Effect of Resin Infiltration on Bleaching

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A. Objectives and Specific Aims

The purpose of this in-vitro study is to examine the influence of resin infiltration on bleaching procedures on human teeth. Extracted human teeth will be artificially demineralized and resin infiltrated. Then the infiltrated tooth surfaces will be bleached with two different bleaching products: in-office (Opalescence Boost, Ultradent) and home bleaching (Opalescence 10%, Ultradent). Three characteristics of the demineralized and infiltrated teeth surface will be measured before and after bleaching. They are shade, surface hardness and the surface roughness of the teeth. After the bleaching is complete, the teeth will be stained with red wine. The three characteristics will be measured again after the staining is complete.

B. Background and Significance

Common non-operative preventive treatment for enamel caries includes the application of fluorides as well as education in oral hygiene and proper diet. However, this regimen holds some limitations in non-compliant individuals, as well as with cavitated proximal lesions. For pits and fissures, mainly of the occlusal surfaces of permanent molars, sealing with light-curing resins has been shown to be an effective preventive measure. A promising alternative therapy to arrest caries lesions might be the infiltration of subsurface lesions with low-viscosity, light-curing resins. Since porosities of enamel caries lesions act as diffusion pathways for acids and dissolved minerals, infiltration of these pores with resins might occlude the pathways and thus hamper or arrest caries progression. Several studies have demonstrated that artificial caries lesions can be penetrated at least partially with commercially available adhesives and fissure sealants, which results in reduced lesion progression in a cariogenic environment.

Based upon the findings of Meyer-Lueckel and Paris a new product has been introduced recently (ICON, DMG). The product is indicated for non-cavitated carious lesions with a depth up to the dento-enamel junction. It can be applied to interproximal and facial lesions. After isolation of the tooth with rubber dam the lesion is etched with 15% HCl to remove the hypermineralized pseudo intact surface layer of the early caries lesion. This will allow the penetration of the resin into the pores of the decalcified enamel. After light curing the infiltrated resin prevents progression of the lesion. Additionally, the resin modifies the optical properties of early caries lesions, appearing clinically as white spot lesions. With the infiltration of the clear resin material the white spot will be reduced or even disappear, thus improving the esthetic outcome of the tooth.

Due to the newness of the product possible effects of bleaching therapy applied after resin infiltration have not been investigated, yet.

C. Preliminary Studies

A clinical study, nto Dr. Jin-ho Phark and Dr. Duarte's ongoing caries and is light-cured.o the " is being conducted by Dr. Phark and Dr. Duarte. The objective of the study is to verify the product's clinical performance and color stability over time.

D. Methods

Six groups will be tested

1. Demineralized and infiltrated in-office bleaching and staining
2. Demineralized and infiltrated home bleaching and staining
3. Demineralized and infiltrated non-bleached (control)
4. Demineralized in-office bleaching and staining
5. Demineralized home bleaching and staining
6. Demineralized none bleached teeth (control)

48 human teeth will be decoronated. The facial surfaces of all groups will be demineralized to intentionally create artificial caries lesions. After demineralization, 24 teeth will be infiltrated with the resin ICON (DMG). Then each tooth will be divided into three parts. Each part will be randomly assigned to one of the groups 1-3. One part of the divided tooth Specimens for group 1 will be bleached with in-office bleaching material and will be stained with red wine. Specimens for group 2 will be bleached with home bleaching material and will be stained with red wine. Specimens for group 3 will serve as the control group, which will not be bleached or stained. The groups 4, 5 and 6 will not be infiltrated after demineralization. They will be also divided into three part and randomly assigned to one of the groups 3-6. Specimens for group 4 will be bleached with in-office bleaching material and will be stained with red wine. Specimens for group 5 will be bleached with home bleaching material and will be stained with red wine. The last part, which specimens for group 6 will serve as the control group, which will not be bleached or stained.

Shade Measurement

The shade of the tooth will be measured using a spectrophotometer (Crystaleye, Olympus) before and after bleaching with in-office and home bleaching material. Also, the shade will again be measured after staining with the red wine. L*a*b* will be measured. ΔE values will be calculated to assess the color change after each treatment.

Surface Hardness

The surface hardness of the tooth will be measured using Atomic Force Microscopy (AFM) before and after bleaching with in-office and home bleaching material. Also, the surface hardness will again be measured after staining with the red wine.

Surface roughness

The surface roughness of the tooth will be measured using a profilometer before and after bleaching with in-office and home bleaching material. Also, the surface roughness will again be measured after staining with the red wine.

E. Human Subjects

Not Applicable

F. Literature Cited

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