SEM study on dentin/resin interface in primary teeth

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Introduction
The aim of the present paper was to study the character of connection between dentine adhesives and dentine in primary teeth, and to compare the structural pattern of selected adhesions in total etch technique and self-etching technique.

Objectives
Dentin hybridization in primary teeth.

Material and Methods
Dentinal adhesives Excite, Prime bond, Single bond, Xeno III, AdheSe and Prompt-L-pop Adper were used. The former three belong to the total etch technique, the latter three to the self-etching technique. Thirty extracted intact primary teeth were used for the study, each adhesive was applied into 5 teeth and the class I cavity was filled with EvoCeram. Struers Accutom 50 was used to halve the teeth previously embedded into epoxy resin using Epovac, and the obtained samples were embedded into methacrylate resin. The cut surfaces were polished with the Struers Tegra system. The polished surfaces were etched for 20 seconds with 37% phosphoric acid and for 5 minutes in 5% sodium hypochlorite to remove the debris. The samples were photographed in Tescan Vega TS 5136 XM scanning electron microscope.

Results

Total-etch technique
The acid-etched dentine surface was covered continuously by dentine adhesives Excite, Prime bond and Single bond. Dentinal adhesives penetrated into dentinal tubules in the form of tags and formed the hybrid layer in the demineralized surface dentine. The resin tags obturated totally dentinal tubules and sent very fine processes into anastomosing tubules.

Self-etching technique
Self-etching adhesives Xeno III, AdheSe and Prompt-L-Pop Adper formed the hybrid layer and penetrated into dentinal tubules obturing them in the same way as the adhesives of total etched technique, however, best results were obtained after AdheSe and Xeno III application. Co-polymerization of dentinal adhesives with the composite resin material was found to be good and without voids.
Fig. 1a: Excite. Enamel. Tags of dentinal adhesives in the etched enamel

Fig. 1b: Excite. Dentine. Dentinal adhesives forms the hybrid layer and penetrates into dentinal tubules. (2-4004)

Fig. 1c: Excite. Dentine. Hybrid layer along the cavity wall, penetration of adhesives into dentinal tubules (1-4004)

Fig. 2a: Prime bond. Enamel. Tags of dentinal adhesives in the etched enamel

Fig. 2b: Prime bond. Dentine. Dentinal adhesives forms the hybrid layer and penetrates into dentinal tubules. (2-2002)

Fig. 2c: Prime bond. Dentine. Hybrid layer along the cavity wall, penetration of adhesives into dentinal tubules (1-2004)

Fig. 3a: Single bond. Enamel. Tags of dentinal adhesives in the etched enamel

Fig. 3b: Single bond. Dentine. Dentinal adhesives forms the hybrid layer and penetrates into dentinal tubules

Fig. 3c: Single bond. Dentine. Higher magnification of the previous picture

Fig. 4a: Xeno III. Enamel. Tags of dentinal adhesives in the etched enamel

Fig. 4b: Xeno III. Dentine. Dentinal adhesives forms the hybrid layer and penetrates into dentinal tubules

Fig. 4c: Xeno III. Dentine. Higher magnification of the previous picture

Fig. 5a: AdheSe. Enamel. Tags of dentinal adhesives in the etched enamel

Fig. 5b: AdheSe. Dentine. Hybrid layer along the cavity wall, penetration of adhesives into dentinal tubules (1-4005)

Fig. 5c: AdheSe. Dentine. Higher magnification of the hybrid layer. (1-4005)
Conclusions

There was no substantial difference in morphology of the dentine/resin interface between the adhesives studied. The findings have suggested that the hybrid layer function of all adhesives studied might be of the same quality. This fact that there is no substantial morphological difference in the dentine hybridization between total-etch and self-etching adhesives may be of importance in the restoration of primary teeth because the number of steps and the procedure duration can be significantly reduced.

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Literature


Abbreviations

SEM = Scanning Electron Microscopy
E = enamel
D = dentine
C = dentine tubule
T = tag
H = hybrid layer
A = dentinal adhesives
F = composite filling

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SEM study on dentin/resin interface in primary teeth

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Abstract

Dentin adhesive systems, single bond, Prime bond, Prompt-L pop, AdheSe, Xeno III, and Exclade were applied into single cavities prepared in extracted primary teeth and then were restored with fissure sealants. The teeth were prepared for analysis using a scanning electron microscope using low and high magnification, and then micro and macroetching systems. The teeth were then examined using optical microscopy and X-ray microtomography to evaluate the bonding and restoration integrity. The results showed that the use of different adhesives and sealants can significantly reduce bond failures.

Introduction

The aim of the present study was to test the influence of a composite sealant and the use of dentin adhesives in primary teeth, in order to compare the structural pattern of dentin adhesives in teeth with and without microfills.

Materials and Methods

Dentin adhesive systems, single bond, Prime bond, Prompt-L pop, AdheSe, Xeno III, and Exclade were used. The AdheSe and Xeno III systems were applied without a primer. The single bond and Prime bond systems were used as a primer. The dentin and enamel samples were sectioned in half to reveal the adhesive interface and the adhesive line. The sections were then treated with a 10% phosphoric acid solution for 30 seconds, rinsed with water, and dried with compressed air. The sections were then placed in the respective adhesive and sealed with nail polish. The sections were then placed in the respective adhesive and sealed with nail polish. The sections were then placed in the respective adhesive and sealed with nail polish. The sections were then placed in the respective adhesive and sealed with nail polish. The sections were then placed in the respective adhesive and sealed with nail polish.

Results

Single bond

Prime bond

Xeno III

AdheSe

Prompt-L pop

Conclusion

There was no statistical difference in morphology of the dentin/resin interface between the various sealants studied. The fibrous structure of the dentinal tubules was present in all groups, and the treatment was effective in reducing bonding failures. There was no significant difference in bond strength between the various sealants, and the results support the clinical use of these materials in primary teeth.

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References