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THERMAL ANALYSIS OF DENTAL ENAMEL FOLLOWING Er,Cr:YSGG LASER IRRADIATION AT LOW FLUENCES

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Background and Objectives: Er,Cr:YSGG laser radiation is slightly better absorbed by hydroxiapatite than the Er:YAG laser and this fact may indicate its use as a benefit tool for caries prevention. This study was performed to investigate the surface and intrapulpal temperature during Er,Cr:YSGG laser irradiation at sub-ablative conditions.

Study Design/Materials and Methods: Twenty five extracted human molar teeth were selected and divided into five groups, according to the following Er,Cr:YSGG irradiation conditions without air-water spray: 1.0; 1.5; 2.8; 5.6; 8.5 J/cm^2. During laser irradiation, surface temperature was measured using a thermocamera (ThermaCAM-FLIR SC3000). The pulpal temperature was also monitored by means of a thermocouple type T (copper-constantan) placed in the pulpal chamber.

Results: The surface temperature increased directly with the energy density of laser, and returned to its initial temperature 3 seconds after laser irradiation. Laser irradiation resulted in a non-significant intrapulpal temperature increase ($\sim$1°C) in all parameters tested. Temperature rise values were compared using analysis of variance (ANOVA) with alpha equals 0.05.

Conclusions: The application of laser irradiation did not induce detrimental surface and pulpal temperature variations at the utilized parameters, being suitable for caries prevention.

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EFFECTS OF PULSED Nd:YAG LASER ON MICROLEAKAGE OF COMPOSITE RESTORATIONS IN CLASS V CAVITIES

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Background and Objectives: The purpose of this study was to evaluate the effects of pulsed Nd:YAG laser on decrease of dentinal microleakage beneath the restoration.

Study Design/Materials and Methods: Thirty two sound extracted premolar teeth were subjected to two standardized, V shaped, class V cavity preparations on both buccal and lingual surfaces. Cavities were located at 1–2 mm below the Cemento–Enamel Junction (CEJ) line. The teeth were divided into two groups of experimental and control in a random manner. Both 20 and 15 mJ/pulse laser energies were tested. Etching, bonding, and filling were performed using Tetric ceram composite material. All samples were thermocycled for 1,000 cycles followed by an immersing period of 1 week in 2% basic fuchsin solution. Specimens were then sliced longitudinally and evaluated under a digital scanner for the extent of dye penetration.

Results: Results indicated that the level of microleakage of laser-treated cavities was significantly less than that of untreated cavities ($P < 0.05$) for 20 mJ/pulse laser energy. No significant decrease in microleakage level was observed for the 15 mJ/pulse laser energy.

Conclusions: The short pulsed Nd:YAG laser with the energy of 20 mJ/pulse and aforementioned features appeared to be able to reduce microleakage toward pulp.

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LASER DOPPLER FLOWMETRY OF PULPAL BLOOD FLOW DURING THE DENTAL LEVELING

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Background and Objectives: The evaluation of the pulp blood flow during orthodontic movements has been accomplished by using indirect and destructive techniques (e.g., histological studies, fluorescent markers). Although the laser Doppler flowmetry makes it possible the study of the pulp blood flow into the real clinical conditions, the information available in the literature is limited to intrusive and retractive movements. This work aimed to study the pulp blood flow of central incisors of patients submitted to an orthodontic treatment, during the leveling phase.

Study Design/Materials and Methods: Using a laser Doppler flowmeter, LowLab, Moor Instruments (UK), the pulp blood flow of 12 patients was measured before the application of the force, immediately after, 48 hours, 72 hours, and 1 month later.

Results: The obtained results indicate that the mean flow during the leveling significantly decreases immediately after the force application (61.7% of the initial value, $P = 0.001$, Mann-Whitney), decreasing up to 37.7%, $P < 0.001$, (72 hours), returning to the initial value 1 month later.

Conclusions: The result agrees with the expectation that, during orthodontic movements, the pulp blood flow can decrease, initially by the arteries strangulation, and latter by a pulp inflammation induced by a periodental inflammation process.

Contract grant sponsor: FAPESP; Contract grant number: 00/14817-9.