Effects of Different Er,Cr:YSGG Laser Parameters on Resin-Enamel/Dentin Bond Strength

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INTRODUCTION / AIM

Previous studies have shown the effects of Er,Cr:YSGG laser irradiation on the enamel and dentin bond strengths[1,2]. However, there are few reports that show the significance of the irradiation with different laser parameters (output power and pulse frequency) on enamel and dentin bond strengths and interface morphology. This in-vitro study attempted to evaluate the microtensile bond strength (μTBS) and interface morphology of resin-enamel and resin-dentin interfaces, either followed by treatment with Er,Cr:YSGG laser irradiation using different parameters or not.

MATERIALS AND METHODS

The flattened enamel and dentin samples of seventy bovine teeth were embedded into acrylic blocks and randomly divided into enamel and dentin groups; dentin specimens were further divided into seven subgroups according to surface treatments using Er,Cr:YSGG lasers with different parameters: 3 W/20 Hz, 3 W/35 Hz, 3 W/50 Hz, 1.5 W/20 Hz, 1.5 W/35 Hz, 1.5 W/50 Hz, or no laser treatment. Enamel and dentin specimens were further divided into seven subgroups according to surface treatments using Er,Cr:YSGG lasers with different parameters: 6 W/20 Hz, 6 W/35 Hz, 6 W/50 Hz, 3 W/20 Hz, 3 W/35 Hz, 3 W/50 Hz, or no laser treatment (n=5). Interface morphology was also assessed under SEM.

RESULTS

The bonding effectiveness of adhesive resin to laser-irradiated enamel was affected by both the output power and pulse frequency of Er,Cr:YSGG laser. However, Er,Cr:YSGG laser treatments yielded significantly reduced dentin bond strengths regardless of different parameters. Although parameters recommended by the manufacturer lowered μTBS, increasing pulse rate may maintain optimum enamel μTBS. Therefore, 3 W/50 Hz parameters might improve resin-enamel bond strength, when Er,Cr:YSGG laser irradiation is used for laser conditioning.

DISCUSSION

The bonding effectiveness of adhesive resin to laser-irradiated enamel was affected by both the output power and pulse frequency of Er,Cr:YSGG laser. However, Er,Cr:YSGG laser treatments yielded significantly reduced dentin bond strengths regardless of different parameters. Although parameters recommended by the manufacturer lowered μTBS, increasing pulse rate may maintain optimum enamel μTBS. Therefore, 3 W/50 Hz parameters might improve resin-enamel bond strength, when Er,Cr:YSGG laser irradiation is used for laser conditioning.

REFERENCES