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The Influence of Desensitizing on Bond Strength of Dentin Adhesives

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Introduction

If the enamel has been removed, as is commonly done, to allow restoration, millions of dentinal tubules can be exposed (1). Dentin exposure means a potential increase of risk of pulpal injuries, since dentin tubules can represent channels for the diffusion of injurious substances, triggering a pulpal inflammatory response (2). Moreover, exposed dentin can be sensitive to mechanical, thermal, tactile or osmotic stimuli, causing the clinical symptom of dentin hypersensitivity (3,4). Consequently, sealing dentin after cavity preparation may be important and necessary in order to maintain dentin vitality, pulpal health, and patient comfort. The material used at this purpose must be able to seal the dentin tubules and it has to be biocompatible and insoluble in oral fluids (5). However, it is only low information available about the influence of these desensitizing agents on bond strength of dentin adhesives in dental literature.

Objectives

Therefore, the aim of the present study was to evaluate the influence of a densensitizer (Gluma Desensitizer) on tensile bond strength of different dentin adhesives.

Material and Methods

Sixty freshly extracted third molars stored in saline for a maximum of seven days after extraction were included in this study. All teeth were specially prepared allowing the simulation of dentin perfusion. Dentin specimens with a total thickness of 3.5 mm (± 0.5mm) were obtained under standardized conditions. The specimens were randomly assigned to four experimental groups: group A1: Clearfil New Bond/ Clearfil Core; group A2: Gluma Desensitizer/ Clearfil New Bond/ Clearfil Core; group B1: Xeno III/ Tetric; group B2: Gluma Desensitizer/ Xeno III/ Tetric. All materials were applied as recommended by the manufacturer (Fig. 5 -7). Tensile bond strength of the above mentioned bonding agents was measured 15 minutes after application and light curing of the composite material (colour A2) using an universal testing machine (Fig. 1, 2, 4). For each group mean value and standard deviation were calculated. Statistical analysis was performed using ANOVA and Tukey's test.

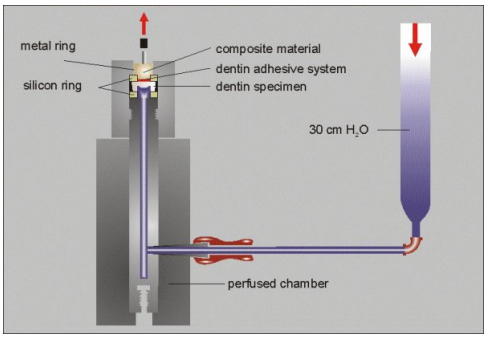

Fig. 1: Special designed apparatus to test tensile bond strength under permanent dentin perfusion.

Fig. 2: Special designed apparatus mounted in a universal testing machine.

	Group A1 (Clearfil New Bond/ Clearfil Core)	Group A2 (Gluma Desensitizer/ Products Group A1)	Group B1 (Xeno III/ Tetric Ceram)	Group B2 (Gluma Desensitizer/ Products Group B1)
Bond Strength (MPa)	12.59	12.50	4.46	6.60
Standard deviation	+/- 4.65	+/- 5.26	+/- 1.38	+/- 1.23

Tab. 1: Mean value and standard deviation within the different groups.

Results

For the four test series following tensile bond strengths were evaluated (mean values and standard deviations in MPa): Group A1: 12.59 (± 4.65), group A2: 12.50 (± 5.26), group B1: 4.46 (± 1.38), group B2: 6.60 (± 1.23). Statistical analysis showed a significant influence of the used dentin bonding agent on tensile bond strength ($p < 0.001$, ANOVA). Pairwise comparisons showed no significant differences between specimens pretreated with the desensitizer and untreated samples in group A. Tensile bond strength of Clearfil New Bond (group A1, A2) was significantly increased compared to the groups treated with Xeno III ($p < 0.05$, Tukeys test).

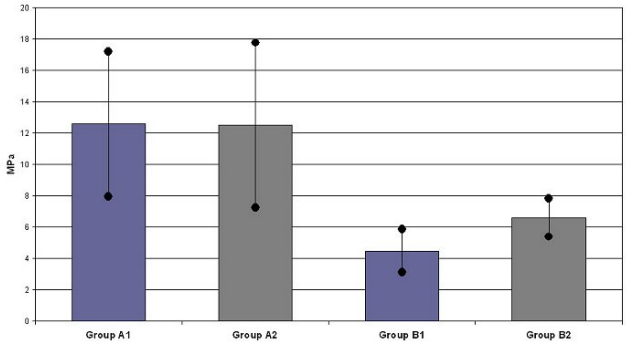

Fig. 3: Mean value and standard deviation within the different groups.

Fig. 4: The experimental device mounted in the universal testing machine (Zwick Z005).

Fig. 5: Materials used in group A: The dentin adhesive Clearfil New Bond and the corresponding self-curing composite Clearfil Core.

Fig. 6: Materials used in group B: The dentin adhesive Xeno III and the light-curing composite material Tetric Ceram (colour A2).

Fig. 7: The desensitizing agent. Gluma Desensitizer applied in group A2 and B2.

Discussion

Within the limitations of an in vitro investigation it can be concluded that the pretreatment of dentin using a desensitizer might not affect tensile bond strength of the dentin adhesives tested.

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Abbreviations

MPa = Megapascals
Fig. = Figure
Tab. = Table

This poster was submitted by Dr. Christian Ralf Gernhardt.

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