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Effect of different concentrations of CHX on microtensile bond strength

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Authors:
Dr. Katrin Bekes, Prof. Dr. Hans-Günter Schaller, PD Dr. Christian R. Gernhardt, Susann Sigmund,
Department of Operative Dentistry and Periodontology, Martin-Luther-University Halle-Wittenberg, Halle, Germany

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Introduction

The use of disinfectant solutions is an alternative to reduce or eliminate bacteria from cavity preparations (1). To reach this goal, some antibacterial solutions have been evaluated [chlorhexidine (CHX), sodium hypochlorite, fluoride solutions], and the results of different studies are controversial with regard to how the disinfectants affect adhesion (2,3). CHX has been widely used as an antimicrobial agent, including for disinfection before the placement of restorations (4).

Objectives

The aim of the present study was to evaluate the effect of different concentrations of chlorhexidindigluconate (CHX) on microtensile bond strength (mTBS) of two dentin adhesives (Syntac Classic, Optibond All-in-One) in vitro (Fig. 1, 2).

Fig. 1,2: The etch and rinse adhesive system Syntac Classic and the self-etch adhesive Optibond All-in-One used in this study.

Material and Methods

Seventy-two extracted third molars were included in this study. All teeth were specially prepared allowing the simulation of dentin perfusion (Fig. 3).
The specimens were randomly assigned to one of the six groups of fifteen samples each: group S-C: Syntac control group (no CHX-application); group S-0.2: immersion for five minutes in 0.2% CHX prior to bonding with Syntac, group S-5: immersion for five minutes in 5% CHX prior to bonding with Syntac, groups O-C, O-0.2 and O-5 followed the same procedure with Optibond All-in-One as adhesive.
All specimens were mounted to a experimental apparatus, where a physiological intrapulpal pressure (30cm H2O) could be established and maintained during the experimental period (Fig. 3). A metal ring was positioned, thereby the dentin bonding agents and the resin material could be applied on a standardized surface area of 0.785 mm² (Ø 1 mm) (Fig. 4, 5). Microtensile bond strength was measured 15 minutes after application of the composite (Tetric Ceram) using an universal testing machine.
Statistical analysis was performed using SPSS 18.0. The data of mTBS were analysed by one-way anova. Post hoc pair-wise comparisons were performed using Tukey multiple comparisons. For each outcome, statistical significance was set at $p < 0.05$.

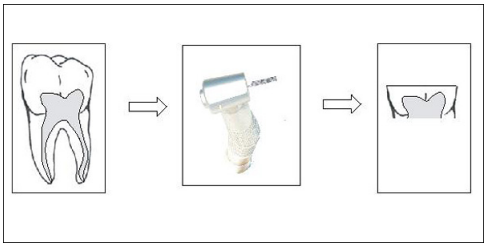

Fig. 3: Specimen preparation that allows to simulate dentin perfusion.

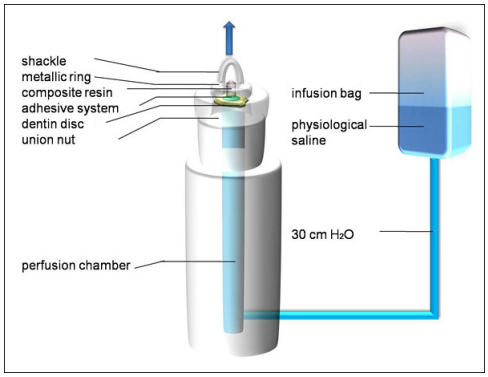

Fig. 4: Special designed apparatus to test microtensile bond strength with permanent dentin perfusion.

Fig. 5: Original experimental device.

Results

The mean values (±SD) of the mTBS of the two materials tested in this study are presented in Tab. 1 and Fig. 6.

	S-C	S-0.2	S-05	O-C	O-0.2	0-5
Mean	24.27	19.69	13.25	22.78	20.12	16.99
SD	6.07	4.83	3.39	4.49	4.57	4.17

Tab. 1: Mean values and standard deviations (in MPa) within the different experimental groups

Statistical analysis showed a significant influence of the used dentin adhesive and the pre-treatment with CHX in different concentrations ($p < 0.001$, ANOVA). The application of 5% CHX before bonding procedure (S-5, O-5) resulted in a significant reduction of mTBS compared to the untreated control groups (S-C, O-C) ($p < 0.05$, Tukey's test). Between the 0.2% CHX-groups and the controls, no significant differences could be detected ($p < 0.05$, Tukey's test). Pairwise comparison between Syntac and Optibond showed no significant differences after the different pre-treatments ($p < 0.05$, Tukey's test).

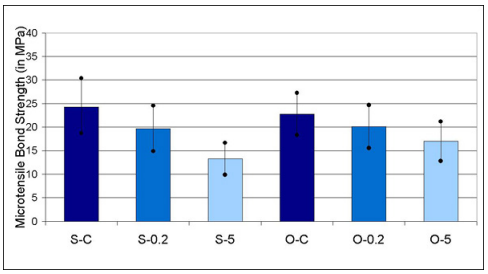

Fig. 6: Graphically expression of the results.

Conclusions

Within the limitations of an in vitro investigation it can be concluded that CHX in high concentrations affected the mTBS of both tested adhesive systems. Further studies are necessary to improve the understanding about interactions between disinfectant solutions and adhesive components.

Literature

1. Meiers JC, Kresin JC. Cavity disinfectants and dentin bonding.Oper Dent. 1996 Jul-Aug;21(4):153-9.
2. Geraldo-Martins VR, Robles FR, Matos AB. Chlorhexidine's effect on sealing ability of composite restorations following Er:YAG laser cavity preparation. J Contemp Dent Pract.2007 Jul;8(5):26-33.

Abbreviations

MPa = Megapascal
mTBS = microtensile bond strength

This Poster was submitted by Dr. Katrin Bekes.

Correspondence address:
Dr. Katrin Bekes
Martin-Luther-University Halle-Wittenberg
Department of Operative Dentistry and Periodontology
Grosse Steinstrasse 19
06108 Halle
Germany

Poster Faksimile:

Martin-Luther-University Halle-Wittenberg

2460

Effect of Different Concentrations of CHX on Microtensile Bond Strength

H.G. SCHALLER*, C.R. GERNHARDT, S. SIEGMUND and K. BEKES

Department of Operative Dentistry and Periodontology, University School of Dental Medicine, Martin-Luther-University Halle-Wittenberg, Germany

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Aim of the study

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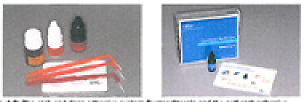

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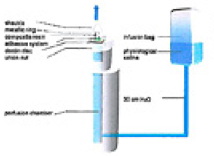

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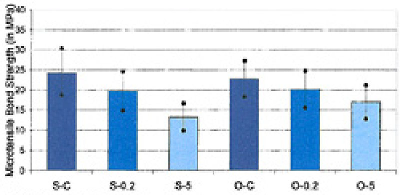

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Correspondence: Prof. Dr. Hans-Günter Schaller
Martin-Luther-University Halle-Wittenberg,
Department of Operative Dentistry and Periodontology,
Gr. Steinstr. 19,D-06108 Halle (Saale), Germany
E-Mail: hans-guenter.schaller@medizin.uni-halle.de

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