Light polymerization during cavity filling : influence of total energy density on shrinkage and marginal adaptation

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Abstrak

The aim of the study was to evaluate the marginal adaptation and shrinkage stress development of a micro hybrid restorative composite as a function of energy density. Linear displacement and shrinkage forces were measured with custom-made devices for energies of 4,000, 8,000, 16,000 and 32,000 mJ/cm2 at a constant power density of 800 mW/cm2. Marginal adaptation of composite restorations cured with the same energy desinty was evaluated before and after mechanical loading with 300,000 cycles at 70 N. The group "4,000 mJ/cm2" showed the lowest shrinkage force [2.9(0.2)kg] and linear displacement [23.5(0.7)um] but led to the worst marginal adaptation after loading [46.4(23.5)%CM] probably due to under-curing. When the maximum energy of 32,000 mJ/cm2 was applied, a slight increase in shrinkage forces [3.6(0.2) kg and 29.2 (0.8) um], and a slight decrease in marginal adaptation after loading [75.4(11.5) %CM] were observed, but these changes were not significantly different in comparison to groups cured with energies of 8,000 and 16,000 mJ/cm2. For the resin composite tested in this study, no differences in marginal adaptation could be detected above the energy threshold of 8,000 mJ/cm2.