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Laser-aided degradation of composite resin

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ABSTRACT

The removal of residual composite resin after debonding orthodontic brackets often creates surface scratches, enamel loss, and enamel tearouts. If the Nd: YAG laser could selectively degrade the resin without damaging the underlying tooth structure, these problems might be eliminated. The purpose of this study was to determine the effectiveness of the Nd: YAG laser in degrading composite resin within a time frame that will not cause pulpal damage. Minimal lasing times and optimum frequencies were determined by testing the compressive strengths of resin cylinders exposed to laser radiation for 2, 3, 5, 10, or 15 seconds at frequencies of 60, 80, or 100 Hz. The optimum condition was determined to be a 3 second lasing time at a frequency of 100 Hz. Cylinders of composite resin were divided into four groups consisting of: (1) resin, (2) resin with a laser enhancing dye, (3) resin lased for 3 seconds at 100 Hz, and (4) resin with the dye which was lased for 3 seconds at 100 Hz. The compressive strengths of the four groups were statistically compared. The resin groups that were lased for 3 seconds at 100 Hz showed a 75% reduction in compressive strength. The results of this study demonstrate that dual wavelength pulsed Nd: YAG laser energy, when used within the parameters described here, will degrade the mechanical properties of composite resin, thereby offering the potential for a quick and efficient method of removing residual composite resin.

KEY WORDS: Laser, Nd: YAG, Composite resin, Dental enamel, Orthodontic brackets.

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