Peri-implantitis: from the diagnosis to the treatment

By Dr Magda Mensi, Italy
Dr Annamaria Sordillo, Argentina

Peri-implant disease diagnosis is as fundamental as controversial. Although the progress made during the last decade is still hard to find univocal definitions and unambiguous diagnostic criteria. The parameters used to define peri-implant disease usually are: Probing Depth (PD), Crestal Bone Loss (CBL), Bleeding on Probing (BOP) and presence of suppuration and/or fistula. Peri-implant mucositis is characterised by soft tissues inflammation witnessed by absence of PD, BOP and CBL.32 If undiagnosed, peri-implantitis becomes essential. Bleeding on Probing is the key parameter for peri-implant disease diagnosis.29 Presence of BOP can be found in 91% of implants and CBL in a recent systematic review the authors concluded that 45% of the implants included in the meta-analysis were affected by mucositis, whereas the prevalence of peri-implantitis was estimated to be 22%.2

Peri-implantitis lesions are different from periodontal ones, both in their extent and composition of the inflammatory infiltrate.10 Peri-implantitis is known to progress faster than periodontal lesions10 and has a more uncertain response to both surgical and non-surgical treatments.10 This is enough to affirm that prevention is of major importance for the success of implant restoration. The prevention starts with patients framing in risk categories28 Subjects with a history of periodontitis are at greater risk to develop MB and peri-implantitis.12 This risk is increased in case of rough implants, poor oral hygiene, smoke habits, diabetes and poor metabolic control.21 The clinician must be able to diagnose and treat periodontal disease and have the duty to work on patients’ habits, giving them support in a change that can bring benefits not only to the implant therapy but to their health as well.27

Second step of prevention can be carried out during the surgical phase: a correct positioning of the fixture can bring benefi ts not only to the implant area and the patient to keeping an high standard home-care. An inef fective care leads to the develop- ment of inflammatory reactions that can be kept hidden under the prosthesis and be unrecognised until their removal. (Fig.4) Particular attention should be given to reach an appropriate amount of keratinized peri-implant tissue: its presence can be benefi cial for the maintenance of an adequate oral hygiene.12 Long abutments and implant placement at sub-mucosal level cannot be considered a good choice from the periodontal point of view since they may create a deep probing depth since the very beginning of the implant-borne restoration’s life.16

Third milestone of the peri-implantitis prevention is Supportive Periodontal Therapy (SPT): the lack of a regular and effective SPT is a risk factor for the development of peri-implantitis. Every recall should be accompanied by a proper examination and probing21 to detect and eff ectively treat any case of peri-implant mucositis, since it can early progress to peri-implantitis. Sometimes it might be necessary to remove the overlying prostheses in order to achieve a more eff ective treatment and, in some cases, a better resolution of the inflammatory disease. (Fig.5-6) The objective of the SPT should be the absence of peri-implant inflamm- ation witnessed by absence of BOP.11

But what should we do in case peri-implantitis diagnosis? Being an infective pathology, biofilm and calculus removal is the key of peri-implant treatment. A gold standard non-surgical treatment still does not exists.13 Up to now no clinically relevant advantage of one treatment over the other can be found13 and only limited improve- ments accompanied by a tendency for recurrence have been reported.12 What has been happening during the last decades is the transposition of periodontal therapy strategies and technologies to the implant world. The use of curettes and me- chanical devices can be reasonable since it’s proved that peri-implant diseases are caused by a complex biofilm that has to be disrupted14 but becomes disputable given the struc- tural differences between a tooth and an implant. Scaling and Root Plan- ing makes little sense on a titanium surface with its particular micro and macro structure. An implant should not be planed but detoxifi ed and decontaminated without alteration of its smooth and rough surfaces and with recovery of the biocompat- ibility.12 Erosion with liberation of ions and metal particles is an under- estimated issue in dentistry. Wear

**Fig. 1:** Case 1. Peri-implant probing reveals a deep PD with abundant suppuration and BOP.

**Fig. 2:** Case 1. BOP starts immediately after prosthesis crown removal.

**Fig. 3:** Case 1. X-ray showing severe peri-implant CBL.

**Fig. 4:** Case 1. Clinical appearance after the prosthetics.

**Fig. 5:** Implant bar with abundant plaque deposits and evident mucositis.

**Fig. 6:** Resolution of mucositis after non-surgical therapy and healing period without bar.

**Fig. 7:** Pocket dentalization with erythritol powder conveyed by sub-gingival tip.

**Fig. 8:** Implant surface debridement with piezo-ceramic device and PEEK tip.

**Fig. 9:** Internal pocket line curettage.

**Fig. 10:** Case 1. Healing at 6 months after MAINST therapy. PD has decreased to 2mm. BOP and suppuration are absent.

**Fig. 11:** Case 1. Healing at 12 months after MAINST therapy.

**Fig. 12:** Case 2. Baseline. Probing reveals a deep PD with abundant suppuration and BOP.

**Fig. 13:** Case 2. Baseline. The radiography shows severe peri-implant CBL.

**Fig. 14:** Case 2. First application of dicycloxylic 14%.

**Fig. 15:** Case 2. Supra-gingival biofilm removal with erythritol powder.

**Fig. 16:** Subgingival decontamination with erythritol powder and sub- gingival tip.
debris have been described to be one of the responsible factors for aseptic loosening of orthopaedic implants. They can be phagocytized by macrophages, inducing the expression of pro-inflammatory cytokines activating osteoclasts maturation. On the surface of titanium implants we can find a self-repairable layer of TiO2 that shows a high chemical stability and prevent the diffusion of metallic ions. Scratching of the implant or abutment surface could lead to the temporary removal of the TiO2 layer and to release of metal particles. In some of the biopsies it was possible to detect titanium accompanied by pro-inflammatory macrophages. Furthermore, the alteration of the oxide layer and the contamination of the surface by instrument debris results in an impaired cell adhesion and implant biocompatibility.

In some in vitro studies, implant surfaces treated with stainless-steel curettes show a significantly lower number of attached fibroblast compared to untreated controls. Ultrasonic scalers with metal tips are effective in removing plaque from implant surfaces but cause damages mostly to the smooth surfaces, increasing the roughness and the possibility of new biofilm formation.

This is the reason why different materials curettes made have been introduced to not damage the implant surface (titanium-coated, carbon fiber, teflon, plastic). Same happened with ultrasonic devices: ethylenediaminetetraacetic acid solution have been proposed as an efficient scaling mean. Fox et al. showed that plastic and titanium-allow curette produce significantly lower roughness on titanium surface compared to steel ones. Unfortunately, the softer the material, the more limited is the debridement power. Different non-metal curettes were found to be ineffective in removing bacteria from both smooth and rough surfaces. Repeated use of glycine powder was not associated with any surface alterations, making its use feasible for life-long implant maintenance. Schmägel et al. proved glycine powder to be as effective as ultrasonic instruments with PEEK tip in cleaning both smooth and structured surfaces. Drago et al. analysed the in vitro effect of erythritol powder finding that it shows even a stronger antimicrobial and antibacterial activity than glycine. The detoxifying Erythritol powder has a lower granularity although the abrasive power is high. This may help reaching the micro-infrastructures of the implant and, in conjunction with the antimicrobial activity, help detoxifying the surface. Schmidt et al. analysed the effects of different instrumentations (stainless steel and plastic curettes,

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stainless steel and plastic coated ultrasonic devices, two types of glycine powders and one of erythritol on implant mock-ups through a scanning electron microscope. They found out that air-polishing treatment resulted in the least surface modifications. Amongst the powders tested, the erythritol was proven to be the most respectful of the implant surface. Furthermore, the introduction of specifically designed flexible nozzles able to reach the deeper portion of the pockets has increased the decontamination power of this kind of device. Ronay et al.24 in an in-vitro study tested the cleaning effectiveness of the different devices specifically designed flexible nozzles and to the implant surfaces, in particular in narrow and deep pockets. The use of different biodegradable carriers can give a better and easier contact with the implant structure and can cut out the need for fibres removal. Renterv et al.24 tested the single dose of locally delivered minocycline as a coadjuvant of manual debridement with curettes, compared to chlorhexidine gel application. The additional use of minocycline was small but significantly higher both on PD and BOP. Butler et al25 investigated biodegradable carriers like release 8.5% doxycycline as an adjuvant to debridement with plastic curettes as well as mechanical and oral hygiene instructions. The results were promising showing a significantly greater gain in mean attachment level PD and BOP improvement for the doxycycline carriers. Above all, doxycycline seems to be the most effective local antibiotic available.

3D imaging and diagnosis in dentistry: pitfalls and manipulation tools

Dr. Bart Vandenbergh | DDS | MSc | PhD

Dr. Bart Vandenbergh has his Master degree in Dentistry at the Katholieke Universiteit Leuven in 2005. He continued his oral imaging training with a Master in Medical Imaging (2007) and a PhD in Medical Sciences (2010) researches 2D and 3D imaging techniques for periodontal diagnosis. For this training, he spent three years in the United States of America as research scholar at Temple University in Philadelphia (2005-2006) and at Tufts University in Boston (2007). Shortly after, he was recruited by the University of Vercelli (Italy) as a Department’s Professor (2007-2009). In 2009 Bart moved to a Sardinia and worked as a clinician in the department of Diagnostic Sciences and Pathology as Visiting Assistant Professor.

References


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TIME & LOCATION:
Thursday 23rd November 2017 | 09:00 - 18:00 | Royal Rose Hotel, Abu Dhabi, UAE
Friday 24th November 2017 | 09:00 - 18:00 | CAPP Training Institute, Dubai, UAE

CONTACT:
Email: Events@cappmea.com
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