

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

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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.

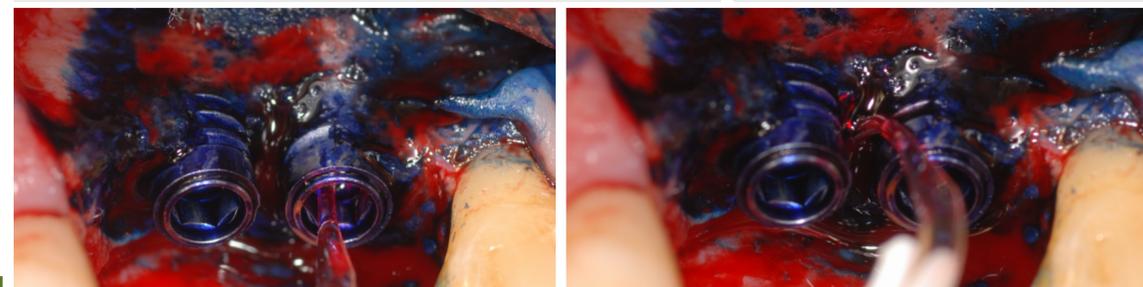
Methods and Materials

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 was measured mesially and distally and parallel with the long axis of the implant with a software (ImageJ, version 1.49, National Institute of Health).

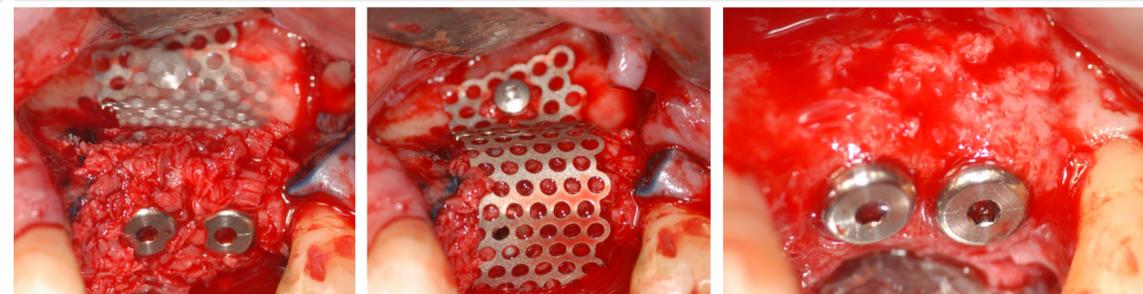


T0 | Pre-operative view

T0 | Ti-brush decontamination



T0 | Antimicrobial photodynamic therapy



T0 | Reconstruction with autogenous bone and Ti-mesh

T1 | Re-entry



T2 | 5-year clinical and radiological follow-up

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 $79.71\% \pm 25\%$. • 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** 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.

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

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