Adjunctive use of antimicrobial photodynamic therapy in the surgical treatment of peri-implantitis

Pier Paolo Poli1, 2, Mattia Manfredini1, 2, Francisley Avila Souza1, Carlo Maiorana1, 2, Mario Beretta1, 2

1Implant Center for Edentulism and Jawbone Atrophies, Maxillofacial Surgery and Odontostomatological Unit, Fondazione IRCCS Ca’ Granda Ospedale Maggiore Policlinico, Milan, Italy; 2Department of Biomedical, Surgical and Dental Sciences, University of Milan, Milan, Italy; 3Department of Surgery and Integrated Clinic, Araçatuba Dental School, São Paulo State University “Júlio de Mesquita Filho” - UNESP, Araçatuba, Brazil

Background and Aim

Implant surface decontamination plays a crucial role in the management of peri-implantitis. To this end, several methods have been proposed to remove the biofilm efficiently, but results remain inconclusive. Antimicrobial photodynamic therapy (aPDT) has been proposed as a valid adjunct treatment option for the management of biofilm-related infection in the oral cavity, thanks to its rigorous broad-spectrum bactericidal activity without inducing antimicrobial resistance1-4.

The aim of this case-series was to illustrate the 5-year follow-up results of a combined protocol consisting of mechanical debridement and laser-assisted decontamination by means of aPDT in the regenerative treatment of peri-implantitis at bone-level implants from clinical and radiographic aspects.

Methods and Materials

Overall, 7 referred patients presenting with peri-implantitis were prospectively included. Surgical treatment (T0) consisted of flap elevation, granulation tissue removal, mechanical debridement with rotary titanium brushes (Ti-Brush, Straumann), and aPDT with a specific setup (HELBO, bredent medical) consisting of phenothiazine chloride dye irradiated with a handheld 100-mW diode laser with a wavelength of 660 nm equipped with a dedicated probe. Bone augmentation was performed with autogenous bone particles harvested nearby the surgical site, stabilized by a titanium mesh (KLS Martin) covered with a collagen membrane (Biogide, Geistlich). The clinical evaluation at re-entry (T1) was performed after 9 months in terms of vertical defect height (VDh) and vertical bone gain (VBG). The stability of marginal bone levels was assessed radiographically at the last follow-up visit, 5 years after the surgical regenerative treatment (T2). The radiographic distance between the implant platform and the most coronal bone-to-implant contact level remained stable compared to T1. The resultant mean supracrestal vertical gain was 1.69 ± 1.9 mm. The mean intrabony VDH, defined as the distance from the alveolar bone crest to the bottom of the defect, decreased from 2.45 ± 1.03 at T0 mm to 0 mm at T1. At T2, mean marginal bone levels remained stable compared to T1. The first visible bone-to-implant contact (BIC) was measured at 0.77 ± 0.32 mm and 1.01 ± 0.2 mm apically to the implant platform at the mesial and distal aspects respectively.

Results

In total, 4 mandibular and 9 maxillary implants were assessed. Healing proceeded uneventfully. • The mean VDH, defined as the distance from the top of the implant platform to the bottom of the bone defect, measured at the level of the deepest aspect, decreased from 4.11 ± 1.07 mm at T0 to 0.96 ± 1.33 at T1. This resulted in a mean VBG of 3.15 ± 1.7 mm, which corresponded to an overall mean VBG score of 79.71% ± 25%. • The mean supracrestal VDH, defined as the linear distance from the alveolar bone crest to the implant platform, decreased from 2.65 ± 1.37 at T0 to 0.96 ± 1.33 at T1. The resultant mean supracrestal vertical gain was 1.69 ± 1.9 mm. • The mean intrabony VDH, defined as the distance from the alveolar bone crest to the bottom of the defect, decreased from 2.45 ± 1.03 at T0 mm to 0 mm at T1. • At T2, mean marginal bone levels apically to the implant platform at the mesial and distal aspects respectively.

Conclusion

Newly formed bone-like tissue was visible in contact with the decontaminated implant surface and no clinical signs of infection or healing complications were noted at the re-entry surgery. Marginal bone levels remained stable after a 5-year follow-up period, without recurrence or progression of the disease. aPDT therefore presents a safe and synergistically effective adjunct to mechanical treatment against biofilm-induced oral infections including peri-implantitis.

References