

# PERIIMPLANTARY INFECTIONS – ETIOLOGY, PROPHYLAXIS, DIAGNOSIS AND THERAPEUTIC ATTITUDE

<sup>1</sup>L. COVACI, <sup>2</sup>S. NICOLAE, <sup>3</sup>R. OROS, <sup>4</sup>V. NICOLAE

<sup>1</sup>Individual Medical Office, <sup>2,3,4</sup>“Lucian Blaga” University of Sibiu

**Abstract:** *The health condition of the periimplantary tissues is a major factor on which depends the prognostic of the implantoprosthesis treatment. The pathology of these tissues – generically called, periimplantary infection – has different stages of evolution. In the conditions of an early diagnosis and of a therapy properly instituted, this pathology may be eliminating, extending the functional life of the respective implant. This article systematically approaches the periimplantary infections from the point of view of etiology, early diagnosis, prevention and therapeutic measures.*

**Keywords:** oral implantology, periimplantary infections

**Rezumat:** *Starea de sănătate a țesuturilor periimplantare reprezintă un factor major de care depinde prognosticul tratamentului implanto-protetic. Patologia acestor țesuturi – denumită generic infecție periimplantară – se prezintă sub diferite grade de evoluție. În condițiile unui diagnostic precoce și ale unei terapii corect instituite, această patologie poate fi înlăturată, cu prelungirea vieții funcționale a respectivului implant. Acest articol abordează sistematic infecțiile periimplantare din punct de vedere al etiologiei, diagnosticului precoce, mijloacelor de prevenție și a celor terapeutice.*

**Cuvinte cheie:** implantologie orală, infecții periimplantare

The tissues that come into contact with a dental implant are represented by the periimplantary gum and periimplantary bone.

The periimplantary infections usually occur after a prosthetic restoration applied on an implant. They may also occur consecutively after the exposure of the implant in the oral cavity through the dehiscence of the mucoperiost and the visualization of the cover screws.

According to the stage of affection, the periimplantary infectious process may initially comprise only the periimplantary soft tissues (mucositis) and afterwards, it may extend to the level of the bone tissue (peri-implantitis).

The increased pathogenesis of these infections is due to the morphologic particularities of the periimplantary tissues, particularities related to the composition of the conjunctive tissue, disposition of the collagen fibres and local vascularization.

The periimplantary gingival liner is made up of an epithelium of 2 mm in thickness, directly attached to the implant surface through hemidesmosomes and an adjacent conjunctive tissue of 1-1,5 mm in width.

Due to the absence of the radicular cement, the collagen fibres are parallelly oriented to the implant surface, being partially inserted in the alveolar bone periosteum, thus accomplishing a weaker connection with the implant, as against that accomplished with a natural tooth, through parodontium.

Also, the periimplantary conjunctive tissue is rich in fibroblasts and quite poor in cells, in comparison with that around a natural tooth, while the rate of cell replacement is slower.

Finally, the absence of the marginal parodontium in the case of implants, makes the blood flow be accomplished only through the suprapariosteal vessels.

All these characteristics make this periimplantary soft tissue resemble with a fibrous tissue, with low blood flow and with a reduced defence capacity.

## Periimplantary infections etiology

As in the case of periodontia, the periimplantary infections have a multifactorial etiology.

The determining factors are local and may be divided into two large categories:

- Bacterial plaque
- Occlusal overstress

The production of a periimplantary infection is invariably conditioned by the existence of the bacterial plaque.

Besides these determining factors, the periimplantary infections are also produced by a series of favouring factors, such as:

- General factors (smoking, decompensated diabetes mellitus, haematological diseases, osteoporosis).
- Local factors (parodontopathies, improper oral hygiene, mucosal hyperplasia, exposure of the cover screws).

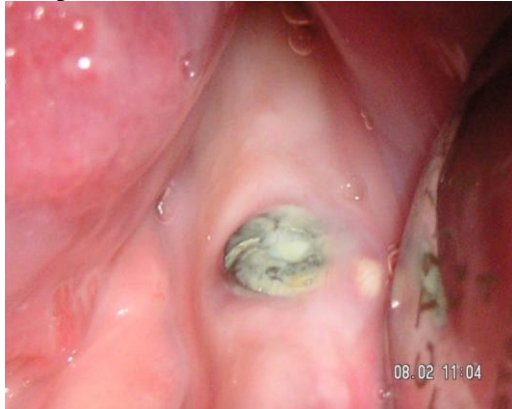
The general factors favour the recurrence of the periimplantary infections and decrease their compliance to the treatment, while the parodontopathies at the level of the remaining teeth, increase the risk of producing periimplantary infection through bacterial migration.

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Mucosal hyperplasia may occur either due to drugs or traumas and favour the periimplantary infections indirectly, because of the difficulty in preserving a proper hygiene.

Partial exposure of the cover screws during the stage of accomplishing the bone insertion of the implant may lead to the occurrence of certain retentive submucosal spaces that favour the accumulation of bacterial plaque.

### Picture no 1. Periimplantary infection following the partial exposure of the cover screw



### Prophylaxis of the periimplantary infections

The preventing measures of the periimplantary infections may be easily deduced from the analysis of their etiology.

Before starting the implantoprosthodontic treatment, the patients with the above-mentioned systemic affections will be informed that they are likely to register periimplantary infections.

Those having an improper hygiene will be trained with a view to a proper oral hygiene and will be informed about its importance, and that they will be monitored on the new hygienization technique.

When the patients present parodontopathies, these will be treated before accomplishing the implant, either conservatorily or surgically according to the gravity of the affection.

In order to prevent the accumulation of the bacterial plaque, the following are important:

- excision of the gingival mucosa suprajacently to the partially exposed cover screw; disassembly of this cover screw and the assembly of a cicatrization screw;
- the accomplishment of a prosthetic restoration with large embrasures that allow the self-cleaning;
- the establishment of a rigorous programme of dispensarization with check ups every three months;
- professional hygienization;
- the accomplishment of implants at home.

Within the dispensarization sessions, besides the clinical examination, radiological examinations are also necessary, in order to establish the level of the periimplantary bone, invariably compared to the level of the bone in the moment of applying the prosthetic restoration. Smith and Zarb established that the allowable

bone re-absorptions should be of 1,5-2 mm one year after the insertion and of 0,2 mm afterwards.

Professional hygienization is accomplished within the dispensarization session with instruments that do not destroy the implant area and do not favour the subsequent accumulation of bacterial plaque. Curettes made up of plastic material will be used, rubber cones, as well as supra- and subgingival irrigations with antibacterial solution of chlorhexidine 0,1-0,2%.

The hygienization of implants at home consists in brushing the teeth with electrical or manual brushes, as well as the use of the intradental brushes and of the dental thread for the prosthetic restorations.

The prevention of the occlusal overstress consists in:

- the insertion of implants in a proper topography;
- checking the accomplishment of a sealed connection between the implant and the prosthetic stump;
- recovery of the functional occlusal through the prosthetic restoration.

### Diagnosis of the periimplantary infections

The methods for the diagnosis of the periimplantary infections consist both in the clinical examination and in the use of complementary investigations.

The clinical examination is made by inspection with a parodontal sound made up of plastic material. The sounding depth will be always compared with that obtained immediately after the application of the prosthetic restoration.

The complementary investigations consist in:

- microbiological analysis of the fluid in the periimplantary groove;
- testing the implant stability with the periotest;
- checking the quality of the bone integrity through the analysis of the resonance frequency;
- radiographies for the analysis of the periimplantary bone re-absorption.

Testing the implant stability with the help of the periotest is not always relevant because in some situations, the implant may remain immobile even in the context of a significant bone re-absorption. Checking the quality of the bone integrity proves to be more useful through the analysis of the resonance frequency.

Periimplantary mucositis represents the incipient stage of the periimplantary infection and is manifested through mucosal erythema, edema, hyperplasia, serous secretion, bleeding as a result of a light sounding unchanged or slightly increased in comparison with the initial status. It is not associated either with the bone re-absorptions or with the formation of a periimplantary pouch, the radiological status remaining unchanged.

Periimplantitis represents the most advanced form of periimplantary infection, manifested by:

- increased sounding depth, as against the initial situation (>4mm);
- bleeding upon the light sounding;

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- purulent secretion at the level of the periimplantary pouch;
- deep bone pains;
- altered radiological status with evident bone re-absorption.

### Periimplantary infections therapy

The treatment of the periimplantary infections aims at:

- the recovery of bone integrity;

The therapeutic attitude varies according to the evolution stage of the affection:

- conservatory therapeutic measures (mechanical cleaning, anti-infectious and antimicrobial therapy, antimicrobial photodynamic therapy, laser therapy);
- corrective therapeutic measures;
- regenerative-augmentative measures;
- implant removal.

### Conservator treatment of the periimplantary infections

This type of treatment consists in a combined antimicrobial and anti-infectious therapy and it is indicated in the case of mucositis and in an easy form of periimplantitis (horizontal or vertical bone re-absorption less or equal to 2mm).

The first therapeutic step is represented by the accomplishment of the professional hygienization, followed by motivating and training the patient with a view to a proper hygienization of the implants at home. In the case of occlusal overstress, it will be necessary to check the prosthetic restoration and to remove the premature contacts and of the interfaces.

In order to clean the implant area contaminated with bacteria or with bacterial degradation products, different methods of mechanical or chemical decontamination are available.

The mechanical decontamination methods consist in irrigations with pulverized stream or through the ends of the ultrasonic systems, specially modified, while the chemical decontamination methods consist in bandaging the implant surface with solution of citric acid, EDTA and chlorhexidine – gel.

Two modern modalities for the decontamination of the implant area are resented by the antimicrobial photodynamic and laser therapy.

After the decontamination of the implant surface, the antibacterial therapy may follow, topically and systemically accomplished according to the result of the microbiological examination.

The topic antibiotherapy may be accomplished through the injection of antibiotics paste in the periimplantary groove (picture no. 2), while the systemic antibiotherapy consists in administrating Metronidazole of 400 mg and Amoxicillin of 500 mg, both of them 3 times a day.

### Surgical treatment of the periimplantary infections

This therapy is indicated after the disappearance of the inflammation in the case of periimplantary pouches with depths of more than 5 mm.

The corrective therapeutic measures are indicated only in the lateral regions of the arches, in order not to bring about aesthetical prejudices and aim at reducing the periimplantary pouches and the mucosal hyperplasia.

The regenerative-augmentative therapeutic measures are recommended in the case of the bone pouches with two up to three walls and of the circular bone loss with infraalveolar component (pictures 3 and 4), provided that the clinical immobility of the implant should be preserved. The materials used are either the autolog bone or different materials of bone substitution (allogene, xenogene and aloplastic graft), covered by barrier membranes.

Implant removal is imposed only in the situation in which the affected implant registers clinical mobility.

### Picture no. 2. The topic antibiotherapy of the periimplantary infections

#### a. Metronidazole benzoate ampulla



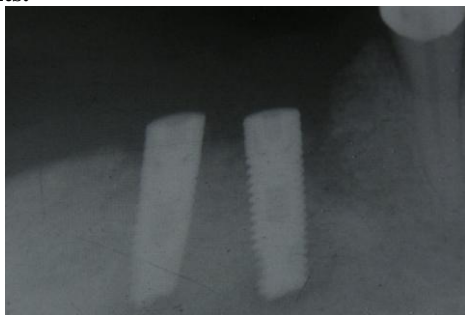
#### a. Donsolon ampulla



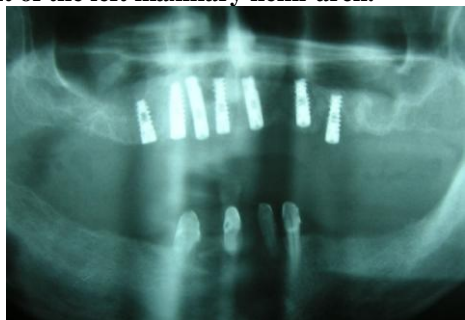
#### c. Injecting the paste in the periimplantary groove with the help of cannula



**Picture no. 3. Periimplantary bone resorption in both implants.**



**Picture no. 4. Bone resorption around the most distal implant of the left maxillary hemi-arch.**



### CONCLUSIONS

Patient's dispensarization on long term represents an essential condition in order to supervise the health of the periimplantary tissues and to early diagnose any inflammation.

Morphological particularities of the periimplantary tissues bring about their more increased vulnerability to the bacterial attack, in comparison with the periodontium of the healthy teeth, so that the mucosity may evolve rapidly towards periimplantitis.

The establishment of a therapeutic measure corresponding to the evolution stage of the affection may produce the healing of the periimplantary tissues and implicitly, the increase of the implant functionality.

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