CLINICAL ORAL IMPLANTS RESEARCH

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on behalf of Working Group 2†

Peri-implant tissue destruction. The Third EAO Consensus Conference 2012

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The authors have not declared any potential conflicts.

Abstract

Objective: The task of this working group was to update the existing knowledge base regarding the prevalence of peri-implant tissue destruction, the role of occlusal overload, and the outcome of non-surgical and surgical treatment.

Materials and methods: The literature was systematically searched and critically reviewed. Four manuscripts were presented in key areas deemed to be essential for the current understanding of the magnitude of the clinical entity peri-implantitis. The role of overload as an etiological component was reviewed. Also available data on the results from non-surgical and surgical interventions for the control of tissue destruction were presented.

Results: The consensus statements following plenary session approval, clinical implications, and directions for future research based on the group discussions are presented in this article. The results and conclusions of the systematic review process are presented by the respective authors in the subsequent papers.

Implant therapy is a well established method of replacing missing teeth. Excellent long-term results can be achieved, but biologic complications may occur. However, the reported magnitude of the incidence of these complications is a matter of academic dispute. One review is therefore focusing on the epidemiology of peri-implantitis and critically assessing the reporting of data and the subsequent conclusions being made. Occlusal overload has been related to the loss of marginal bone and implants. PICO questions were formulated to assess what is the effect of overload vs. no overload on bone/implant loss in clinically stable implants. Once mucosal inflammation and loss of supporting peri-implant tissues have occurred, non-surgical and surgical interventions are often indicated. One review is critically evaluating the efficacy and safety of non-surgical treatment of peri-implantitis. The presence of a supra-structure, implant design, and implant surface characteristics may limit access to infected sites and therefore non-surgical therapy may be judged ineffective. Surgical open flap debridement, with or without adjunctive therapies, has been recommended as a possible way of treating peri-implantitis. Surgical interventions were thus evaluated, only considering human studies.

The following reviews were available for group discussions and the foundation for the subsequent plenary sessions

- Mombelli A, Müller N, Cionca N. The epidemiology of peri-implantitis. Mombelli et al. (2012)
- Muthukuru M, Zainvi A, Esplugues EO, Flemmig TF. Non-surgical therapy for the management of peri-implantitis. Muthukuru et al. (2012)
- Renvert S, Polyzois I, Claffey N. Surgical therapy for the control of peri-implantitis. Renvert et al. (2012)
- Naert I, Duyck J, Vandamme K. Occlusal overload and bone/implant loss. Naert et al. (2012)

Based on the content of the four reviews the following consensus statements, clinical recommendations and implications for research were agreed, following the presentation of data and plenary discussions. It should be noted that the headings used below do not reflect any absolute border between different topics. Several statements may also fall within the theme of the adjacent reviews.

†Members of working group 2: Noel Claffey, Thomas Flemmig, Isidor Flemming, Andrea Mombelli, Ignace Naert, Stefan Renvert, Isabella Rocchietta, Soren Schou, Frank Schwarz, Wim Teughels, Pascal Valentini, Ann Wennerberg.

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Epidemiology

Consensus Statements

The prevalence of peri-implantitis over a 5–10 year period following implant placement has been reported to be in the order of 10% of implants and 20% of patients*.

Differences in the definition of peri-implantitis have resulted in a wide range of reported prevalence values.

Such differences include the use of different thresholds for bone loss, inflammatory parameters (BOP, PPD), and differences in the combination thereof.

Furthermore, the study samples may not be representative of the general target population for implant treatment.

Early peri-implant bone resorption can be caused by remodeling, that may be unrelated to infection and is not necessarily peri-implantitis.

Long-term monitoring of implant performance should not be based on radiographs taken directly after implant placement, but should rather relate to recordings obtained 3 months after completion of treatment, once tissue homeostasis has been established.

Factors that have been shown to affect peri-implantitis prevalence include smoking, poor oral hygiene, and a history of periodontitis.

Clinical recommendations

Peri-implantitis may be expected to occur in one of five patients, hence frequent monitoring of the peri-implant tissues for signs of inflammation is necessary.

Prior to placement of implants patients should be informed of the risk of peri-implant diseases and how it can be reduced.

Preventive measures including control of biofilm and modifiable risk factors should be integral to patient care.

Implications for research

Future studies should rely on well-defined disease definitions and should be conducted in samples reflecting the primary target population for implant therapy.

Additional studies, preferably prospective, are needed to assess the impact of factors associated with the initiation and progression of peri-implantitis. Among these local and systemic factors are diabetes, medication, and treatment-related regimens.

To obtain a more complete picture of the clinical and economic implications of implant treatment, in future studies it will be necessary to assess how much subsequent treatment may be generated following implant placement, including prophylaxis, treatment of mucositis, peri-implantitis, and therapy due to implant loss.

Non-surgical intervention

Consensus statement

The continuum from peri-implant mucositis to peri-implantitis is difficult to determine. It is therefore important to treat early signs of inflammation to prevent or limit marginal bone loss.

Peri-implant mucositis can be treated successfully with non-surgical mechanical debridement.

For peri-implantitis non-surgical mechanical debridement alone has limited efficacy.

Clinical recommendations

Patients should be monitored regularly for plaque control, signs of peri-implant inflammation such as suppuration, increasing probing depth and bone loss. Patients presenting with these factors should be subject to high vigilance monitoring.

All treatment modalities should disrupt the submucosal biofilm.

Removal of the restoration may be considered for debridement, if submucosal access is limited, e.g. by the design of the crown, implant design, or position of the implant in the jaw.

A regular maintenance program may be needed for the long-term management of peri-implantitis lesions.

Implications for research

Well designed and controlled clinical trials including above mentioned should be performed in the general target group.

Surgical therapy

Consensus statement

Surgical therapy should at least include:

Removal of the granulation tissue.

Thorough cleaning of the contaminated surface.

Adjunctive measures (submucosal air-polishing, ER:YAG laser treatment, locally delivered antimicrobials) may result in greater reduction in bleeding on probing and probing depth. However, the outcomes are variable and influenced by factors not yet fully understood.

Resection of the bony wall, filling of the defect or surface modifications of the implant can be considered in adjunction to mechanical instrumentation.

The decision to employ either a regenerative or resective surgical approach depends among other things upon aesthetic demands of the site, the defect morphology, and the presence of adjacent teeth or implants.

The use of a membrane in conjunction to surgical therapy of peri-implantitis does not seem to improve the healing results.

Clinical recommendations

If non-surgical treatment does not resolve the peri-implantitis lesion or arrest progressive bone loss, surgical therapy may be considered.

Before surgical therapy local and systemic risk factors such as poor oral hygiene, smoking, and periodontitis should be under control.

Surgical therapy is considered to be superior to non-surgical therapy in resolving peri-implantitis.

Implications for research

Animal studies may be necessary in the development and evaluation of new treatment protocols.

Randomized clinical trials are necessary to substantiate the benefits of various elements of surgical therapy.

Overload

Definition of overload

Overload is defined by strains in excess of 3.000 micro strain (με) in bone, which results in loss of bone mass.

Mild overload is defined by strains between 1.500 and 3.000 με, which results in gain of bone mass (mechanostat Frost 1998, 2004).

In all identified studies the term "overload" was used without measuring the strain occurring in the bone-implant interface. Hence, the type of overload was not known.

Consensus statements

Based on three animal studies the following conclusions could be drawn:

There is evidence for a different peri-implant bone tissue response to the applied load depending on peri-implant tissue health:

In healthy peri-implant tissues, no loss of bone mass and even bone gain occurred.

In inflamed peri-implant tissues (experimental peri-implantitis), increased marginal bone resorption occurs (loss of bone mass).

Although not well controlled and thus excluded from this review, non-physiological loading in some animal studies leads to bone/implant loss.

Clinical recommendations

Peri-implant tissues should be healthy before loading.

Loading the implants surrounded by inflamed tissues, may trigger marginal bone loss.

Implications for research

Efforts should be made to quantify strains at the bone-implant interface.

Hence, for a better understanding of the biomechanical conditions, validated numerical modelling data can be valuable.

*Minority Statement

Delivered at the Consensus Conference Plenary Session by Tomas Albrektsson (University of Gothenburg, Sweden) and Ann Wennerberg, (Malmö University, Sweden).

"Based on a recently completed review we authored, it is quite clear that a particular figure for the true incidence of peri-implantitis cannot be stated. Therefore our minority statement is written in opposition to the precise figures of implants or patients allegedly threatened by peri-implantitis."

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