

**Evaluation of the Effect of Dentin Treatment
with C0₂ Laser and Air Abrasion on the
Microleakage of Composite Restorations
(In Vitro Study)**

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Abstract

An in vitro study was carried to compare the microleakage of composite restoration at dentin following treatment with CO₂ laser, Air Abrasion, Combination between them and acid.

One hundred extracted maxillary premolars (caries free), stored in distilled water, were used. Flat occlusal dentin surfaces were grounded wet on 600-grit silicon carbide paper. Cylindrical cavities were prepared at the center of the occlusal surfaces. Teeth were then distributed randomly in to five groups, 20 teeth each:

Group A: Teeth were treated by CO₂ laser (pulsed CO₂ laser with 10.6 μm wave length, 6.3 cm distance, power 6 watt with pulse duration of 0.2 second and repetition rate 2 Hz).

Group B: Teeth were treated by air abrasion (using aluminum oxide particles size 50 micrometers& air flow handy device at 1.2 cm distance with 15 seconds perpendicular application, air pressure was 2.75 bar and water pressure was 0.6 bar).

Group C: Teeth were treated by 37% phosphoric acid for 20 seconds.

Group D: Teeth were treated by CO₂ laser and 37% phosphoric acid.

Group E: Teeth treated by air abrasion and 37% phosphoric acid.

All the cavities were restored with the same bonding and composite materials and stored in distilled water in an incubator at 37° C. Half of each group were stored for 1 day and themocycled between 5-55°C,(10 cycles) while the other half were stored for 14days and thermocycled between 5-55°C,(140 cycles). Then the teeth were covered with 2 layer of nail varnish except 1 mm around the restoration. The teeth were immersed in the 2% methylene blue dye for 24 hours at 37°C in the incubator and then they were longitudinally sectioned in a mesiodistal direction and the extent of the dye penetration was recorded.

The statistical analysis of the result revealed that the use of CO₂ laser, air abrasion to condition dentin significantly reduced the microleakage of composite restoration, while there was no significant decrease in microleakage when using acid etching on dentin following CO₂ laser or air abrasion.

There was statistically increase in microleakage with in times when using acid to condition dentin.