

**Evaluation of marginal gap at the composite/enamel
interface in Class II composite resin restoration by
SEM after thermal and mechanical load cycling
(An in vitro comparative study)**

A thesis

submitted to the council of the College of Dentistry
University of Baghdad in partial fulfillment of the
requirements for the degree of Master of Science in
Conservative Dentistry

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B.D.S., M.Sc., Ph.D.

2014 A.D.

1435 A.H.

Abstract

Resin composites have improved greatly since their introduction and are now the materials of choice for most of the restorations. Many commercially available dental composites are based on methacrylate chemistry, and volumetric shrinkage still remains a major drawback, which can result in gap formation at the tooth/restoration interface permitting the passage of bacteria and oral fluids resulting in post-operative sensitivity, pulpal inflammation, and secondary caries. This study was conducted with aim of comparing in vitro the marginal adaptation of three different, low shrink, direct posterior composites Filtek™ P60 (packable composite), Filtek™ P90 (Silorane-based composite) and Sonic fill™ (nanohybrid composite) at three different composite/enamel interface regions (occlusal, proximal and gingival regions) of a standardized Class II MO cavity after thermal changes and mechanical load cycling by scanning electron microscopy.

Thirty six sound human maxillary first premolars of approximately comparable sizes were divided into three main groups of (12 teeth) in each according to the type of restorative material that was used:

Group (A): The teeth were restored with Filtek™ P60 and single bond™ Universal adhesive using horizontal incremental technique.

Group (B): The teeth were restored with Filtek™ P90 and P90 system adhesive using horizontal incremental technique.

Group (C): The teeth were restored with Sonic fill™ composite and single bond™ Universal adhesive using bulk technique.

After specimens were stored in distilled water at 37°C for 7 days, all specimens were subjected to thermocycling at (5° to 55 °C), then submitted to mechanical load cycling (intermittent axial force of 49N and a total of 50.000 cycles). The specimens were observed under scanning electron microscope at (2000 X) to measure marginal gap width (the distance between the dental wall and the restoration) at occlusal, proximal and gingival regions in micrometer using Tescan software, version 3.5.

Data were analyzed statistically by one way ANOVA test and least significant difference tests.

The results of this study showed that the silorane-based posterior composite (Filtek™ P90) showed significantly the least marginal gap width at the occlusal, proximal and gingival regions after the application of thermal changes and mechanical load cycling in comparison to the two methacrylate-based posterior composite Filtek™ P60 (packable) and the Sonic fill™ (nano-hybrid). Sonic fill™ bulk fill composite that relied on the vibration concept to lower the viscosity of high filler loaded composite material showed significantly lesser marginal gaps width at occlusal, proximal and gingival composite/enamel interface regions in comparison with Filtek™ P60 (packable composite) using horizontal incremental technique. The silorane-based composite (Filtek™ P90) showed non-significant difference in marginal gaps width at the three different regions. While, both methacrylate based Filtek™ P60 and Sonic fill™ composite showed significantly lesser marginal gap width at the occlusal region in comparison with gingival regions of class II composite restorations.