Full-arch implant rehabilitation

By Dr David García Baeza, Spain

An implant-supported restoration is a good alternative to conventional complete prostheses for patients with edentulism. This treatment has been performed successfully in recent years and constitutes a high-value clinical reality.

Oral implantology has undergone great advances in recent years, as it allows lost teeth to be replaced with a high degree of satisfaction on the functional and aesthetic level. A partial or total loss of teeth affects not only facial aesthetics but also vital functions, like chewing and phonation. A prosthodontic rehabilitation with a high success rate can be obtained for this type of patient. The prosthetic options for rehabilitating an edentulous patient with dental implants are divided into two categories: fixed and removable restorations.

A hybrid prosthesis consists of a cast metal framework covered by acrylic, which supports artificial fixed teeth. The original design of the hybrid prosthesis (fixed-removable) was developed by Swedish research- ers using the two-stage endosseous implant system developed by Per- inguey Brånemark. The prosthesis consisted of a gold alloy framework attached to the copings of the implants, and on this framework conventional acrylic resin denture teeth were secured with acrylic resin.

The factors that determine the type of implant-supported restoration for a completely edentulous patient are the amount of space from the bone to the occlusal plane (prosthetic space) and the lip support. The prosthetic space needed for a hybrid prosthesis is a minimum of 1 mm and a maximum of 1.5 mm, with lip support given by the bone structures. When a space of 1 mm or less is available and there is lip support, a porcelain-to-metal restor- ation is suggested. When there is more than 1.5 mm of prosthetic space and absence of lip support, a type of implant-supported overdenture restor- ation is recommended, which will give the lip support not provided by the bony structures of the patient.

Cox and Zarb described the treatment of severely resorbed complete- ly edentulous maxillae with a hybrid prosthesis using a metallic structure with acrylic and artificial teeth, with prosthetic spaces larger than 1.5 mm. An incorrect adaptation between metal structures and implants can cause bone loss and failure of osseointegration, which is clinically decisive. It is generally accepted in the literature that the passive fit of a prosthesis is required for maintenance and long-term success of an implant treatment. In addition, the literature has implied that incorrect adaptation of metal structures is a decisive and significant factor, causing mechanical and biological complications. The loosening of both the prosthesis and the abutment screws and even the fracture of various system components have been attributed to the lack of adjustment and adaptation of the prosthesis.

In this article, the clinical case of a patient with a completely edentulous maxilla and advanced periodontal disease in the mandible is presented. The patient’s mandible was rehabilitated with a hybrid prosthesis on six implants. The implant-supported prosthetic treatment that was performed to restore the patient’s aesthetics and functionality, thereby improving his quality of life, is described step by step, as is the prepa- ration process of the prosthesis.

A 68-year-old patient presented to our facility with a complete maxil- lary mucosa-supported denture, with which he was relatively comfort- able. He had all of his original teeth on the lower arch, but with very advanced periodontal disease, which had caused him a loss of sup- port of more than 80 per cent. These teeth presented with Class II and III mobility, which made it very diffi- cult to clean (Figs 1 & 2).

The proposed treatment plan for the patient was to extract the mandibu- lar teeth and rehabilitate the lower arch using implants and a fixed pros- thesis to maintain the same feeling as with his natural teeth. In addition, it was decided to replace the complete denture of the upper arch.

Normally, when teeth are extracted from a complete arch and an im- mediate restoration is placed, it creates a problem of adaptation for the patient, especially in the mandibular area. To help the patient during this period of healing and osseointegra- tion of the implants, it is recommen- ded to place two provisional implants.

Once the extractions had healed, six Astra tapered implants (GC Tech Europe) of 4 mm in diameter and 10 mm in length were placed in the position of the molars, first premolars, and central incisors (Figs 3a & b). The bone quality and quantity were good, and once the expected osseointegration time had passed, transi- tional abutments were placed. In this case, two abutment diameters were used, narrower (SR Abutment of 3.8 x 2.0 mm), GC Tech Europe) for the in- tracrestal and premolar areas, where there was less inserted gingival tissue, and wider (SR Abutment of 4.3 x 2.0 mm) in the posterior area (Figs 4a & b).

Before beginning with the prosthodontic phase, there was a waiting period for the tissue to mature. For this, an impression was taken with closed- tray copings, which is very simple, but does not give a very exact model (Figs 6 & 7). This was subsequently used to make a rigid impression tray that was made of metal and was se- cured with plaster to only one of the implants (Fig 8). Once the rigid impression tray was placed in the mouth, open-tray cop- ings were then used and they were splinted to the structure with a spe- cial pluster mixture; once this had hardened, everything was registered with a polyvinylsiloxane impression (Figs 9 & 10). This technique yields a very reliable master cast, ensuring a very good structure fit (Fig. 11).

Once the final model with the differ- ent analogues was ready, the plan-
Kois flow for the cranial-maxillary reference (Fig. 19).

Once the models had been placed in the articulator and the parameters taken from the patient, the laboratory technician began to make a set of wax teeth from wax for both the upper and lower arches so that the correct fit could be assessed, including the patient’s occlusion and aesthetics (Figs. 14 & 15).

As Figures 16 to 19 show, the upper arch was narrower than the lower one because those teeth were lost much earlier, which meant that, for correct functioning of the complete maxillary prosthesis while chewing, the posterior areas were to be placed at a crossbite. This allowed for force when chewing food to fall at a crossbite. That way, the axis of force when chewing food would fall on the alveolar process and not the prosthesis.

Once confirmed that everything worked properly, the next step was constructing the metal structure that would be closely linked to the wax teeth design (Figs. 20 & 21). This was again once again checked with the teeth in position to give a last confirmation before the final manufacturing. At that time, confirmation of the modifications made could be carried out again by using the lead foil strip, as well as confirmation of the occlusion, in case there was any variation (Fig. 22).

Subsequently, the final prostheses were made. The maxillary one was made as wide as possible in the posterior area so that it would be as stable as possible, and the mandibular one was placed on implants. Confirmation and small adjustments had to be performed in the mouth to counterbalance the small misalignments that normally occur in manufacturing (Figs. 23–25).

Discussion

The treatment of a completely edentulous patient with an oral restoration on implants begins by discussing treatment expectations, followed by an accurate clinical evaluation. Thus, a detailed intraoral and extraoral examination are performed following a work plan to help in the diagnosis. This includes studying patient photographs and radiographs, which have evolved remarkably in recent times, using models on a semi-adjustable articulator and following the protocol for the design of a proper prosthetic restoration on implants, choosing from overdentures, hybrid or fixed prostheses. The choice will depend on what the dentist plans using a multifunctional guide—tomographic/surgical/prosthetic—for implant placement and a suitable type of oral restoration.

Rehabilitation with implant-supported hybrid prostheses is a fixed treatment in completely edentulous jaws where the prosthetic space is 11mm or 15mm, but where the need for lip support for prosthetic restoration is not a determining factor. An implant-supported hybrid prosthesis can be a questionable alternative treatment when a fixed restoration of porcelain and metal does not meet the patient’s requirements for aesthetics, good phonetics, proper oral hygiene and oral comfort.5,6

Bidra and Agar proposed a classification system for edentulous patients for using implant-supported fixed prostheses, classifying them into four classes according to the following factors:

1. amount of tissue loss;
2. position of the anterior teeth in relation to the location of the residual ridge;
3. lip support;
4. smile line; and
5. need for prosthetic material for gingival colouring (pink acrylic).7

Class I includes patients who require gingiva-coloured prosthetic material such as pink acrylic to obtain aesthetic tooth proportions and optimal prosthetic contouring to attain adequate lip support. Class II patients require pink acrylic only to obtain aesthetic tooth proportions and for prosthetic contouring. Lip support is not a consideration, since the difference in lip projection with or without any prosthesis is generally insignificant. Class III contains patients who do not require gingiva-coloured prosthetic material. Class IV is assigned to patients who may or may not require pink acrylic, depending on the result obtained after surgical interventions. Following this classification, the patient in this report was determined as Class II.

The fabrication of hybrid dentures in patients with adequate interocclusal space provides the dentist with several advantages regarding the aesthetic appearance, including replacement and decrease of soft-tissue support owing to the bulkiness of the metal substructure and in the height of crowns compared with a metal-supported porcelain prosthesis. In addition to these aesthetic advantages, hybrid prostheses work
Delivering innovation, digital solutions and versatility—the Astra Tech Implant System evolution continues...

By Dentsply Sirona Implants

Dentsply Sirona Implants continues to deliver innovation, digital solutions and versatility in implant dentistry. With the latest product developments, the Astra Tech Implant System continues to evolve, based on customer needs and the latest digital technology.

With a comprehensive product and solutions portfolio for all phases of implant dentistry, Dentsply Sirona Implants continually strives to increase the application of implant therapy, based on science and without compromising safety and efficacy. “The implant solutions that we develop are based on the needs of our customers, as well as centered around our well-documented and clinically proven implant systems. We’re all about providing long-term functional and aesthetic solutions for the many different situations that happen in clinics and laboratories everyday all over the world. And we help dental professionals deliver the absolute best care for their patients,” says Gene Dorff, Group Vice President at Dentsply Sirona Implants.

This digital implant workflow solution streamlines the implant planning, purchasing and delivery of products. For the clinician, this custom implant solution increases convenience, seamlessly and efficiently connecting with qualified laboratories, and enables consistent, excellent results for patients.

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In fact, the revised implant design change comes with significant advantages—with a deeper implant thread design apically, it is easier to reach preferred primary stability and the handling experience is enhanced for easy installation.

Dr. Mark Ludlow, Division Director of Implant Prosthodontics and Associate Professor at the College of Dental Medicine at the Medical University of South Carolina, agrees: “You still have all the wonderful properties of TX and EV, but with this new implant, you get better handling that helps hit that primary stability—it literally just sinks into the osteotomy.”

With this new change in design properties also comes the new name—Astra Tech Implant EV. The new implant line will be available starting in the North American market in October 2019 and in the European market in early 2020.

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Azento is the latest innovation in the Dentsply Sirona Implants’ implant solutions portfolio, helping implant dentistry professionals with one of their most common indications—single tooth replacement—in implant therapy.

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Latest clinical data on Astra Tech Implant System

The Astra Tech Implant System OsseoSpeed implants show excellent long-term clinical results, as described in the article by Winstead et al. “Patients in this study received a total of 105 immediately loaded implants in the edentulous mandible. Minimal bone loss, 100% implant survival and 100% prosthetic survival rates were reported at the 10-year follow-up.

Using short implant is a solution for patients with limited bone that are unwilling or unable to undergo bone grafting. In a recently published...
The design philosophy of the Astra Tech Implant System EV is based on the natural dentition and supported by flexible surgical protocol and a simple prosthetic workflow for increased confidence and satisfaction for all members of the treatment team.

- Unique interface with one-position-only placement for Atlantis patient-specific abutments
- Self-guiding impression components
- Versatile implant designs
- Flexible drilling protocol

The foundation of this evolutionary step remains the unique Astra Tech Implant System BioManagement Complex.

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