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Treatment of exposed implant surfaces: Er:YAG laser compared to conventional mechanical therapy

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AIM: The use of Er:YAG lasers has been increasingly proposed for the treatment of peri-implantitis and many studies have demonstrated its excellent ability to ablate dental calculus. The purpose of this study was to compare the effectiveness of Er:YAG laser therapy with mechanical instrumentation.

MATERIALS AND METHODS: The study included 20 patients with 20 ailing implants. All the implants (4 x11 mm), with sand-blasted and acid-etched surfaces and smooth neck, were considered hopeless after the clinical examination and radiographs. They showed substantial loss of bone, suppuration, bleeding on probing, >8 mm of probing dept but no mobility. Implants were divided into two groups of 10 implants each. Under local anesthesia implants of both of groups were treated and then they were extracted and analyzed using scanning electron microscopy (SEM). In the group test the Er:YAG laser irradiation was carried out under sterile saline water spray in direct contact with implant and bone surface by maintaining the contact tip oblique to the implant surface with circular motion from top to bottom. The laser device **(Doctor Smile PLUSER Erbium laser, LAMBDA, Vicenza, ITALY www.lambdaspa.com)** emitted infrared radiation at a wavelength of 2940 nm and the output energy was set at 1,5 W. In the control group the debridement of titanium surface was performed by plastic curette and then the surface was exposed to citric acid for 5 minutes.

GROUP CONTROL

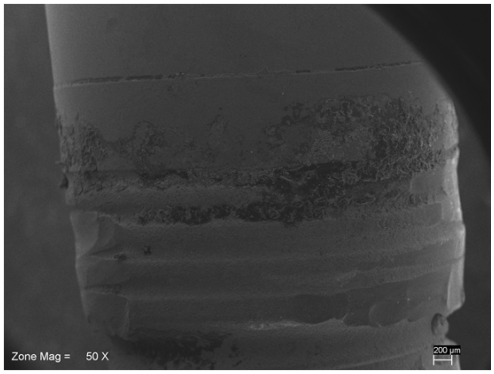

Fig. 1 – SEM analysis: implants treated in group control

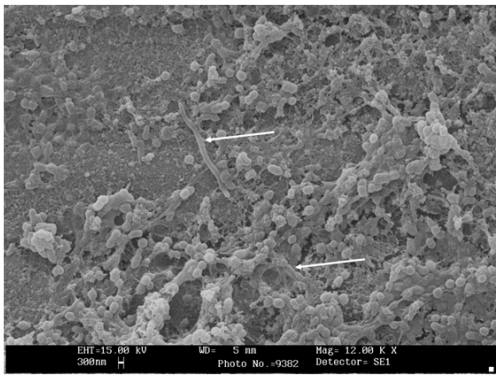

Fig. 2 – SEM analysis: implants treated with mechanical therapy showed remaining calculus

RESULTS: SEM analysis showed that both Er:YAG laser irradiation and conventional treatment of peri-implantitis had reduced the bacteria and decontaminated the implant surface. The conventional treatment with plastic curette and citric acid was not able to remove subgingival calculus adhered on titanium surface. The Er:YAG laser demonstrated high bactericidal effects against periodontopathic pathogens, hemostatic effects and an effective calculus ablation from implants with sand-blasted and acid-etched surfaces without injuring this surface.

GROUP TEST

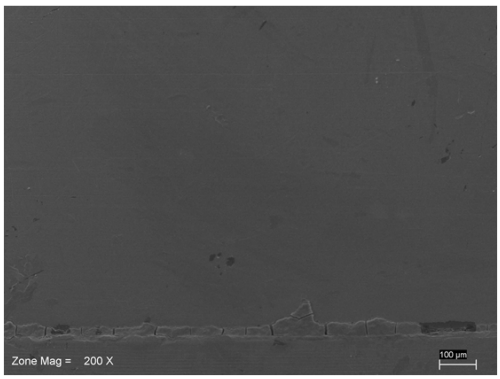

Fig. 3 – SEM analysis: the Er:YAG laser irradiation achived a complete removal of contaminats on implant surfaces

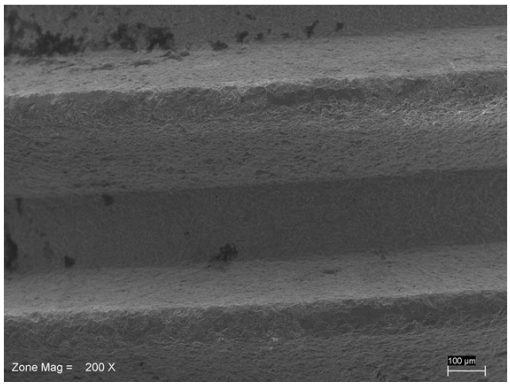

Fig. 4 – SEM analysis: complete removal of calculus on without any damage on the laser-tretaed implant surfaces

DISCUSSION: The therapeutic strategie of peri-implantitis is based on the complete elimination of the etiologic factors such as plaque, bacterial deposits, infected connective tissue and subgingival calculus. In the present study the Er:YAG laser irradiation achieved safe, effective, and thorough granulation tissue removal and implant surface debridement without any damage on the laser-treated implant surfaces. The complete removal of contaminants such as bacteria and their products, and soft tissue cells from the rough surface, has been much more difficult with mechanical debridement and it has taken more time. The remaining calculus is a risk factor of relapse because it might cover oneself soon of new plaque biofilm.

CONCLUSION: The Er:YAG laser is more efficient than mechanical instrumentation with plastic curette and citric acid in the treatment of exposed implant surfaces.