

The impact of Er,Cr:YSGG laser on the shear strength of the bond between dentin and ceramic is dependent on the adhesive material

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Received: 12 May 2011 / Accepted: 29 June 2011
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Abstract The bond joint between dentin and ceramic is a critical determinant in prosthodontic dentistry. The laser is an alternative to the diamond bur for preparing tooth cavities. However, the impact of lasers on the bond between the laser-irradiated dentin and the ceramic remains a matter of controversy. We determined the shear strength of bonds between ceramic blocks and human dentin discs prepared with either an Er,Cr:YSGG laser or a diamond bur. A total of 180 dentin discs were randomly assigned to four groups. Three groups of discs were prepared with the Er,Cr:YSGG laser irradiation (2 W, 30 Hz, 50% H₂O, 70% air) and the fourth group was prepared with a diamond bur. In one of the laser groups the discs surfaces were also treated with phosphoric acid and in another with phosphoric acid and mechanical smoothing using a dental excavator. The ceramic blocks were bonded to the dentin discs with Syntac adhesive (together with Variolink II curing system), ExciTE adhesive (together with Variolink II curing system) or RelyX self-adhesive cement. The shear strength of the bond between ceramic and dentin was significantly higher

following dentin surface treatment with the laser alone than following treatment with the diamond bur and Variolink II/Syntac ($p = 0.021$) but not significantly higher than following treatment with the diamond bur and Variolink II/ExciTE ($p = 0.138$) or RelyX ($p = 0.150$). A significant difference was not observed when the laser-treated dentin was conditioned with phosphoric acid and mechanical smoothing. These findings demonstrate that the bond between dentin and ceramic may be stronger after laser irradiation; however, the selection of the adhesive material is an additional factor that affects the bond strength.

Keywords Adhesive · Dentin · Er,Cr:YSGG laser · Prosthodontic therapy · Shear bond strength

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