Conservative Removal of Lithium Disilicate Veneers Using Er:YAG Laser: Optimal Settings for Bond Strength Reduction

Farzaneh Ahrari

Dental Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Alireza Boruziniat

Dental Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Amir Fallahrastegar

Dental Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Reza Shakiba

Dental Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Zahra Shooshtari

Dental Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Abstract

This study aimed to identify the optimal Er:YAG laser settings for removing lithium disilicate laminate veneers.

Sixty lithium disilicate veneers, each 1 mm thick, were bonded to the buccal surfaces of bovine incisors. The specimens were randomly divided into five groups: one control (Group 1, no laser exposure) and four laser-treated groups (Groups 2–5). Er:YAG laser (2940 nm) was used for debonding of veneers at the following settings: Group 2 (200 mJ, 20 Hz, 25 s), Group 3 (200 mJ, 20 Hz, 50 s), Group 4 (400 mJ, 10 Hz, 25 s), and Group 5 (400 mJ, 10 Hz, 50 s). Following irradiation, the specimens were placed in a universal testing machine, and the shear bond strength (SBS) was determined. Debonded specimens were examined under a stereomicroscope to determine the mode of bond failure. Data were analyzed by ANOVA, Duncan, and Fisher exact study, and P<0.05 was considered significant.

ANOVA revealed a statistically significant difference in bond strength among the groups (P<0.001). The bond strength in the control group (6.15 ± 5.60) was significantly higher than Groups 3 (1.85 ± 2.98), 5 (0.71 ± 0.98), and 4 (0.23 ± 0.45) (P<0.05). No significant difference was found in the frequency of failure modes among the study groups (P=0.089).

An Er:YAG laser setting of 400 mJ and 10 Hz for 25 seconds was found to be the most efficient for reducing bond strength, and thus, this protocol could be recommended for laser-assisted removal of lithium disilicate veneers.