

## Microleakage of the smooth surface and proximal surface using SEM and three-dimensional reconstruction techniques

In-Seo Yang\*, Dong-Hoon Shin

Department of Conservative Dentistry, School of Dentistry, DanKook University, CheonAn, Korea

### I. Objectives

This study was done to evaluate whether or not there are any differences in microleakage of the class 5 composite restoration that were filled at the smooth surface and the proximal surface respectively. In addition any differences between small and large-sized restoration were also studied.

### II. Materials and Methods

Total sixty-four class 5 resin restorations, sixteen per group, were made in the permanent teeth. Two-sized cavities, small (2 x 2 x 1.5 mm) and large (4 x 2 x 1.5 mm), were filled at the smooth surface and the proximal surface each.

Resin replica was made around the restoration after 1,000 times of thermocycling (30 seconds dwelling time, 5oC and 55oC). the percentage of the marginal gap to the whole periphery of the restoration was estimated.

For the evaluation of the amount of microleakage through the three-dimensional reconstruction, restored tooth was immersed in 50% silver nitrate solution for 10 hours after covering with wax and nail varnish except the 1 mm area around the restoration margin. It was exposed under the fluorescent light for another 10 hours, after then, it was dipped in a developing solution for 2 hours.

After imbedding tooth in an autocuring resin, they were serially ground with a thickness of 0.25 mm. Images of each cross-section were taken with a digital camera. 3D-DOCTOR (Able Software Corp., USA) was used for reconstruction of restored tooth. Volume of dye penetration was estimated from a reconstructed image.

Three kinds of statistical analysis was used: Two-way ANOVA and independent T-test for dye volume, Mann-Whitney U test for the percentage of the marginal gap, Spearman' ss rho test for checking of the relationship between two techniques.

### III. Results

1. The site and size of the restoration affected on the microleakage of the class 5 restoration. In other words, much more leakage was seen in the proximal restoration and the large-sized restoration rather than the smooth-surface restoration and the small-sized restoration.
2. Close relationship was found between the amount of microleakage from the three-dimensional reconstruction techniques and the percentage of the marginal gap from the scanning electron microscopic evaluation (Correlation coefficient = 0.614 / p=0.000).

### IV. Conclusions

Within the limits of this study, it was noted that proximal restoration and the large-sized restoration leaked more than smooth-surface restoration and the small-sized restoration. Therefore, it should be strictly recommended large exposure of the margin should be avoided by reducing unnecessary tooth reduction.

Another factors, such as difficulties with filling and light curing, usually lie with the above mentioned factors, much more consideration should be made when restoring the proximal surface.