

Journal of
Lasers

in Medical Sciences

J Lasers Med Sci. 2025;16:e22

<http://journals.sbmu.ac.ir/jlms>

Original Article

 [10.34172/jlms.2025.22](https://doi.org/10.34172/jlms.2025.22)

Er,Cr:YSGG Laser Irradiation of Glass Ceramic Veneers: Shear Bond Strength and Intra-pulpal Temperature



Abstract

Introduction: Glass ceramic veneers are intensely bonded to the underlying tooth structure, so the conventional method (grinding) for their removal is destructive and time-consuming for both veneers and the underlying tooth structure. This study evaluated the shear bond strength (SBS) that is required for the removal of leucite reinforced (LR) glass ceramic of different thicknesses after Er,Cr:YSGG laser irradiation and the effect of this type of laser on intra-pulpal temperature.

Methods: The enamel surfaces of 40 bovine mandibular incisors were arbitrarily divided into four main groups ($n = 10$) after preparation, based on the thicknesses of veneer discs, which were fabricated from LR glass ceramic: C1: Control group, L1: Laser-treated group in which LR discs were 0.5mm in thickness and 5mm in diameter, C2: Control group, and L2: Laser-treated group in which LR discs were 1mm in thickness and 5mm in diameter. Temperature measurement was taken for laser-irradiated groups before and at the end of laser treatment, which was applied using a scanning technique for 60 seconds with an Er,Cr:YSGG laser at 2.5 W and 25 HZ. SBS was evaluated using the universal testing machine for all samples. After de-bonding, a stereomicroscope was used to estimate the failure mode based on the adhesive remnant index (ARI). The independent samples t-test was performed to analyze the recorded data.

Results: The Er,Cr:YSGG laser significantly decreased SBS for Laser-treated groups ($P \leq 0.05$). The SBS decreased with decreasing disc thickness, with no statistically significant differences ($P > 0.05$). ARI had higher scores for the laser-treated groups than for the control groups. Laser irradiation increased intra-pulpal temperature slightly but within the safety range (5.5 °C).

Conclusion: Using the Er,Cr:YSGG laser with the scanning technique could be a safe and effective tool for de-bonding LR glass ceramic veneers.