Influence of Er,Cr:YSGG Laser on Bond Strength of Adhesive Systems to Dental Hard Tissues

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This study evaluated the influence of Er,Cr:YSGG laser irradiation on in vitro tensile bond strength (TBS) of a composite to bovine enamel and dentine using a single-bottle adhesive and two self-etching systems. Bovine teeth were divided into 18 groups: 2 substracts [enamel, dentin]; 3 conditions [none, Er,Cr:YSGG laser with water coolant (2.79 μmeters, 12.5 mJ/pulse; 2.8 J/cm²; 750 μm spot size and 20 Hz), and Er,Cr:YSGG laser without water coolant]; and 3 adhesive systems [Single Bond (SB); Clearfil SE Bond (SE) and One Up Bond F (OU)]. A resin composite was applied, specimens were stored for 24h at 370C and debonded in tension using a testing machine at 0.5 mm/min. The values of TBS were analyzed by ANOVA. After irradiation, some samples of each group were evaluated by scanning electron microscopy. The TBS of composite bonded to enamel was higher than to dentin. Lased surfaces presented lower TBS than unlased ones. Substrate irradiated under water cooling presented higher values of TBS than irradiated without water coolant. Adhesive SB presented TBS similar to SE, and OU presented the lower TBS values. SEM images revealed some melting when irradiated without coolant and absence of smear layer when irradiated with coolant. The irradiation of dental tissues with Er,Cr:YSGG laser at low fluence decreased the bond strength of all tested adhesive systems on enamel and dentin, with worst performance when applied without water spray. Thus, the use of water cooling is mandatory when irradiating dental tissues with Er,Cr:YSGG laser for bonding purposes. Acknowledgements: FAPESP.