Implants should only be inserted when periodontal conditions are stable

By Dr Jan H. Koch, Germany

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 workflow 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. The long-term prognosis is generally good, but biological complications are common. Peri-implantitis and its preliminary stage, mucositis, occur in a substantial proportion of patients. As is the case for periodontitis and gingivitis, oral biofilm is the main cause. Microbial biofilm can also encourage the development of serious systemic disease in the event of pathological changes, such as endocarditis and inflammatory bowel disease.

The only difference in the microbial flora in periodontitis and peri-implantitis is in the detail. Compared with healthy conditions, the quantity and aggressiveness of the pathogenic microorganisms change in both diseases. Bone loss around implants is generally more rapid and leads to more extensive defects when it occurs around teeth.

Accordingly, preventive care is advised even before implant treatment. Determining risks and providing periodontal treatment 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. The risk is also higher when patients who are initially treated are not included in a supportive periodontitis treatment/recall programme.

Leading periodontists therefore recommend carrying out a screening procedure before implant treatment using, for example, the periodontal screening index or periodontal screening and recording. Blending 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.

Taking a careful medical history, including previous systemic exposure, is also important. This provides important information about increased risk of inflammation, for example in patients with diabetes that is not being optimally managed. 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.

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 regenerative measures may be necessary, depending on the situation.

Periodontal aftercare for long-term success

In the periodontal aftercare subsequent to implantation, soft biofilm and hard coatings are regularly professionally and mechanically removed. 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.

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. If the patient had severe periodontitis before the initial treatment, the recall frequency will be increased accordingly, partially to prevent peri-implant inflammation.

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 subperi-implant implant-supported prostheses increases the likelihood of biofilm forming. 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.

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. 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. 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 augmentations.

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. If ISQ values exceed 70, treatment must be provided immediately.

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. 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.

Hygiene-friendly prostheses

The emergence region should be designed to ensure that it isatraumatic to the tissue for long-lasting implant restoration. The implant–abutment connection, material, surface and emergence profile must be bacteriostatic and mechanically resilient over the long term. The transgin...
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By Dr Fernando Rojas-Vizcaya & Mr Francisco Ortega, Spain

Case report: Prosthetic procedure with Atlantis

Anatomical shape, support and colour provided by the use of an Atlantis patient-specific abutment in gold-shaded titanium

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Case

36 year-old patient with a vertical fracture of tooth 46. The treatment plan was to extract the tooth and replace it with a deep implant using a conventional installation and loading protocol. The challenge was to restore the position of the gingival contour and the inter-proximal papilla, as for a natural tooth. In order to achieve a long-term natural result, an Atlantis Abutment was selected to provide the optimal anatomical shape, support and colour.

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. A frequency of two to four times a year has proved to be effective. 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.

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.

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 defibrillation. Mechanical removal of coatings using suitable ultrasonic systems, supported by Ti:YAG lasers, antibacterial photo-dynamic treatment, air polishing, or treatment with local or systemic antibiotics, where appropriate, has shown promising results.

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. Special peri-implant surfaces are available for the surgical treatment of peri-implant 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 aftercare. If biolistic management is carried out consistently, the implantological results can remain stable for several years even after the periodontitis, mucositis or peri-implantitis has healed.

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, because periodontitis 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.

Editorial note: A list of references and information is available from the publisher by scanning this QR code using your mobile phone. More information can be found at niwop.whcom.

Fig. 1: A vertical fracture of tooth 46. When probing, a distal narrow isolated pocket measuring more than 15 mm was detected.

Fig. 2: In the radiograph, a radiolucency along the distal wall of the dental root with the typical “C” shape seen in vertical root fractures could be observed.

Fig. 3: Tooth extraction was performed without damaging the alveolar wall. The socket was grafted and sutured without using grafting material.

Fig. 4: After 8 weeks of healing, the soft tissue over the extraction area was completely healed.

Fig. 5: After 8 weeks, the amount of bone formation into the socket allowed for implant placement.

Fig. 6: Using a surgical drill, the osteotomy could be performed in an adequate position in 3 dimensions, using the zenith of the cervical contour of the planned restoration as a reference point.
The evolution of the Neoss implant system: A retrospective follow-up of three patient cohorts treated with three types of Neoss implants

This article reports on three patient cohorts with three types of Neoss implants. The retrospective analysis shows excellent long-term results with the Neoss implant system. The results also indicate that the introduction of the ProActive implant surface led to improved clinical outcomes in difficult cases.

By Dr Thomas Zumstein, Switzerland & Dr Herman Sahlin, Sweden

Introduction

The effect of dental implant design changes on the clinical outcome is usually difficult to study in a structured way. When comparing study data from different studies, several factors change together with the change of implant design. Here we have a clinical material where the same surgical protocol has been used by the same surgeon at the same clinic but with three generations of Neoss implants. That gives us a unique opportunity to study the effect of implant design changes in a more controlled manner. For each new generation of Neoss implants – i.e. Bimodal Straignt, ProActive Straight and ProActive Tapered – the clinical outcome of the first 50 consecutive patients treated in one private office has been retrospectively analysed. Data on the Bimodal and the ProActive Straight patient groups have been published earlier.

Materials and methods

Patients

This retrospective study analyses three patient cohorts consisting of the first 50 consecutive patients treated with three types of Neoss dental implants (Neoss Ltd, Harrogate, UK):

• Bimodal Straight implants
• ProActive Straight implants
• ProActive Tapered implants
The Bimodal implant had a straight implant body with a blasted surface. The ProActive straight implant has exactly the same implant geometries as the Bimodal implant, but with the blasted and etched hydrophilic ProActive implant surface. The ProActive Tapered implant has the same ProActive surface, the same prosthetic connection and cutting features as the ProActive Straight implant but with a tapered implant body.

The patients were examined clinically and radiographically before treatment. They were thoroughly informed of the surgical and follow-up procedures and gave their written consent before treatment. All treatment steps were part of the routine treatment year at the clinic, and no extra measures were taken for the case of the study. The study was conducted in accordance with ethical principles, including the World Medical Association Declaration of Helsinki.

Surgical protocol

Patients were given antibiotics (Iluclav, 300 mg; Pfizer AG, Zurich, Switzerland) preoperatively and during the procedure, and the implant surgery was performed under local anaesthesia (Uracain D-6 Forte, Pentapharm, Avenia, Switzerland).

In cases of localized horizontal and vertical defects, a guided bone regeneration (GBR) procedure using BioOs and a resorbable BioGide membrane (Geistlich, Switzerland) was performed simultaneously with implant placement. Larger defects were treated using a staged GBR procedure. First, either an autologous bone block and a resorbable membrane (BioGide) or a bone substitute material (BioOs) and a non-resorbable ePTFE membrane (Gore-Tex Regenerative Membrane, Gore Medical, Flagstaff, AZ, USA) were used. Implants were placed after the healing period of 6 months. ePTFE membranes were removed in the same operation. In some cases, sinus floor augmentations were made simultaneous with implant placement either by the use of a sinus lift or using a lateral window technique.

Flapped surgery was used. Implant sites were prepared and implants were placed in accordance with the manufacturer’s guidelines.

Implant placement depth varied between the different treatment groups. In the Bimodal treatment cohort 95% of the implants were placed with the implant platform at bone level and 4% were placed supercemental with half of the collar above bone level. In the two ProActive cohorts, all implants were placed with the implant-abutment connection at bone level.

Follow-up

The patients were scheduled for annual check-ups with clinical and radiographic examination. Follow-up data was collected from the 1-, 3-, and 5-year visits.

Survival analysis was performed, and marginal bone levels were measured from periapical radiographs. Mesial and distal bone levels were measured and an average was calculated. Baseline measurements were taken at time of implant placement for the ProActive groups and at time of prosthesis delivery for the Bimodal group.

Results

Baseline data, treatment schedule and follow-up status for each treatment group is presented in Figure 1.

In the Bimodal group, all followed patients have attended the 10 year check-up. In the ProActive Straight group, the patients have completed the 5 year follow-up, and in the ProActive Tapered group, the 3 year follow-up is completed (Figure 1).

Implant survival is shown in Figure 2. In the Bimodal group, the cumulative survival rate after 10 years was 93.2% for augmented sites (1 failure) and 98.9% for non-augmented sites (1 failure). In the ProActive Straight group, the cumulative survival rate after 5 years was 98.8% for augmented sites (1 failure) and 98.9% for non-augmented sites (3 failures). In the ProActive Tapered group, no failures occurred. Resulting in cumulative survival rates after 3 years of 98.6% for augmented sites as well as non-augmented sites.

Marginal bone levels over time are shown in Figure 3. In the Bimodal group, the bone resorption from prosthesis delivery to 10 years was 0.4 ± 1.2 mm. In the ProActive Straight group, the bone resorption from implant placement to 5 years was 0.7 ± 0.6 mm. In the ProActive Tapered group, the bone resorption from implant placement to 3 years was 0.5 ± 0.6 mm.

All groups showed stable bone levels after the first year. None of the patients in any of the study groups showed any signs of peri-implantitis.

Discussion

The three patient cohorts were treated according to the same clinical protocol. Hence, the groups were similar in gender distribution and percentage of sites requiring bone grafting. However, as clearly seen in Figure 5, the number of implants decreased for each new group. This is most likely reflects a fall in the general implant population over time where the percentage of full arch restorations has decreased and the percentage of single crown restoration has increased over the last 10-15 years.

The results indicate excellent long-term clinical results with the Neoss implant system. The bone levels are maintained on a stable level after one year in all groups with an average long-term bone level change in the Bimodal group between 2 and 10 years is less than 0.3 mm.

The Bimodal implant showed lower survival rate in augmented sites (91.2% vs. 98.2%). No difference in implant survival between augmented and non-augmented sites were seen for the ProActive implants. This indicates that implants with the ProActive surface experience less complications than implants with the Bimodal surface. This finding is in line with earlier studies showing that ProActive implants performed better than Bimodal implants when placed directly after total extraction of remaining teeth and loaded with a fixed bridge within 3 days.

No case of peri-implantitis was recorded in the studied patient population during the 3-15 years of follow-up. This is an interesting and encouraging finding. However, additional studies and larger patient populations are needed to establish whether this is due to the studied patient population, the surgical and prosthetic protocol, the meticulous follow-up schedule or the implant properties.

In conclusion, the studies show excellent long-term results with the Neoss implant system. The results also indicate that the introduction of the ProActive implant surface led to improved clinical outcomes in difficult cases.

References


Fig. 3: Marginal bone levels. All groups showed bone resorption less than 0.7 mm to the longest follow-up time point. The bone levels in the Bimodal group is lower than the other groups, partly due to differences in implant depth. A Neoss 4.0 mm straight implant is outlined to show the bone level in reference to the implant collar.