

Photodynamic therapy and regenerative bone augmentation

# A new treatment concept for peri-implantitis

Dr Fred Bergmann, Viernheim/Germany

**Resorption processes of the oral hard and soft tissues due to inflammation, broadly described as peri-implantitis, require a complex treatment concept to achieve a permanent inflammation-free bone and soft-tissue situation around the implant. Our treatment concept for reducing inflammation and augmenting the bone is illustrated by two case studies.**

The growing number of dental implants and their increasing durability in situ is reflected by stable long-term results. A cross-section review of the literature has shown that implant success rates are better than 90 per cent over a ten-year period. On the other hand, reports also increasingly describe peri-implant complications with corresponding hard- and soft-tissue problems resulting in inflammatory changes of the peri-implant mucosa with pocket formation and corresponding bacterial colonization, as known from periodontology. Advanced stages of the process result in marginal bone resorption in the crestal part of the implants; if left untreated, they can lead to implant loss and bone defects. Regular implant inspections and the evaluation of clinical and X-ray parameters with early diagnosis of possible inflammatory changes are indispensable for initiating peri-implantitis treatment at an early stage.

These clinical exams should also include an inspection of the implant superstructure, implant mobility and the zone of keratinized mucosa. Proximal, vestibular and palatal pocket-depth probing should not result in any bleeding.

In some cases, X-rays are taken to secure the diagnosis. Especially patients with periodontal disease or increased periodontal risk require intensive monitoring. Regularly updated medical histories (at least annually) and evaluation of the general medical background are particularly helpful in such cases. Osteoporosis, tumour diseases or the administration of specific drugs such as bisphosphonates can have a negative impact on the health of the peri-implant tissues. Additional measures for peri-implantitis treatment (as described in the literature) include accompanying antibiotic treatment in addition to pocket cleaning, disinfection and decontamination of the implant sur-

face. The use of photodynamic therapy by means of various lasers in cases of bone involvement has also been described frequently.

The decontamination of the raw, usually etched and irradiated micro-enhanced titanium surfaces of implants presents particular problems, and it is critical for treatment success. In addition to the conventional measures familiar from periodontal treatment, photodynamic therapy appears to be successful in this case.

The question as to which augmentation materials should be used in the treatment of bony defects is subject to controversial discussion. Permanent and non-resorbable closure of vertical bone defects to avoid epithelial depth proliferation and renewed pocket formation represents an important treatment goal. New Porous Titanium Granules (PTG; Tigran Technologies, Sweden) could be an interesting alternative.

## Concept

We would like to present our current approach to the treatment of peri-implantitis on the basis of two clinical case studies. The concept involves the following treatment steps:

- Initial phase with debridement, pocket rinsing, full-mouth disinfection and possibly accompanying antibiotic treatment aiming to reduce any active inflammation.
- De-epithelisation of the pocket with the diode laser. Mobilization of the mucoperiosteal flap up to the edge of the intact bone. Removal of all granulation tissue and cleaning of the titanium surface with vector, curette and a titanium brush (Tigran Brush No 1).

- Photodynamic therapy using the Helbo laser for decontaminating the implant and bone.
- Regenerative treatment using PTG to stabilize the soft tissue and to prevent the formation of new pockets.

**Case 1**

The 66-year-old female patient presented with multiple implants and a fixed restoration. Nine years after surgery, a massive inflammatory reaction occurred in

the region of the anterior maxillary implants with pus formation, pain and bone resorption at sites 13, 12 and 11. Within the scope of the initial treatment (three appointments within a week), the peri-implant pockets were rinsed with chlorhexidine digluconate, the denuded implant surfaces were cleaned with the vector under antibiotic screening (Amoxicillin 3 x 1000 mg/day) and the inside of the pockets was de-epithelialized immediately afterwards with the diode laser. The regenerative operation was carried out in the following week (Figs. 1 to 12).

Fig. 1  
Clinical situation  
after initial  
pre-treatment.



Fig. 2  
X-ray finding  
with bone resorption  
in regions  
13, 12 and 11.



Fig. 3  
De-epithelialisa-  
tion with the  
diode laser.



Fig. 4  
Intrasulcular  
incision.



Fig. 5  
Removal of  
inflammatory  
granulation  
tissue and  
cleaning of the  
implant surface.



Fig. 6  
Application of  
the vector.



Fig. 7  
Staining of the  
bacterial cell  
walls prior to  
photodynamic  
therapy with  
the soft laser  
(Helbo).



Fig. 8 Application of the Tigran white titanium granules in the region of the decontaminated bone defects.



*Figs. 9 and 10  
Eight days after  
the operation.*



*Figs. 11 and 12  
The clinical  
and X-ray site  
six months after  
the operation  
shows a stable  
situation with-  
out signs of  
inflammation.*

**Case 2**

In a 54-year-old female patient, five years after augmentation with a retromolar bone block transplant and subsequent implantation in region 44, painful peri-implantitis occurred with bone resorption near

an implant. The patient received treatment similar to the first patient, except that the titanium surface was cleaned with a special titanium brush and augmented with Tigran PTG (Figs. 1 to 6).



*Fig. 1  
Initial X-ray  
situation.*

*Fig. 2  
Diode laser for  
de-epithelization.*



*Fig. 3  
Cleaning the  
implant surface  
with the Tigran  
titanium brush.*

*Fig. 4  
Applying the  
Helbo laser for  
photodynamic  
therapy.*



Fig. 5 After wound closure.

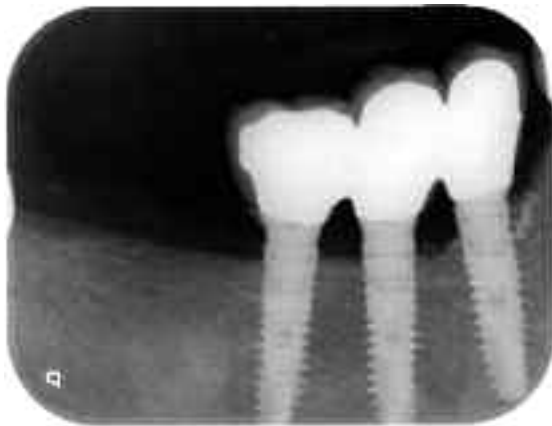


Fig. 6  
After peri-  
implantitis  
treatment.

### Discussion and summary

The treatment of two cases of extensively advanced peri-implantitis sought to remove the inflammatory soft tissue, to clean the implant surface mechanically (manual instruments and vector), and to decontaminate it physically (Helbo laser). This bacterial reduction is in turn a precondition for augmenting the bone defect with an alloplastic material (PTG) and, hence, for avoiding the formation of new pockets. Six months after this combination treatment, the clinical and X-ray status had stabilized. The titanium-based alloplastic material, PTG, has the potential to act as a permanently stable, resorption-resistant material in the region of the prepared titanium implant surface. ■

A list of references will be supplied by the editorial office on request.

### Contact address

**Dr Fred Bergmann**  
Oral surgeon  
Heidelberger Straße 5-7  
68519 Viernheim  
Germany  
[www.oralchirurgie.com](http://www.oralchirurgie.com)