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Effect of Delayed Bonding and Three Different Antioxidants on Composite Restoration Microleakage of Internally Bleached Teeth (An *in vitro* study)

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Abstract

Hydrogen peroxide or its derivatives are used in various concentrations in most dental bleaching techniques. However, these bleaching agents have various side effects. It has been reported that bleaching may affect the sealing ability of immediately placed composite resin restoration. The aim of this *in vitro* study was to evaluate and compare the effect of delayed bonding procedure and different antioxidant agents on the microleakage of composite restoration in endodontically treated teeth after intracoronal bleaching with 35% hydrogen peroxide using dye penetration test.

Sixty sound human mandibular second premolar teeth were randomly divided into six groups, 10 teeth in each group. All teeth received endodontic treatment. The samples of all groups except **Group A** (negative control) were bleached with 35% hydrogen peroxide (Opalescence® Endo "walking" bleach) that was placed into the pulp chamber for 5 days. For **Group B**, the samples were immediately bonded and restored after bleaching. For **Group C**, the bonding procedure was delayed 2 weeks after bleaching. For **Groups D, E and F**, the samples were treated with 10% sodium ascorbate, 10 % green tea and 10% pine bark respectively and then immediately bonded with composite resin. In all groups, the access cavities were bonded using Scotchbond™ Universal Adhesive and restored using Filtek™ Bulk Fill posterior restorative composite resin. Teeth were subjected to 500 thermal cycles between 5-55 °C and immersed in 2% methylene blue dye for 1 day. Teeth were then sectioned longitudinally in bucco-lingual direction, using a diamond disk. The samples were then examined under stereomicroscopic magnification (20X). Microleakage was assessed with a 0 - 4 scoring system and analyzed using nonparametric statistical methods at a level of significance of 0.05.

The results of this study showed that internal bleaching with 35% hydrogen peroxide gel for 5 days resulted in a significant increase in microleakage of composite resin restorations when bonding was performed immediately after bleaching (Group B). No significant difference was found between (Group A) and the group that were bonded after 14 days after bleaching (Group C). Furthermore, there was no significant difference among groups that were bonded after treatment with the antioxidant materials (D, E and F) when compared to each other, and when compared to the negative control group (Group A).

As a conclusion, delaying the bonding procedure for 14 days or the application of 10% from one of the tested antioxidants (sodium ascorbate, green tea and pine bark) for 30 minutes, effectively reversed the compromised sealing of composite filling to bleached dental tissue with no significant difference among these antioxidant materials.