Implant-supported immediate restoration in the edentulous maxilla

Author: Dr Fernando Rojas-Vizcaya, Spain

Introduction

Implant dentistry has become an established form of treatment with good and predictable results for functional and aesthetic reconstruction in cases of masticatory dysfunction. As bone in the maxilla is often soft and sometimes insufficient in volume, the edentulous maxilla could be a great challenge for the treating dentist. The type of treatment chosen is crucial for success, in particular when a fixed immediate restoration is requested by patients. In such cases, successful treatment requires primary stability of the implants inserted and a sufficient number of implants to support the superstructure.1

In addition, exact placement is essential and can be achieved by means of computer-assisted planning. At least six implants are recommended to support a fixed restoration in the edentulous maxilla.2 Moreover, in soft bone, it is necessary to use an implant system that guarantees sufficient primary stability due to its external geometry and its thread design.3
Another precondition for successful treatment is a tension-free fit of the prosthetic superstructure. Also desirable is primary splinting of the implants by the superstructure, which can be achieved with a milled bar restoration. Utilising CAD/CAM technology, highly precise wide-span solutions can be manufactured today with an accurate fit.

Case report

A 69-year-old female patient presented to our practice. Apart from teeth 17 and 27, her maxilla was edentulous. The remaining teeth could not be permanently preserved due to the periodontal status. A removable temporary denture was anchored to the maxillary molars. The patient requested a fixed restoration to permanently restore masticatory function and aesthetics.

The clinical and radiographical examination showed that sufficient bone was available to place implants that would support a fixed restoration (Figs. 1 & 2), and a bar-retained immediate restoration on six OsseoSpeed EV implants was planned. The OsseoSpeed EV implants and the new drilling protocol allow for excellent primary stability, which makes this an ideal treatment solution for this particular case. In addition, the OsseoSpeed surface is especially indicated for use in soft bone applications.

Fig. 5. Installation of the Uni Abutments EV.
Fig. 6. Uni Abutment EV Temporary Cylinders attached to the abutments.
Fig. 7. Perforated denture to gain free space around Uni Abutment EV Temporary Cylinders.
Fig. 8. Abutment access covered with silicone.
Fig. 9. Peri-apical radiograph showing the implants at bone level.
Fig. 10. Uni Abutments EV exposed for impression taking.
In order to safely and exactly place the implants, the use of a surgical template was planned. The maxillary provisional denture was duplicated and the laboratory created a surgical template from it. The surgical template was used to determine the best prosthetic position for the implants (Fig. 3). After incision and raising a flap, the bone proved to be of good quality and of sufficient volume to ensure a buccal bone wall of approximately 2 mm after implant placement. In all, six OsseoSpeed EV 3.6 S implants were placed in the maxilla. The recommended drilling protocol was followed, using the Twist Drill EV, Step Drill EV and Cortical Drill EV. The implants were inserted with a torque of 25 Ncm, using a contra angle and the Implant Driver EV (Fig. 4). The final installation was carried out manually. Subsequently, 2 mm Uni Abutments EV were manually connected to the implants using the Uni Driver EV (Fig. 5). Uni Abutment EV Temporary Cylinders were placed on the abutments to attach the temporary restoration. The surgical procedure was completed by replacing the soft tissue flaps and suturing around the abutments (Fig. 6).

The existing provisional denture was grinded generously at the level of the temporary cylinders so that it could be safely placed on top of the cylinders. The maxilla was covered with a rubber dam to protect the newly sutured surgical wound (Fig. 7). The reduced temporary denture was secured to the cylinders with self-hardening plastic. Afterwards,
the cylinders were shortened to denture level, and their channels were closed with silicone (Fig. 8). The patient thus received a temporary immediate restoration in one treatment session. Radiographs showed an excellent fit of the abutments and cylinders and a good positioning of the implants (Fig. 9). After osseointegration of the implants, teeth 17 and 27, which could not be preserved, were extracted.

After eight weeks of healing, the temporary denture was removed and the Uni Abutments EV were exposed to prepare for the final impression (Fig. 10). For this procedure, Uni Abutments EV Pick-Ups were connected to the abutments and the impression was made using a customised impression tray (Fig. 11).

When the impression material had set, the pins were unscrewed and the impression was removed. Uni Abutment EV Replicas were attached to the pick-ups in the impression to prepare the master model made from dental plaster stone (Fig. 12). A diagnostic wax-up was created on the model to be able to plan the exact location and dimension of the planned bar structure. The model and wax-up were sent to DENTSPLY Implants manufacturing center, where they were scanned, and the data was transferred to the ATLANTIS ISUS software. Using the software, an ATLANTIS ISUS Hybrid superstructure was designed (Fig. 13). After review and approval of this design by the dentist and dental technician, the framework was milled from a solid block of cobalt-chrome in the DENTSPLY Implants manufacturing centre.

Review of the precise fit was controlled and verified in production as well as referring to the master model (Fig. 14). With the previously created wax-up, the final restoration was completed. The ATLANTIS ISUS Hybrid superstructure was installed to the abutments with a torque of 15 Ncm (Fig. 15). The screw channels were subsequently sealed with composite. The contact area of the denture with the maxillary mucosa was designed in a slightly convex form that prevents air from escaping, avoids phonetic problems and food impaction, and allows for good oral and denture hygiene (Fig. 16). The control radiographs showed the marginal bone to be at the level of the implant shoulder and also an excellent fit of the prosthetic restoration (Fig. 17). Aesthetics and function were ideally recreated and the upper lip was well supported by the prosthesis. The patient was very satisfied with the result (Figs. 18a & b).

**Conclusion**

Restoration of the edentulous maxilla with an implant-supported fixed restoration presents great challenges for the treating dentists. The present case describes how an excellent prosthetic restoration can be created both in terms of function and aesthetics using the Astra Tech Implant System EV and an ATLANTIS ISUS patient-specific implant superstructure.

**Editorial note**: A complete list of references is available from the publisher.

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**Dr Fernando Rojas-Vizcaya**, DDS, MS  
Department of Prosthodontics  
University of North Carolina, Chapel Hill, NC, USA  
Director of the Mediterranean Prosthodontic Institute, Castellon, Spain