Er:Yag Laser application on titanium implant surfaces contaminated by *Porphyromonas gingivalis*: an histomorphometric evaluation

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Aim. The aim of this study was to evaluate the in-vitro application of Erbium Yag Laser (Erl) on implant surfaces contaminated by *Porphyromonas gingivalis* (Pg.). Moreover, this study evaluated the surface characteristics of irradiated implants.

Methods. A total of 60 implants was evaluated (20 for each test group). Each group was divided into two subgroups composed of 10 implants: test (Erl) and control. Implants were contaminated by Pg. reference strains. After proper incubation, test implants were irradiated with Erl. Laser parameters were the following: 2.940 nm wavelength, 20 μs pulse duration, 10 Hz frequency and 30 MJ pulse energy. A periodontal fiber was used to irradiate the implant threads on the axial surface with a 45° angle of incidence and performing apex-crown motions for 16 s. Histomorphometric evaluation of implant surfaces (test and control) was made at different magnifications (1,000x; 6,000x; 11,000x). Pg. counts were calculated on a 4 × 800-mm² surface utilizing a 10-mm grid. Statistical evaluation was made with Fisher and Student's t test (P<0.05).

Results. No surface alterations on test implants were observed. Counting results showed the following decontamination values: 76.2% for machined test implants, 90.9% for titanium plasma spray implants and 98.3% for sandblasted and etched implants. A minimal residual bacterial presence was observed in all groups.

Conclusion. The results of the following study showed that Erl application has decontamination effectiveness on different implant surfaces. The modification of laser time application and working parameters could easily determine complete bacterial removal from all the implant surfaces analyzed.

Key words: Dental implants - Lasers, solid-state - Histology - Porphyromonas gingivalis - Microscopy, electron, scanning.

peri-implant disease is a collective term used to describe pathologies that affect tissues around implants: peri-implant mucositis is a reversible inflammatory condition of soft tissue, peri-implantitis is defined as an inflammatory process that affects soft and hard tissues around implant fixture causing bone loss, often associated with bleeding and suppuration. The main etiological factor of peri-implant diseases is the accumulation of dental plaque that shows a very similar composition if compared to bacterial biofilm found in periodontal pockets. Mombelli et