

Influence of CHX on Microtensile Bond Strength of Self-Etching Adhesives

Language: English

Authors:

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

Date/Event/Venue:

31.8.-3.9.2011
45th Meeting of the CED of the IADR
Budapest, Hungary

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 influence of different concentrations of chlorhexidindigluconate (CHX) on microtensile bond strength (mTBS) of two self-etching dentin adhesives (Futurabond NR, Bond Force) in vitro.

Material and Methods

The study was carried out on 120 extracted primary molars. All teeth were specially prepared allowing the simulation of dentin perfusion and standardized conditions (Figure 1). The specimens were randomly assigned to one of the eight groups of fifteen samples each: group F-C: Futurabond NR, control group (no CHX-application); F-0.2: immersion for five minutes in 0.2% CHX prior to bonding with Futurabond, F-2: immersion for five minutes in 5% CHX prior to bonding, F-5: immersion for five minutes in 2% CHX prior to bonding, groups B-C, B-0.2, B-2 and B-5 followed the same procedure with Bond Force as adhesive. All materials were applied as recommended by the manufacturer. MTBS was measured 15 minutes after application of the composite (Tetric Ceram) using a Zwick universal testing machine (Figure 1).

Statistical analysis was performed using SPSS 15.0. The data of mTBS were analysed by one-way anova and Tukey's multiple comparisons. For each out-come, statistical significance was set at $p < 0.05$.

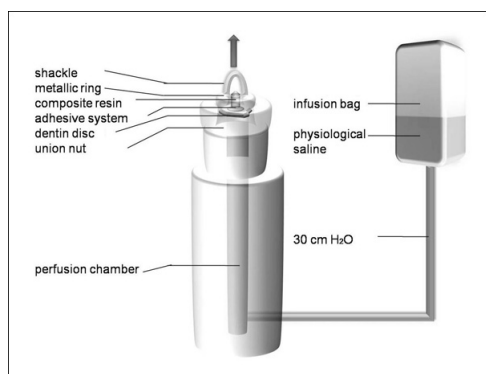


Fig. 1: Special apparatus designed to test mTBS

Results

For the test series following tensile bond strengths were evaluated (mean values and standard deviations in MPa) (Table 1):

	F-C	F-0.2	F-2	F-5	B-C	B-0.2	B-2	B-5
Mean	23.9	18.4	17.3	16.3	23.0	19.6	13.9	10.8
±	7.7	4.4	5.2	5.7	7.5	5.6	6.5	3.0

Table 1: Mean values and standard deviations (in MPa) within the different 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) (Figure 2). The application of 2% and 5% CHX before bonding procedure (F-2, F-5, B-2, B-5) resulted in a significant reduction of mTBS compared to the untreated control groups (F-C, B-C) ($p < 0.05$, Tukey's test). Between the controls and the 0.2% CHX-groups, no significant differences could be detected ($p > 0.05$, Tukey's test). Pairwise comparison between Futurabond and Bond Force showed no significant differences in all groups ($p > 0.05$, Tukey's test).

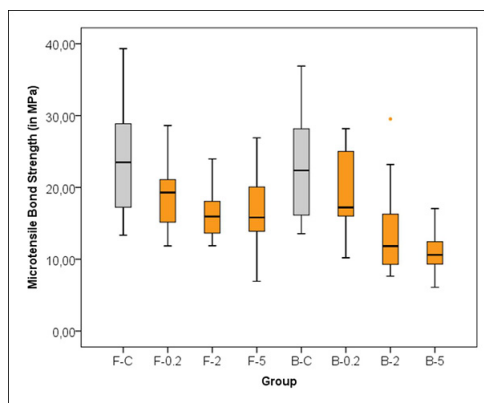


Fig. 2: Boxplot of the results

Conclusions

Within the limitations of an in vitro investigation it can be concluded that CHX in higher concentrations affected the mTBS of both tested self-etching adhesive systems.

Literature

1. Meiers JC et al.: Cavity disinfectants and dentin bonding. Oper Dent. 1996; 21(4):153-9.
2. Geraldo-Martins VR, et al.: Chlorhexidine's effect on sealing ability of composite restorations following Er:YAG laser cavity preparation. J Contemp Dent Pract. 2007;8(5):26-33.
3. de Campo EA et al.: Influence of chlorhexidine concentration on microtensile bond strength of contemporary adhesive systems. Braz Oral Res 2009;23(3):340-5.
4. Carrilho MR et al.: Chlorhexidine preserves dentin bond in vitro. J Dent Res. 2007 Jan;86(1):90-4.

Abbreviations

CHX = chlorhexidindigluconate
mTBS = microtensile bond strength
MPa = megapascals

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

Influence of CHX on Microtensile Bond Strength of Self-Etching Adhesives



K. BEKES*, S. SIEGMUND, H.G. SCHALLER, C.R. GERNHARDT
 Department of Operative Dentistry, Martin-Luther-University Halle-Wittenberg, Germany

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

Aim of the Study

The aim of the present study was to evaluate the influence of different concentrations of chlorhexidindigluconate (CHX) on microtensile bond strength (mTBS) of two self-etching dentin adhesives (Futurabond NR, Bond Force) in vitro.

Material and Methods

The study was carried out on 120 extracted primary molars. All teeth were specially prepared allowing the simulation of dentin perfusion and standardized conditions (Figure 1). The specimens were randomly assigned to one of the eight groups of fifteen samples each: group F-C: Futurabond NR, control group (no CHX-application); F-0.2: immersion for five minutes in 0.2% CHX prior to bonding with Futurabond, F-2: immersion for five minutes in 5% CHX prior to bonding, F-5: immersion for five minutes in 2% CHX prior to bonding, groups B-C, B-0.2, B-2 and B-5 followed the same procedure with Bond Force as adhesive. All materials were applied as recommended by the manufacturer. MTBS was measured 15 minutes after application of the composite (Tetric Ceram) using a Zwick universal testing machine (Figure 1).

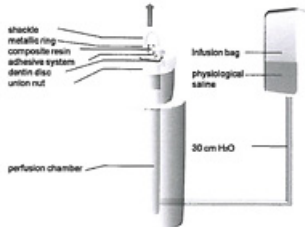


Figure 1: Special apparatus designed to test mTBS.

Statistical analysis was performed using SPSS 15.0. The data of mTBS were analysed by one-way anova and Tukey's multiple comparisons. For each out-come, statistical significance was set at $p < 0.05$.

Results

For the test series following tensile bond strengths were evaluated (mean values and standard deviations in MPa) (Table 1):

	F-C	F-0.2	F-2	F-5	B-C	B-0.2	B-2	B-5
Mean	23.9	18.4	17.3	16.3	23.0	19.6	13.9	10.8
+/-	7.7	4.4	5.2	5.7	7.5	5.6	6.5	3.0

Table 1: Mean values and standard deviations (in MPa) within the different 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) (Figure 2). The application of 2% and 5% CHX before bonding procedure (F-2, F-5, B-2, B-5) resulted in a significant reduction of mTBS compared to the untreated control groups (F-C, B-C) ($p < 0.05$, Tukey's test). Between the controls and the 0.2% CHX-groups, no significant differences could be detected ($p > 0.05$, Tukey's test). Pairwise comparison between Futurabond and Bond Force showed no significant differences in all groups ($p > 0.05$, Tukey's test).

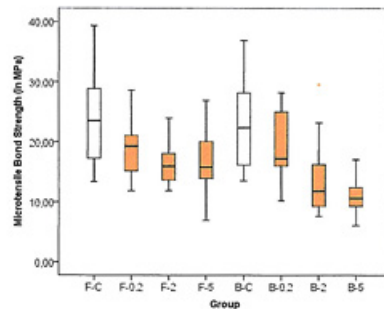


Figure 2: Boxplot of the results.

Conclusions

Within the limitations of an in vitro investigation it can be concluded that CHX in higher concentrations affected the mTBS of both tested self-etching adhesive systems.

References

- Meiers JC et al.: Cavity disinfectants and dentin bonding. *Oper Dent.* 1996; 21(4):153-9.
- Geraldo-Martins VR, et al.: Chlorhexidine's effect on sealing ability of composite restorations following Er:YAG laser cavity preparation. *J Contemp Dent Pract.* 2007;8(5):26-33.
- de Campos EA et al.: Influence of chlorhexidine concentration on microtensile bond strength of contemporary adhesive systems. *Braz Oral Res* 2009;23(3):340-5.
- Carrilho MR et al.: Chlorhexidine preserves dentinbond in vitro. *J Dent Res.* 2007 Jan;86(1):90-4.