative technique to improve the esthetics of discolored teeth.¹⁻⁴ Hydrogen peroxide, in various concentrations and forms, for example, carbamide peroxide agent, sodium perborate, is the primary material used by clinicians in the bleaching process. It is an unstable liquid which easily transforms to water and nascent oxygen that effectively penetrates into enamel and dentin, and chemically reacts with chromogens and tooth components.⁵ Hydrogen peroxide can oxidize both inorganic and organic components of tooth structures resulting in lower surface

hardness,^{6,7} tensile strength,^{8,9} fracture toughness,¹⁰ and an increase in surface roughness, porosity, and sensitivity of tooth tissue.^{1,8,9,11-20}

Most studies have reported adverse effects of bleaching agent on the physical properties of bleached tooth including bond strength at the tooth-restoration interface.^{7,9,13,21,22} Few of them have studied microleakage between tooth and restoration that could be related to vital tooth bleaching.²³⁻²⁵ Microleakage is the major contributor to tooth-hypersensitivity, tooth staining, dental caries, and pulp infection.^{26,27} TEM examination confirmed that exposed collagen fibrils in the remaining demineralized dentin under dental restorations, where microleakage had taken place was stained by dye.²⁸ It was