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Influence of Home Bleaching on Bond Strength of Dentin Adhesives

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Introduction

Bleaching and bonding have become a new reality in dentistry, not only because of the availability of new technologies and materials but also as a result of the increase in knowledge and understanding of the mechanism of action of bleaching agents and adhesive systems. The bleaching process is based on the characteristic permeability of hard tissues that form part of the tooth structure. The bleaching agent is applied to the surface of teeth and permeates the tooth tissues, acting at a distance from the location where it was placed (1-3). Until now only low information is available on the influence of bleaching materials on microtensile bond strength of recently introduced self-etch dentin adhesive systems.

Objectives

Therefore, the aim of the present study was to evaluate the influence of different bleaching agents and concentrations on microtensile bond strength of different dentin adhesives in class V cavities in vitro.

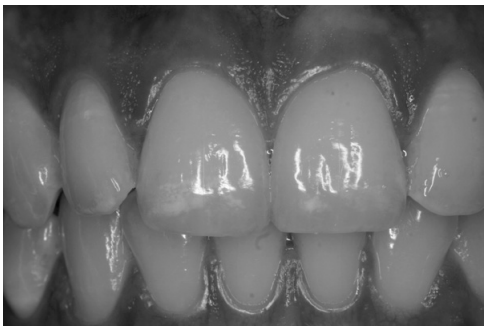

Fig. 1: Frontal view before bleaching

Fig. 2: Frontal view after bleaching with Perfect Bleach 17%

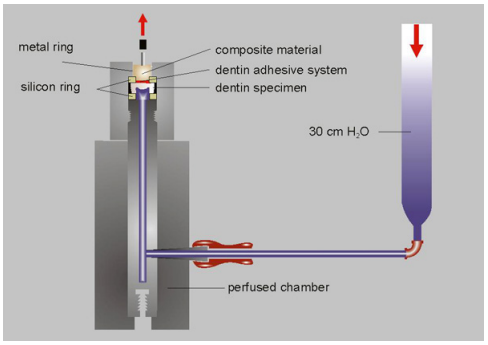

Fig. 3: Special designed apparatus to test mTBs

Material and Methods

The study was carried out on 120 freshly extracted third molars. In all teeth cervical class V dentinal cavities were prepared also allowing the simulation of dentin perfusion. The specimens were randomly assigned to eight experimental groups of fifteen each: S0: Syntac/ control; S17: Syntac/ Perfect Bleach 17%; A: AdheSE/ control; A17: AdheSE/ Perfect Bleach; X: XP Bond/ control; X17: XP Bond/ Perfect Bleach; F: Futurabond NR/ control; F17: Futurabond NR/ Perfect Bleach. Bleaching was performed 8 hours at 36°C for 7 days. Microtensile bond strength of the above mentioned bonding agents was measured using an universal testing machine.

Statistical analysis was performed using SPSS 15.0. The data of mTBS were analysed by one-way anova a. Post hoc pair-wise comparisons were performed using Tukey multiple comparisons. For each outcome, statistical significance was set at $P < 0.05$.

Fig. 4-5: Dentin adhesive systems (Syntac, AdheSE, XP Bond and Futurabond NR) and bleaching material (Perfect Bleach 17%) used in this investigation

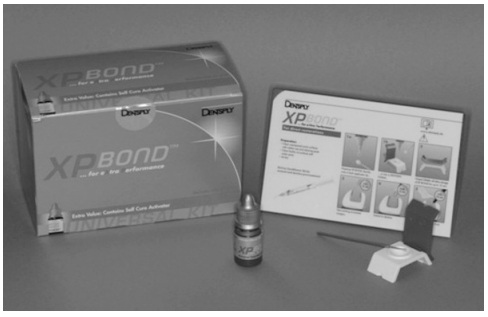

Fig. 6-7: Dentin adhesive systems (Syntac, AdheSE, XP Bond and Futurabond NR) and bleaching material (Perfect Bleach 17%) used in this investigation

Fig. 8: Dentin adhesive systems (Syntac, AdheSE, XP Bond and Futurabond NR) and bleaching material (Perfect Bleach 17%) used in this investigation

Results

For the nine test series following microtensile bond strengths were evaluated (mean value and standard deviation in MPa). The results of all groups and the mean microtensile bond strength values are listed in table 1 and graphially expressed in figure 9.
Statistical analysis showed a significant influence of the used dentin bonding agent and the bleaching agent on microtensile bond strength ($p < 0.001$, ANOVA). Pairwise comparison showed a significant reduction of bond strength in specimen treated with bleaching materials compared to the untreated control groups in the case of Syntac and AdheSE ($p < 0.05$, Tukeys test). Futurabond NR and XP Bond showed no significant decreased bond strength values after bleaching.

Group	**S**	**S17**	**A**	**A17**	**X**	**X17**	**F**	**F17**
Bond Strength	25.89	21.44	24.32	18.97	22.15	18.99	16.25	12.95
+ / -	2.97	2.05	6.93	2.80	3.53	2.96	1.72	1.74

Tab. 1: Bond Strength (in MPa) and standard deviation within the different groups

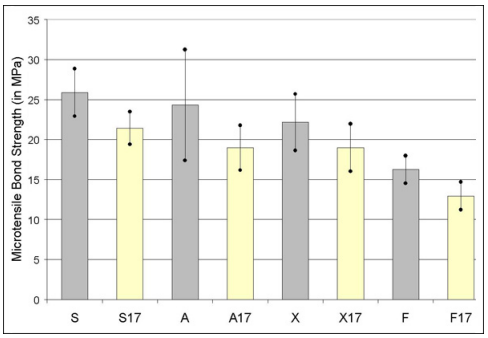

Fig. 9: Graphically expression of the results
(mean values and standard deviation in MPa)

Conclusions

Within the limitations of an in vitro investigation it can be concluded that the pretreatment of dentin using high concentrated bleaching agents might affect tensile bond strength of the dentin adhesives tested.

Literature

1. Barbosa CM, Sasaki RT, Florio FM, Basting RT (2008): Influence of time on bond strength after bleaching with 35% hydrogen peroxide. J Contemp Dent Pract: 9 (2):81-8.
2. Goldstein CE, Goldstein RE, Feinman RA, Garber DA (1989): Bleaching vital teeth: state of the art. Quintessence Int: 20(10):729-37.
3. Goldstein GR, Garber DA (1995): Complete dental bleaching. Chicago: Quintessence Books: 165.

This Poster was submitted by Prof. Dr. Hans-Günter Schaller.

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Poster Faksimile:

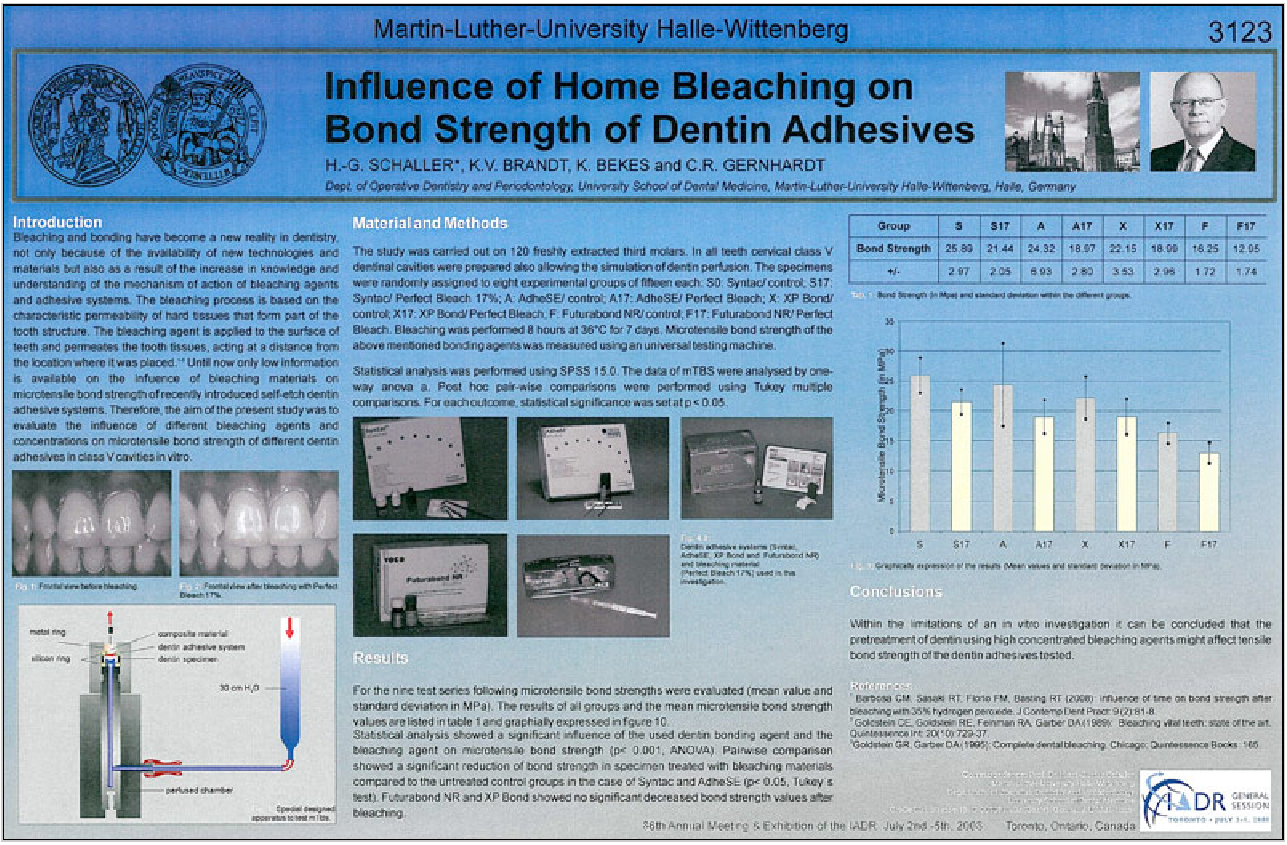

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Fig. 1: Frontal view before bleaching.

Fig. 2: Frontal view after bleaching with Perfect Bleach 17%.

metal ring, silicon ring, composite material, dentin adhesive system, dentin specimen, 30 cm H_2O, perfused chamber

Fig. 3: Special designed apparatus to test m TBs.

Material and Methods

The study was carried out on 120 freshly extracted third molars. In all teeth cervical class V dentinal cavities were prepared also allowing the simulation of dentin perfusion. The specimens were randomly assigned to eight experimental groups of fifteen each: S0: Syntac/ control; S17: Syntac/ Perfect Bleach 17%; A: AdheSE/ control; A17: AdheSE/ Perfect Bleach; X: XP Bond/ control; X17: XP Bond/ Perfect Bleach; F: Futurabond NR/ control; F17: Futurabond NR/ Perfect Bleach. Bleaching was performed 8 hours at 36°C for 7 days. Microtensile bond strength of the above mentioned bonding agents was measured using an universal testing machine.

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Fig. 4-8: Dentin adhesive systems (Syntac, AdheSE, XP Bond and Futurabond NR) and bleaching material (Perfect Bleach 17%) used in the investigation.

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For the nine test series following microtensile bond strengths were evaluated (mean value and standard deviation in MPa). The results of all groups and the mean microtensile bond strength values are listed in table 1 and graphially expressed in figure 10.

Statistical analysis showed a significant influence of the used dentin bonding agent and the bleaching agent on microtensile bond strength ($p < 0.001$, ANOVA). Pairwise comparison showed a significant reduction of bond strength in specimen treated with bleaching materials compared to the untreated control groups in the case of Syntac and AdheSE ($p < 0.05$, Tukey's test). Futurabond NR and XP Bond showed no significant decreased bond strength values after bleaching.

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+/-	2.97	2.05	6.93	2.80	3.53	2.96	1.72	1.74

Tab. 1: Bond Strength (in Mpa) and standard deviation within the different groups.

Microtensile Bond Strength (in MPa); 0, 5, 10, 15, 20, 25, 30, 35; S, S17, A, A17, X, X17, F, F17

Fig. 10: Graphically expression of the results (Mean values and standard deviation in MPa).

Conclusions

Within the limitations of an in vitro investigation it can be concluded that the pretreatment of dentin using high concentrated bleaching agents might affect tensile bond strength of the dentin adhesives tested.

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