

Shear bond strength of bonding to enamel with different laser irradiation distances

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Abstract The aim of this study was to investigate the shear bond strength of bonding to enamel following laser etching with the Er:YAG or Er,Cr:YSGG laser using different irradiation distances. Of 99 extracted human premolar teeth, 90 were divided equally into nine groups. In the control group (group A) the teeth were etched with 38% phosphoric acid. In the laser groups (groups B–I) the enamel surface of the teeth was laser-irradiated, groups B–E with the Er:YAG laser and groups F–I with the Er,Cr:YSGG laser at distances of 1, 2, 4 and 6 mm, respectively. The shear bond strengths were tested using a universal testing machine. The shear bond strengths associated with the Er:YAG laser at 4 and 6 mm and the Er,Cr:YSGG laser at 2, 4 and 6 mm were significantly less than the strengths obtained with the other irradiation distances ($p < 0.001$). The Er:YAG laser at 1 mm and the Er,Cr:YSGG laser at 1 mm etched enamel in the same manner ($p > 0.05$). This finding was confirmed by scanning electron microscopy examination. Irradiation distance did influence the strength of adhesion to enamel. The mean shear bond strengths and enamel surface etching obtained with the Er:YAG laser at 1 and 2 mm and the Er,Cr:YSGG laser at 1 mm were comparable to that obtained with acid etching.

Keywords Laser · Er:YAG · Er,Cr:YSGG · Irradiation distance · Shear test

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