Implants should only be inserted when periodontal conditions are stable

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Biofilm is the most significant cause of inflammatory bone loss around teeth and implants. Diagnostics, biofilm management and, where necessary, treatment help in patients with this problem. The W&H No Implantology without Periodontology work-flow should provide stable tissue prior to implantation through prevention, and implant success in the long term through aftercare – something that is advantageous to both the patient and the treatment team.

Implant treatment can significantly improve quality of life after tooth loss.1, 2 The long-term prognosis is generally good, but biological complications are common.3 Peri-implantitis and its preliminary stage, mucositis, occur in a substantial proportion of patients.4 As is the case for periodontitis and gingivitis, oral biofilm is the main cause.5 This microbial bioenvironment can also encourage the development of severe systemic disease in the event of pathological changes, such as endocarditis and inflammatory bowel disease.6

The only difference in the microbial flora in periodontitis and peri-implantitis is the detail. Compared with healthy conditions, the quantity and aggressiveness of the pathogenic microorganisms change in both diseases.5, 7 Bone loss around implants is generally more rapid and leads to more extensive defects than when it occurs around teeth.4 Accordingly, preventive care is advised even before implant treatment.

Determining risks and providing periodontal treatment

Periodontitis is a key risk factor for peri-implant inflammation. This means untreated periodontitis patients have an increased risk of peri-implant inflammation through to implant loss.8 The risk is also higher when patients who are initially treated are not included in a supportive periodontitis treatment/recall programme.9

Leading periodontists therefore recommend carrying out a screening procedure before implant treatment using, for example, the periodontal screening index or periodontal screening and recording.10 Bleeding on probing and pocket depths are determined at selected positions. An extensive check of the periodontal status should be carried out if the results are abnormal.11

Taking a careful medical history, including previous systemic exposure, is also important.12 This provides important information about increased risk of inflammation, for example in patients with diabetes that is not being optimally managed.13 Furthermore, patients should be informed of the risks relating to implants.

Where necessary, initial periodontal treatment is carried out. First, professional tooth cleaning establishes healthy gingival conditions. In this procedure, calculus (Fig. 1) and biofilm (Fig. 2) are removed as far as the gingival sulcus. In combination with careful instruction on oral hygiene, this gives the patient the basis for long-term freedom from inflammation.14

Removal of subgingival coatings (debridement) is carried out using sonic or ultrasonic devices and special periodontal tips as initial periodontal treatment (Fig. 3). Manual instruments can also be used. Further surgical and/or mechanical removal.15-18 In the subgingival and supragingival areas, ultrasonic devices are generally used for this (Fig. 4), in combination with manual instruments where necessary. Alternatively, subgingival air polishing can be used in combination with periodontal attachments and powders.19

Checking for individual risk factors, such as smoking and diabetes, and working towards a healthy lifestyle are also recommended for a good long-term prognosis after periodontitis treatment.14 If the patient had severe periodontitis before the initial treatment, the recall frequency will be increased accordingly, partially to prevent peri-implant inflammation.10

Proactive implant treatment

If the patient has received good preventative treatment and where necessary has received preliminary periodontal treatment, implant treatment can be planned. A suboptimal implant-supported prosthesis increases the likelihood of biofilm formation.20 In order to avoid this, the correct implant position, sufficient distances from adjacent teeth and an ideal axial alignment should be considered during the planning phase. A sufficiently sized bone site and soft tissue that is well supplied with blood are needed for successful implant healing and a good long-term prognosis. Prior or simultaneous augmentation may be needed to achieve this. In contrast to this, the time at which the implant is inserted and the treatment is provided plays a less significant role.21

In order to support predictable and stable implant treatment, it is also necessary to prepare the implant bed using suitable methods and equipment. This can be achieved using high-performance implantology motors in combination with surgical contra-angle handpieces. Using a low speed and an ample supply of sterile cooling fluid is essential during preparation.22 Otherwise, the bone can overheat and affect the healing process.

Alternatively, the implant bed can be prepared with piezo-surgical systems, for which special sets of instruments are available.23 Bone can be worked on in a gentle yet highly effective manner using other special instruments. Indications include alveolar ridge splitting, surgical tooth removal, and the preparation of bone blocks or lateral windows for augmentation.24 Highly advanced piezo-surgical devices are also minimally invasive in soft tissue.

Stability measurement and bone surgery

Once the implant has been screwed into its final position, the primary stability can be safely and precisely determined using resonance frequency analysis. The technology is available either separately or as an optional module in an implantology motor. If the ISQ (Implant Stability Quotient) value measured is 66 or higher, early intervention is possible, and if it is over 70, treatment must be provided immediately.25

An exposure protocol based on the ISQ value improves the prognosis of treatment. Simply measuring the torque resistance, however, does not provide the same level of clinical safety.26 If reduced ISQ values are measured after the implant has been inserted, a two-phase protocol is generally chosen. After exposure, a new measurement can then be used to determine whether osseointegration has been successful (secondary stability) and loading will be predictable at this point.27

Hygiene-friendly prostheses

The emergence region should be designed to ensure that it is atraumatic to the tissue for long-lasting implant restorations. The implant-abutment connection, material, surface and emergence profile must be biocompatible and mechanically resilient over the long term. The transgingival components should also be accessible for individual and professional cleaning and for probing.28

Definitively integrating abutments or other components at implant level immediately (“one abutment, one time”) has also proved to be effective.29 In combination with good hygiene and correspondingly healthy tissue, this concept can probably be used to achieve a more stable attachment of the implant to the oral cavity than if the components have to be replaced several times - a requirement for peri-implant health.
Whether it is with crowns, bridges, partial or complete prostheses, the implant-supported superstructure should be designed so that the patient can maintain it without any difficulty.\(^{46}\) Additionally, the distance of at least 2 mm between the bone and the mucosal edge of the prosthesis appears to be advised to prevent infection and subsequent bone loss.\(^{39}\)

**Peri-implant aftercare**

Experts recommend treatment immediately after the initial occurrence of symptoms of inflammation to avoid a peri-implant bone loss from the start.\(^{39}\) Mucositis affects almost half of all implants, and since patients often have several implants, it occurs in a high percentage of patients.\(^{39}\) The prophylactic or periodontal recall programme established after the implant has been inserted should therefore be continued.\(^{46}\) At home oral hygiene should be carefully tailored to the new prosthesis and the patient accordingly instructed on this.\(^{20}\) In combination with professional biofilm management, good preventative efficacy can be achieved in this way.\(^{37}\)

The risk of peri-implantitis decreases from 43.3 per cent (no recall) to 18.0 per cent if a patient receives a recall appointment carried out carefully each year, in other words by more than half.\(^{46}\) Ultrasonic systems with special instruments that do not affect the materials are suitable for this, such as those made of PEEK (Fig. 5) or appropriate manual instruments.\(^{37}\)

**Mechanically preventing mucositis**

As for periodontitis patients, peri-implant recall includes regular screening with a clinical check of both periodontal and peri-implant tissue for symptoms of inflammation, probing and, where necessary, radiographic diagnosis.\(^{3}\) A frequency of two to four times a year has proved to be effective.\(^{20}\) Deep probing values and bleeding occur more commonly in patients with peri-implantitis than in those with mucositis; pus secretion only occurs in patients with peri-implantitis.\(^{37}\)

If a patient has mucositis, professional supragingival and subgingival biofilm removal reduce the risk of the inflammation advancing to peri-implantitis. Local and systemic antibiotics used as supportive measures or air polishing, however, show no additional benefit.\(^{37,39}\)

**Treating peri-implantitis**

Peri-implant bone loss can develop even if good preventative care is provided, for example if the patient’s oral hygiene is not sufficient. Most minimal defects should be treated in a non-surgical manner using peri-implant debridement.\(^{46}\) Mechanical removal of coatings using suitable ultrasonic systems, supported by Er:YAG lasers, antibacterial photodynamic treatment, air polishing, or treatment with local or systemic antibiotics, where appropriate, has shown promising results.\(^{20}\)

If closed treatment is no longer possible, the defect must be surgically exposed and carefully decontaminated. This is carried out after flap preparation by removing inflamed tissue and cleaning the surface of the implant using, for example, ultrasonic or piezo-surgical systems. Measures designed to regenerate the bone carried out after this procedure have been successful.\(^{46}\) Special piezosurgical instruments are available for the surgical treatment of periodontal defects.

After treatment, the patient is once again intensively instructed on oral hygiene and made aware of the need for continual recall. If necessary, the frequency can be

selected to be higher than previously in line with periodontal after-care. If biofilm management is carried out consistently the implantological results can remain stable for several years even after the peri-implantitis, mucositis or peri-implantitis has healed.\(^{37,39}\)

**No Implantology without Periodontology**

Successful implant treatment requires consistent, long-term preventative thinking. In each phase, this includes regular periodontal and peri-implant screening in combination with individually tailored risk management, oral hygiene training and professional biofilm management where possible for every patient.

Ideally, this preventative workflow should start well before each restorative measure, before peri-implantitis can develop. It is essential if implant prosthetic treatment is planned or has already been integrated. Patients will be pleased with the long-term success of the treatment and will be pleased to return to a practice or clinic they trust.