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A quantitative analysis about microleakage of all-in-one adhesive

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I. Objectives

Newly all-in-one adhesives were developed for reducing the techique sensitivity and chair time, but lots of concerns were made on bondability, longevity, and microleakage.

The object of this study was to measure microleakage and marginal quality of all-in-one adhesives using electrochemical method and SEM analysis quantitatively.

II. Materials and Methods

After making Class V cavities, they were bulk filled with Heliomolar(#A1) after surface treatment with three adhesives : Adper Prompt (Group 1), One up bond F (Group 2), Xeno III (Group 3). Teeth were storaged in a saline solution for one day, after then, they were finished and polished using Sof-Lex system. Thermocycling was done for 500 times from 5℃ to 55℃ with each dwelling time of 30 seconds. Electrical conductivity (microamphere, μA) was checked two times : before and after cavity filling.

Resin replica was made with a silicone rubber impression material and polyurethane die material shortly after thermocycling. After gold sputtering, percentage of leaky margin was estimated from SEM image (x 1,000).

The data were statistically analysed : ANOVA & Paired T test for electrical conductivity, Kruskal-Wallis & Mann-Whitney test for marginal quality, Spearman' s rho test for checking of relationships between 2 methods.

III. Results

1. There was no difference of microleakage between adhesive systems, but every specimen showed microleakage after filling.
2. Microleakage was reduced about 70 % with resin filling.
3. Marginal quality was the best in group 1, decreasing among groups in the following order : group 2, followed by group 3. There were significant difference between group 1 and group 3 ($p=0.015$), and between group 2 and group 3 ($p=0.019$)
4. There was no relationship between the microleakage measured by electrochemical method and marginal quality measured by SEM analysis.

IV. Conclusions

Within the results of this study, there was no difference of microleakage between adhesive systems. Analysis of microleakage needs various methods because of its own characteristic.