

Effect of Vibration on Adaptation of Composites in Simulated Tooth Cavities

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Objectives: This research investigated the effects of vibration on the rheological properties of dental composites and the adaptation of tooth cavity-composite interfaces.

Methods: A portable vibratory packing device and two composites, Filtek Z250 (Z250) and Filtek Bulk Fill Posterior (BFP), were evaluated. The frequency and amplitude of the vibratory packing device were measured. Dynamic oscillatory shear tests were conducted with varying frequency to examine the rheological properties of the composites. Twenty identical composite teeth with a Class I cavity were prepared and filled with one of the two composites. The composite was placed into a cavity using the vibratory packing device operating in either ON or OFF mode. After light-curing of the composite, the gap between the tooth and the composite was evaluated using micro-computed tomography. Two-way ANOVA was used to evaluate the effects of vibration and composite type on tooth-composite adaptation.

Results: The frequency of the vibratory packing device was 66.8 Hz. The complex viscosity, η^* , of BFP was higher than that of Z250, and η^* of both composites significantly decreased with increasing oscillation frequency. The application of vibration did not decrease gap formation in cavity-composite interface.

Conclusion: The application of vibration (66.8 Hz) decreased the viscosity of composites, but did not enhance adaptation at the tooth-composite interface.

Biography:

Dr. In-Bog Lee is Professor in the Department of Conservative Dentistry at Seoul National University, Korea. He received his D.D.S. (1990) and Ph.D. (1999) from Seoul National University. He has trained in Intern and Resident programs at Seoul National University Dental Hospital in 1990 – 1993. He served as a dentist (Captain) in Korea Army for 3 years (1993 – 1996), thereafter, practiced a private dental clinic for 6 years in Seoul. Dr. Lee joined the Department of Conservative Dentistry at Seoul National University in 2002. His research interests cover the biomechanics of composite restoration, rheology of dental materials, and instrumentation for measurement. He is the founder of IB SYSTEMS (<http://ibsystems.snu.ac.kr>).