Halogen light versus LED for bracket bonding: shear bond strength

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Editor's abstract

The light-curing process is strictly related to bracket bonding resin resistance to shear, traction and torsion forces proceeding from mastication and also orthodontic mechanics. The ideal wavelength of light for polymerizing composite should range from 450nm to 470nm. Mostly used, halogen light devices have a broad spectrum of wavelengths (400 to 500nm) and an optimum polymerization time (40 seconds). Recently made available, LED light-curing devices seem to provide optimal polymerization reaction associated with low light spectrum (460 and 480 nm) and reduced heat emission . However, few studies proving its efficiency were found. The aim of this study was to evaluate the shear bond strength of orthodontic brackets, bonded to human teeth, using different resin light-curing protocols, according to the variation of the light type and light-curing time.

With this purpose, brackets were bonded at the buccal surface of 50 maxillary premolars and submitted to different period of light-curing using three different types of device: one with halogen light (Optilight Plus, Gnatus, Brazil) and two with LEDs (Optilight CL, Gnatus and EliparFreelight, 3M-ESPE). Control group was comprised of halogen light device applied for 40 seconds in each bracket. On the other groups with LED, 10 or 40 seconds were applied. Each specimen underwent the shear test. Intergroup comparisons were performed using variance analysis (ANOVA) with significance level of 5%, followed by Tukey test.

The results showed that all four groups were statistically similar to each other and only Gnatus LED appliance was significantly different from the others when used with a reduced time activation protocol (10s). The retention increased according to the exposure time. The halogen lamp provided the highest mean for brackets shear bond strength, but without statistical significance, followed by 3M-ESPE LED even with reduced time activation protocol. It was concluded that LEDs may be indicated in orthodontic practice, provided that is used an light protocol with activation time of 40 seconds.

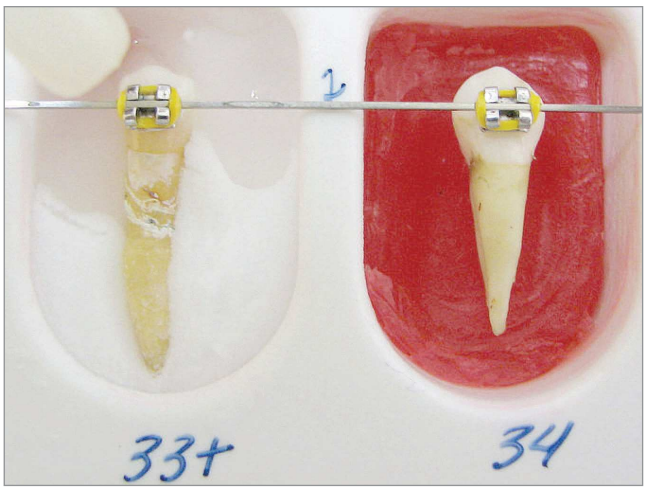

Figure 1 - Tooth / bracket set fixation to the plastic matrix.

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