EFFECT OF ADDITIONAL ENAMEL ETCHING AND A FLOWABLE COMPOSITE TO THE INTERFACIAL INTEGRITY OF CLASS II ADHESIVE COMPOSITE RESTORATIONS

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ABSTRACT

Objective: The purpose of this study was to evaluate microleakage of Class II composite restorations using a self-etching adhesive system with additional enamel etching and/or a flowable resin composite material.

Materials and Methods: Fifty standardized Class II cavities were prepared in the mesial and distal surfaces of extracted human third molars. All teeth were bonded with a self-etching primer adhesive system (Clearfil® Liner Bond 2, Kuraray Co. Ltd., Osaka, Japan) according to the manufacturer's instructions and were restored with a resin composite (Clearfil® AP-X, Kuraray Co. Ltd.). In the control group, only a self-etching adhesive system was used. In the various experimental groups, the preparation surfaces were coated with a layer of flowable resin composite (Protect® Liner F, Kuraray Co. Ltd.) before the placement of resin composite, etched with 37% phosphoric acid (K-Etchant®, Kuraray Co. Ltd.) before the application of the adhesive system, or treated with both of these options. In four groups of specimens, the preparation had a gingival margin in enamel. In a fifth group, the gingival margin was in dentin. All teeth were subjected to thermocycling, 300 cycles between 4°C and 60°C, and were sectioned in half through the restorations. Gaps or cracks at the resin-tooth interfaces were observed directly using a laser scanning microscope and were recorded as percentages of the entire interface length.

Results: Separate enamel etching with phosphoric acid did not improve the resin-enamel seal produced by the self-etching primer alone. Flowable resin composite produced gap-free resin-dentin interfaces but could not prevent cracks and gap formation at the resin-enamel interface.

Conclusions: Neither flowable resin composite nor enamel etching could prevent gap formation at enamel-resin interfaces and crack formation in enamel walls when used with a self-etching primer adhesive system. However, the flowable composite provided gap-free resin-dentin interfaces.

COMMENTARY

The self-etching primer adhesive system is less acidic than phosphoric acid and therefore might be expected to provide poorer resin-enamel interfaces. However, this study showed no improvement in the performance of a self-etching system when an additional acid-etching step was used. The use of a flowable resin composite seemed to reduce polymerization shrinkage stress affecting resin-dentin interfaces.

SUGGESTED READING

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