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 Periodontal 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.3 The long-term prognosis is generally good, but biological complications are common.5 Peri-implantitis and its preliminary stage, mucositis, occur in a substantial proportion of patients.7 As is the case for periodontitis and gingivitis, oral biofilm is the main cause.8 This microbial bioecosystem can also encourage the development of severe systemic disease in the event of pathological changes, such as endocarditis and inflammatory bowel disease.2 The only difference in the microbial flora in periodontitis and peri-implantitis is in the detail.8 Compared with healthy conditions, the quantity and aggressiveness of the pathogenic microorganisms change in both diseases.1 Bone loss around implants is generally more rapid and leads to more extensive defects when it occurs around teeth.3

Accordingly, preventative 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.7 The risk is also higher when patients who are initially treated are not included in a supportive periodontitis treatment/novel programme.8

Leading periodontists therefore recommend carrying out a screening procedure before implant treatment using, for example, the periodontal screening index or periodontal screening and recording.8 Blinding 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.5

Taking a careful medical history, including previous systemic exposure, is also important.5 This provides important information about increased risk of inflammation, for example in patients with diabetes that is not being optimally managed.9 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.7

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.10 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 achieve this. In contrast to this, the time at which the implant is inserted and the treatment is provided plays a less significant role.1–4

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.12 Otherwise, the bone can overheat and affect the healing process.

Alternatively, the implant bed can be prepared with piezo-surgical systems, for which special instruments are available.4 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.3 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.2,9

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.3 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.3

Hygiene-friendly prostheses

The emergence region should be designed to ensure that it isatraumatic to the tissue for long-lasting implant restorations. 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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Fig. 1: Calculus removal using an ultrasound (W&H Tigon 5+) with a 3U tip is a key part of professional tooth cleaning. (Photograph: W&H)

Fig. 2: Rotary cleaning with prophylaxis polishing caps and brushes (W&H Prorac prophyjet contra-angle handpiece) ensures smooth surfaces on teeth. It enables patients to check biofilm effectively at home. (Photograph: W&H)

Fig. 3: If marginal periodontitis is diagnosed, the initial debridement can be carried out very efficiently with an air scaler (laser technology, W&H Prorac with L4P tip). (Photograph: W&H)

Fig. 4: Ultrasound devices are particularly suitable for UPT, for example in combination with periodontal tips (W&H Tigon 5+ with LP tip). (Photograph: W&H)

Fig. 5: Implants and suprastructures are routinely cleaned, for example using ultrasound devices and special plastic instruments (W&H Tigon 5+ with L1P tip). (Photograph: W&H)

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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

By Dr Fernando Rojas-Vizcaya & Mr Francisco Ortega, Spain

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 dental 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.

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 root with the typical “Y” 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 Straight, 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 had exactly the same implant geometries as the Bimodal implant, but with the blasted and etched hydrophilic ProActive implant surface. The ProActive Tapered implant had the same ProActive surface, the same prosthetic connection and cutting features as the ProActive Straight implants 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 during the study period, and no extra measures were taken for the cause 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 (Dulacin, 300 mg, Pfizer AG, Zurich, Switzerland) directly after total extraction of the teeth. Flapped surgery was used. Implant sites were prepared according to the manufacturer’s guidelines.

Implant placement depth varied between the different treatment groups. In the Bimodal treatment cohort 93% of the implants were placed with the implant platform at bone level and 41% were placed supracrestal 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 full follow-up is completed (Figure 3).

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). In the ProActive Straight group, the cumulative survival rate after 5 years was 98.5% for non-augmented sites (1 failure). In the ProActive Tapered group, no failures occurred, resulting in cumulative survival rates after 3 years of 98% 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 0.5 ± 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 1, the number of implants decreased for each new group. This 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 1 and 10 years is less than 0.3 mm.

The Bimodal implant showed lower survival rate in augmented sites (93.2% vs. 98.2%). No difference in implant survival between augmented and non-augmented sites was 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 10 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 different cases.

References


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Figures

Fig. 1: Overview of studies.

Fig. 2: Implant survival rates over time for the three study groups. The Bimodal GBR group showed lower survival rate than the other groups.

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.