Influence of Different Sealants on Root Dentin Demineralization in Situ

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Introduction

Following the improved caries-prophylactic developments, tooth loss even in elderly patients is often avoidable. Therefore, it can be assumed that due to prophylactic treatment and the above mentioned factor the number of exposed and denuded dentin surfaces susceptible for dental caries and dentin hypersensitivity might increase in the future. To avoid these consequences, various prophylactic treatment possibilities are described. It is known that the application of fluoride or fluoride containing solution might prevent root caries development (1). Similar effects have been described after the application of dentin adhesive systems on exposed root surfaces building the acid resistant so-called hybrid layer (2). Furthermore, in the treatment of hypersensitive dentin surfaces numerous desensitizing agents are available. Former investigations have shown that dentin adhesives and other sealants can prevent root surface caries in vitro (3, 4).

Objectives

The objective of this study was to evaluate the onset of initial demineralization in human dentin pretreated either with two different dentin bonding agents or a desensitizer in situ.

Fig. 1a: One dentin specimen of each group mounted in the buccal aspects of this intraoral mandibular appliances.

Fig. 1b: One dentin specimen of each group mounted in the buccal aspects of this intraoral mandibular appliances.
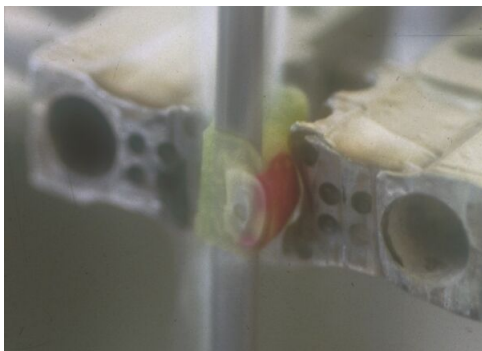

Fig. 2: Cutting a dentinal slab from a specimen.

Material and Methods

Twenty-eight freshly extracted human molars were included in this study. The root surfaces were thoroughly cleaned, thereby removing the cementum. From each tooth four root dentin specimens were prepared. The specimens were distributed among the following experimental groups: A: Syntac Classic, B: XenoIII, C: Hyposen, D: control group, untreated. One dentin specimen of each group was inserted into both buccal aspects of each fourteen intraoral mandibular appliances (Fig. 1, 2). The different dentin adhesives and desensitizers (Fig. 4-6) were used as recommended by the manufacturers.The appliances were worn by fourteen persons for five weeks day and night. One side was brushed daily with a fluoride-containing toothpaste (Aronal). On the other side, plaque was allowed to grow. Individual oral hygiene techniques were performed without any fluorides. During meals, the appliance was stored in 10% sucrose solution. After the in situ period, two slabs (150 microns) were ground (Fig. 3). The depth of the demineralized areas was determined using a polarized light microscope. For each group mean value and standard deviation were calculated. Statistical analysis was performed using ANOVA and Tukey's test.

	Group A brushed	Group B brushed	Group C brushed	Group D brushed	Group A unbrushed	Group B unbrushed	Group C unbrushed	Group D unbrushed
Mean	27,6	28,7	34,3	74,1	59,9	52,5	72,9	101,7
Standard Deviation	9,6	9,6	20,6	18,5	13,1	12,1	19,9	23,9

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

Results

Concerning lesion depth, ANOVA revealed significant differences between brushed and unbrushed specimens. In the brushed groups following lesion depths were evaluated (mean values and standard deviation in microns): Group A: 27.6 ($\pm$9.6); group B: 28.7 ($\pm$9.6); group C: 34.3 ($\pm$20.6); group D: 74.1 ($\pm$18.5). The unbrushed specimens showed following lesion depths: Group A: 59.9 ($\pm$ 13.1); group B: 52.5 ($\pm$ 12.1); group C: 72.9 ($\pm$ 19.9); group D: 101.7 ($\pm$23.9). Compared to the untreated control, lesion depths in group A, B and C were significantly decreased in the brushed and also in the unbrushed subgroups ($p<0.05$, Tukeys test) (Tab. 1, Fig. 3).
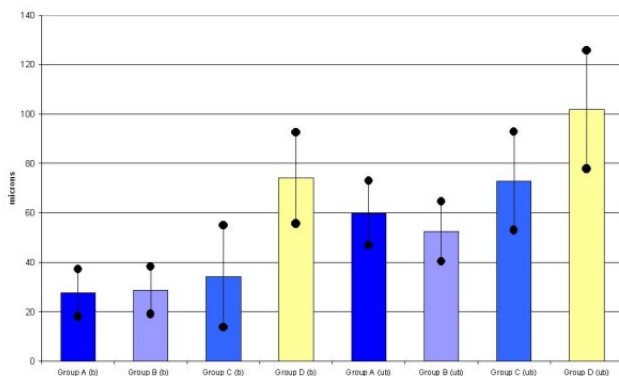

Fig. 3: Mean value and standard deviation within the different groups.

Fig. 4: Desensitizer used in the present study: Hyposen

Fig. 5: Dentin adhesives used in the present study: Xeno III .

Fig. 6: Dentin adhesive system Syntac used in the present investigation.
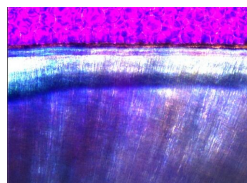

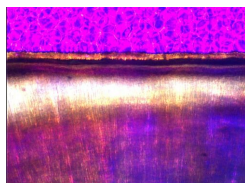Fig. 7: Specimen treated with Syntac, unbrushed (group A (ub)), 10x.

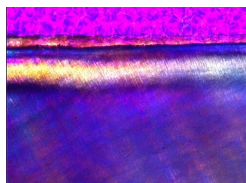Fig. 8: Specimen treated with Xeno III, unbrushed (group B (ub)), 10x.

Fig. 9: Specimen treated with Hyposen, unbrushed (group C (ub)), 10x.
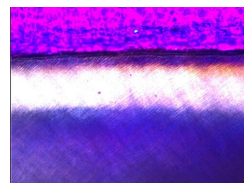
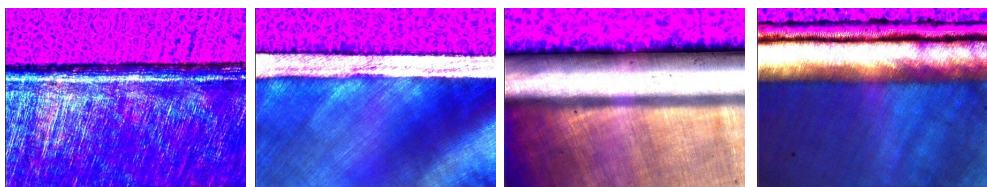Fig. 10: Untreated unbrushed control specimen (group D (ub)), 10x.

Fig. 11: Specimen treated with Syntac, brushed (group A (b)), 10x.

Fig. 12: Specimen treated with Xeno III, brushed (group B (b)), 10x.

Fig. 13: Specimen treated with Hyposen, brushed (group C (ub)), 10x.

Fig. 14: Untreated, brushed control specimen (group D (b)), 10x.

Conclusions

Within the limitations of an in situ study it can be concluded that the demineralization of the root surface can be impeded by application of dentin adhesives and desensitizers under different oral hygiene conditions.

Literature

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Poster Faksimile: