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Quantitative evaluation of microleakage using microtomograph in Class V restorations

Kyung-Mo Cho*, Dong-Hoon Shin

Department of Conservative Dentistry, College of Dentistry, Dankook University, Cheon-An, Korea

I. Objectives

In recent years, the use of Microtomograph in dentistry were proposed and its applications are increasing. The purposes of this study is to evaluate the microleakage in Class V restorations by using Microtomograph and to compare with other leakage test methods.

II. Materials and Methods

Using high speed round bur, Class V cavities were prepared to the buccal sides of sixty extracted human upper premolars and randomly distributed to 4 experimental groups and restored as follows. Group 1: Restored with microhybrid composite resin(Supreme, 3M ESPE, USA), Group 2: Restored with microfill composite resin(A110, 3M ESPE, USA), Group 3: Flowable composite resin(Filtek-Flow, 3M ESPE, USA), Group 4: Resin modified Glass Ionomer(Fuji II LC improved, GC, Japan). In Group 1, 2, 3 Single-bond was used after etched 15 seconds by 34% phosphoric acid. In Group 4, 10% polyacrylic acid was applied for 10 seconds before filling.

Following one day storage in 100% humidity at room temperature, the restored teeth were thermocycled for 500 cycles between 5 ℃ and 55 ℃. Microleakage were assessed by marginal gap ratio evaluation under Scanning Electron Microscope, leakage evaluation by Electrochemical methods, Quantitative evaluation using Microtomograph in order.

III. Results

1. In SEM evauluation, Group 1 and 2 were showed highest gap formation and lowest in Group 4.
2. In Electrochemical and Microtomgraphical evaluations, there is no significant difference between groups.
3. There is no significant correlation between leakage evaluation methods.

IV. Conclusions

Relationship between gap and microleakage is questionable in short observation period. Microtomograph is presumed useful to evaluate the leakage of restorations, but to evaluate the longevity of restorations accurately other evaluation methods must be combined.