

Maxillary rehabilitation using the All-on-4 concept

Immediate fixed teeth – a treatment concept for edentulous patients

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The number of edentulous patients continues to be substantial. Many of them suffer from having to wear a conventional complete denture and would much prefer a fixed implant-supported denture instead. One possible form of therapy is the All-on-4 treatment concept by Professor Paulo Maló. Advantages of this method are that no or only minimal bone augmentation is required and that the usually four implants in the mandible or the four or six implants in the maxilla can be restored immediately.

Introduction

Our practice is located in a very rural area, an area that was severely underserved by physicians and dentists over many decades. This had become evident in recent years by the poor oral health of the patients. Compared to dentists who practice in larger cities, we still have many edentulous patients today who are wearing complete dentures despite their relatively young age.

In 2007 we became acquainted with the All-on-4 concept developed by *Professor Paulo Maló* (Lisbon) for the restoration of edentulous jaws without augmentation procedures. We were immediately fascinated by this biomechanical approach. Just two straight implants in the anterior region and two angulated implants in the posterior region are placed per jaw. The distal implants are inserted obliquely at an angle of between 30 and 45 degrees. This allows the existing bone to be optimally exploited, while sensitive anatomical structures can be avoided and thereby protected. The distal implants can be positioned further posteriorly in the jaw to achieve better prosthetic support for up to a twelve-unit bridge, from a biomechanical point of view. The two distal implants play a vital role in retaining the bridge. When restoring the edentulous maxilla, we prefer the variant that uses six implants, namely four straight implants in the anterior jaw region and two angulated implants in the posterior jaw. In doing so, we adhere to the guidelines of the DGI Consensus Conference (Aerzen) of 2010, which recommended six implants for

a fixed implant-supported restoration in the edentulous maxilla.

Patients benefit from this treatment mode in that they can receive well-fitting implant-supported dentures without augmentation procedures and in that the implants – given sufficient primary stability – can be immediately restored with a provisional bridge that provides primary splinting of the implants. This concept has been successfully used by dentists for more than ten years and is well documented in studies thanks to the support of Nobel Biocare [1-6].

Baseline situation

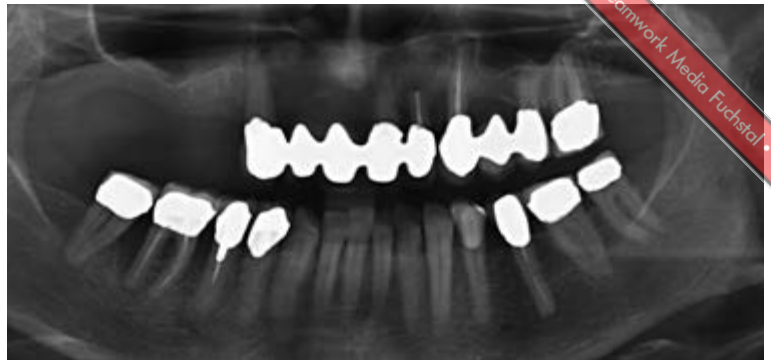
A 60-year-old female patient presented with a TMJ problem. The patient had been missing teeth 14 to 18 for many years. A bridge covered teeth 21–22 and teeth 23–25. Tooth 26 carried a single crown (Figs. 1 and 2). Due to advanced periodontal disease, the teeth were already extremely mobile and not salvageable. The patient desired the rehabilitation of the upper jaw only.

Diagnosis, planning and pre-treatment

The three-dimensional image made it apparent that the bone was severely atrophied – by 90 per cent – in the posterior jaw region (Fig. 3). However, the bone supply volume was still sufficient to plan for six implant positions following sinus-floor elevation procedures. The implants were tilted distally and bicortically attached in order to achieve optimum utilization of the local bone and primary stability at more than 35 Ncm.



1 | Due to advanced periodontal disease, the patient's teeth were not salvageable.



2 | Preoperative situation. Teeth 14–18 were missing in the maxilla. The patient wore a bridge on teeth 21–22 and teeth 23–25.



3 | Clearly visible bone atrophy in the posterior jaw.

The first treatment step was aimed at eliminating the periodontal inflammation. First, a microbiological test was performed to identify the bacteria. A specific antibiotic treatment regimen was initiated based on the result: 3 x 500 mg of amoxicillin and 3 x 400 mg of metronidazole over a period of seven days. In addition, antimicrobial photodynamic therapy was used to target pathogenic microorganisms.

TMJ function was also examined because of the joint complaints. The exam showed that physiotherapy was indicated. A physical therapist with whom we work in such cases introduced the patient to a special relaxation programme with re-

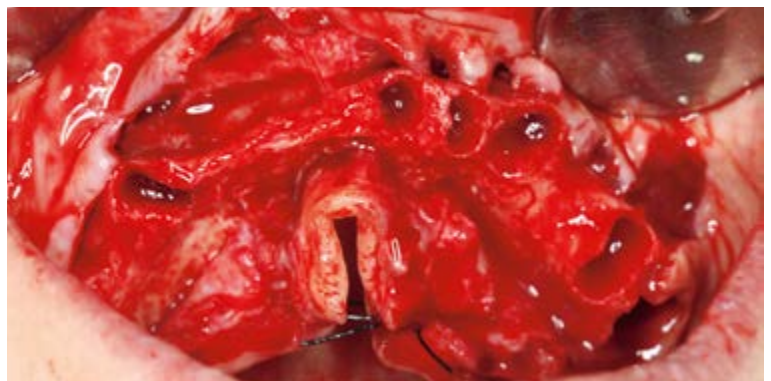
laxing massage techniques and exercises that she could perform at home. This was done parallel to the periodontitis therapy. The pre-treatment phase took two months to complete.

Surgical procedure

To start, the existing bridge was removed by tapping, which had the effect of immediately loosening the already highly mobile teeth (Fig. 4). After tooth extraction, the sockets were debrided and vertically reduced to obtain a wide bony bed around the implant shoulder (Fig. 5). The six implants (Nobel Active, Nobel Biocare) were inserted at the planned



4 | The removal of the bridge also loosened the already highly mobile teeth.



5 | After tooth extraction, the sockets were curetted and vertically reduced.



6 | The implants were distally tilted and secured bicortically. All implants had sufficient primary stability.



7 | The existing bone was maximally utilized for anchoring the implants.

positions immediately thereafter. Due to its specific design, the NobelActive implant “compresses” the bone during insertion. This allows a high level of primary stability to be achieved even in compromised bone situations. The existing jawbone was maximally utilized for anchoring the implants, which were inserted as planned (Figs. 6 and 7). 3.5 x 18 mm implants were placed at sites 21, 11, 13 and 16; 4.3 x 15 mm implants were placed at sites 23 and 26 with corresponding multi-unit abutments angulated by 30 degrees. The required primary stability was achieved for all six implants. Because of the patient’s history of periodontal disease, antimicrobial photodynamic therapy (Helbo; bredent) was again performed during implant insertion (Fig. 8).

Immediate restoration

The dental laboratory (Labor Friedeburger Zahn-technik) had prepared the provisional resin denture prior to surgery. After taking the impression of the initial situation, the teeth were erased to reposition them conventionally for the fixed prosthesis. The resin denture was relieved at the positions where

the implants were planned. The special challenge of a procedure like this is that the laboratory work has to be very precise, since the fit of the provisional restoration cannot actually be checked until the day of surgery.

Once the implants had been inserted, the provisional was carefully connected to examine the chewing, eye and smile line as well as the bite. Then the provisional was precisely adapted to the implant positions. Before placement, the provisional bridge received a gingival dressing with an elastic consistency (Coe Pak; GC) to protect the sutured wound margins (Fig. 9). As, in this case, support for the provisional restoration extended to the first molar, the patient received a twelve-unit immediately loaded provisional resin bridge.

During the healing phase, it was important for the patient not to exert too much force during chewing. To prevent excessive masticatory forces from being transmitted to the implants, patients are generally supplied with a provisional resin bridge. If they exert too much pressure, the provisional will break. We explained to the patient in great detail

8 | Along with the insertion of the six NobelActive implants, antimicrobial photodynamic therapy was performed because of the pre-existing periodontal disease.





9 | The patient received a fixed temporary bridge made of acrylic resin on the day of implant placement (shown here with the gingival dressing still in place).

that she should be eating only soft food with her new fixed teeth during this time, because too much load pressure would jeopardize the survival of the implants through the healing phase.

Ten days after surgery, the patient returned to the practice for a routine follow-up visit. The provisional bridge was removed and cleaned, and the sutures were removed. In this session we were already able to show the patient a digitally created image of the CAD/CAM milled titanium framework of her future definitive restoration, including its set-up in the

articulator (Fig. 10). We also discussed the possible outcome with her. The dental technician planned the final bridge on the basis of the provisional restoration and the photos showing the patient's baseline situation (Fig. 11). In general, we have observed that patients tend to develop a fairly detailed mental image of their future dentition. Parafunctions, too, can be detected and treated while the provisional restoration is worn. We therefore attempt to raise patients' awareness of the appearance of their final restoration at this relatively early stage.



10 | At the regular follow-up ten days after surgery, the patient was shown a first view of her final restoration.



11 | The dental technician planned the final bridge on the basis of the provisional restoration and the photos of the patient at the outset of treatment: provisional (above) and definitive (below) restorations.



12 | The definitive bridge featured a titanium framework precision-milled via NobelProcera and multi-layered composite veneering.



13 | The bridge was convex to make it easy to clean.



14 | About four months after surgery, the definitive bridge could be delivered to the patient (Labor Friedeburger Zahntechnik).



15 | The patient presenting her happy smile.

The laboratory had had the titanium framework precision-milled via NobelProcera and then veneered the framework with multi-layer composite veneers (visio.lign, bredent; Figs. 12 and 13). About four months after surgery, the definitive bridge could be delivered to the patient (Figs. 14 and 15).

Conclusion

Since we began integrating this form of therapy systematically into our treatment procedures, the number of restorations produced in this way has increased from year to year, which had given our practice an immense economic impetus. In the past four years, the All-on-4 concept allowed us to treat significantly greater numbers of new patients than in previous years. We now rehabilitate approximately 50 to 80 patients a year in this way, with very good results.

From 2007 to 2013, we restored 132 patients (48 men and 84 women) using the All-on-4 concept. No tooth loss occurred in the edentulous mandible (77 patients, 308 implants). In the edentulous maxilla (52 patients with six implants each and three patients with four implants each, for a total of 324 implants) ten instances of implant loss occurred in

patients with six implants (3.1 per cent). We had to use a two-phase approach only in three patients (due to lack of primary stability); the remaining 129 patients received provisionalization immediately after surgery. One reason why we are able to achieve these results is that we schedule the patient for recall appointments at regular intervals, at which the bridge will be completely removed and professionally cleaned.

We appreciate the All-on-4 concept not least because of its social aspects, because the patients receive a fixed implant-supported restoration that is good value for money and gives them more quality of life. ■

To find the list of references visit the web (www.teamwork-media.de). Follow the link "Literaturverzeichnis" in the left sidebar.

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