The Effect of Radiotherapy on Resin-dentin Bond Strength

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Abstract: Radiotherapy for oral cancer causes radiation caries. This study evaluated the effect of \(\gamma\) -ray irradiation on resin/dentin bond strength, dentin microhardness and elastic modulus. One group of bovine incisors was irradiated with 60 Gy \(\gamma\) -rays using a cobalt 60 therapeutic machine. The control group of bovine incisors was not irradiated with \(\gamma\) -rays. Flat dentin surfaces were prepared on the labial side. The teeth were treated with the Clearfil SE Bond adhesive system. Clearfil AP-X hybrid composite was built up to \(3 \times 4 \times 3\) mm. The resins were light cured with 600mW/cm\(^2\) for 40s. After storage for 24h, the teeth were sectioned to about 1.0 mm thickness. The slabs were trimmed (ca. 1 mm\(^2\)) at the adhesive-dentin interface for the micro-tensile bond strength test (\(\mu\)-TBS). The trimmed specimens were mounted on a testing apparatus, and stressed to failure under tension at 1 mm/min in an EZ test machine. Nano-indentation hardness and elastic modulus on both dentin surfaces were measured using a nano-indentation tester. \(\mu\)-TBS (n=10), nano hardness (n=20) and elastic modulus data (n=20) were analyzed using Fisher’s PLSD test. There was no significant difference in \(\mu\)-TBS between the intact group and irradiated group (p >0.05). Nano hardness and elastic modulus of the irradiated group were significantly lower than those of the intact group (p <0.05). Irradiation with 60 Gy \(\gamma\) -rays had no effect on resin/dentin bond strength. However, 60 Gy \(\gamma\) -ray irradiation significantly decreased the microhardness and elastic modulus of dentin.

Key words: \(\gamma\) -ray irradiation, Bond strength, Elastic modulus