

INTERNAL BLEACHING

FEBRUARY 2006

ENDOESTHETICS

This patient presented wishing to eliminate the yellowish discoloration of tooth #2.1. She recalled sustaining a trauma roughly twenty years prior, after which the tooth continued to discolor. No other signs or symptoms were reported. (sequence of treatment images on pages 3 and 4). Looking at the radiograph, partial calcification in the coronal part of the canal is noted. At mid-root level, a canal space is clearly visible, although of an irregular shape.

Access preparation and ultrasonic troughing identified the original canal, which was diametrically quite narrow to begin with, but which became very wide at mid-root level. There was profound bleeding upon entering this region of the canal space. The sensation was similar to what one experiences with a resorption defect.

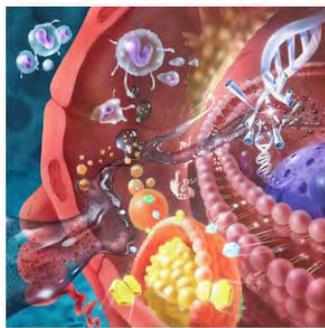
The apical foramen was gauged with ProsystemGT #70, and a dressing of calcium hydroxide placed for a period of two weeks (Ultracal/NaviTip, UPI, S. Jordan, Utah)

At the followup appointment, an apical plug of MTA was placed, the canal sealed and the MTA allowed to set. At the final appointment, the root canal procedure was completed. Sodium perborate alone was used (Superoxyl is NOT recommended for bleaching procedures due to the prevalent incidence of cervical resorption). The material was changed on



three occasions during the next two weeks. The access opening was soaked with 10% sodium ascorbate for five minutes (see below) as it acts as a scavenger for any residual oxygen which may affect the polymerization of the resin used to close the preparation

SODIUM ASCORBATE



Sodium Ascorbate is a buffered form of Vitamin C that consists of 90% ascorbic acid bound to 10% sodium. A powerful anti-oxidant, it is available in many holistic food stores in liquid form.

REFERENCE ARTICLES

1: Oper Dent. 2003 Nov-Dec;28(6):825-9.

Reversal of dentin bonding to bleached teeth.

Kaya AD, Turkun M.

Many studies have shown a considerable reduction in enamel bond strength of resin composite restorations when the bonding procedure is carried out immediately after bleaching. These studies claim that a certain waiting period is needed prior to restoration to reach the original bond strength values prior to bleaching. This study determined the effect of anti-oxidant applications on the bond strength values of resin composites to bleached dentin. Ninety human teeth extracted for orthodontic purposes were used in this study. The labial surface of each tooth was ground and flattened until dentin appeared. The polished surfaces were subjected to nine different treatments: 1) bleaching with gel (35% Rembrandt Virtuoso); 2) bleaching with gel + 10% sodium ascorbate (SA); 3) bleaching with gel + 10% butylhydroxyanisole (BHA); 4) bleaching with sol (35% hydrogen peroxide); 5) bleaching with sol + 10% sodium ascorbate; 6) bleaching with sol + 10% BHA; 7) bleaching with gel + immersed in artificial saliva for seven days; 8) bleaching with sol + immersed in artificial saliva for seven days; 9) no treatment. After bonding application, the resin composite in standard dimensions was applied to all specimens. The teeth were stored in distilled water at 37 degrees C for 24 hours and a universal testing machine determined their resistance to shear bond strength. The data was evaluated using ANOVA and Duncan tests. Bond strength in the bleached dentin group significantly decreased compared to the control group. On the other hand, the antioxidant treatment had a reversal effect on the bond strength to dentin. After the bleaching treatment, the **10% sodium ascorbate application was effective in reversing bond strength. In the samples where antioxidant was applied after the bleaching process, bonding strength in dentin tissue was at the same level as those teeth kept in artificial saliva for seven days.**

2: J Dent Res. 2002 Jul;81(7):477-81.

Reversal of compromised bonding in bleached enamel.

Lai SC, Tay FR, Cheung GS, Mak YF, Carvalho RM, Wei SH, Toledano M, Osorio R, Pashley DH.

Oxygen inhibits polymerization of resin-based materials. We hypothesized that compromised bonding to bleached enamel can be reversed with **sodium ascorbate**, an anti-oxidant. Sandblasted human enamel specimens were treated with distilled water (control) and 10% carbamide peroxide gel with or without further treatment with 10% sodium ascorbate. They were bonded with Single Bond (3M-ESPE) or Prime&Bond NT (Dentsply DeTrey) and restored with a composite. Specimens were prepared for microtensile bond testing and transmission electron microscopy after immersion in ammoniacal silver nitrate for nanoleakage evaluation. Bond strengths of both adhesives were reduced after bleaching but were reversed following sodium ascorbate treatment ($P < 0.001$). Resin-enamel interfaces in bleached enamel exhibited more extensive nanoleakage in the form of isolated silver grains and bubble-like silver deposits. Reduction of resin-enamel bond strength in bleached etched enamel is likely to be caused by a delayed release of oxygen that affects the polymerization of resin components.

3. Effect of 10% sodium ascorbate on the shear bond strength of composite resin to bleached bovine enamel.

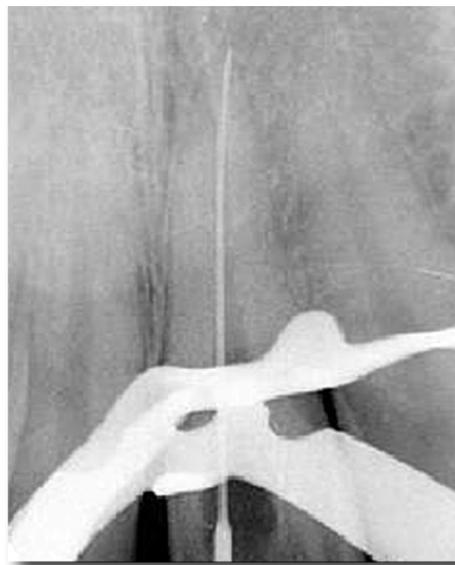
Turkun M, Kaya AD.

Department of Restorative Dentistry and Endodontics, School of Dentistry, Ege University, Izmir, Turkey.

The purpose of this study was to comparatively investigate the effect of antioxidant treatment and delayed bonding after bleaching with three different concentrations of carbamide peroxide (CP) on the shear bond strength of composite resin to enamel. One hundred flat buccal enamel surfaces obtained from bovine incisors were divided into three bleaching groups of 10, 16 and 22% CP ($n = 30$) and a control group. Each bleaching group was then divided into three subgroups ($n = 10$). Group 1 consisted of specimens bonded immediately after bleaching. Group 2 specimens were treated with antioxidant agent, 10% sodium ascorbate, while Group 3 specimens were immersed in artificial saliva for 1 week after bleaching. Specimens in the control group were not bleached. After the specimens were bonded with Clearfil SE Bond and Clearfil AP-X, they were thermocycled and tested in shear until failure. Fracture analysis of the bonded enamel surface was performed using scanning electron microscope. The shear bond strength data was subjected to one-way analysis of variance followed by Duncan's multiple range test at a significance level of $P < 0.05$. Shear bond strength of composite resin to enamel that was bonded immediately after bleaching with 10, 16 and 22% CP was significantly lower than that of unbleached enamel ($P < 0.05$). For all three bleaching groups, when the antioxidant-treated and delayed bonding (1 week) subgroups were compared with the control group, no statistically significant differences in shear bond strength were noted ($P < 0.05$).



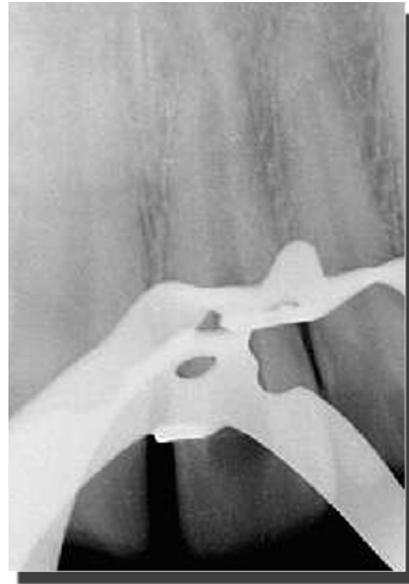
Preoperative radiograph



Working Length Determination



Ca(OH)₂ insertion



Canal preparation completed



MTA Apical plug/Obturation/Access Sealed

Postoperative clinical appearance

