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.

Occlusal 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 (fixated-removable) was developed by Swedish researchers using the two-stage endosseous implant system developed by Per-Ingvar Branemark. 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 7mm and a maximum of 15mm, with lip support given by the bone structures. When a space of 7mm or less is available and there is lip support, a porcelain-to-metal restoration is suggested. When there is more than 7mm of prosthetic space and absence of lip support, a type of implant-supported overdenture restoration 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 edentulism with a hybrid prosthesis using a metallic structure with acrylic and artificial teeth, with prosthetic spaces larger than 7mm. 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 preparation process of the prosthesis.

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

The proposed treatment plan for the patient was to extract the mandibular teeth and rehabilitate the lower arch using implants and a fixed prosthesis 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 immediate 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 osseointegration of the implants, it is recommended to place two provisional implants.

Once the extractions had healed, six Aadvå tapered implants (GC Tech Europe) of 4mm in diameter and 10mm 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, transitional abutments were placed. In this case, two abutment diameters were used, narrower (SR Abutment of 3.8 x 2.0mm, GC Tech Europe) for the incisal and premolar areas, where there was less ingested gingival tissue, and wider (SR Abutment of 4.3 x 2.0mm) in the posterior area (Figs. 4a & 4b).

Before beginning with the prosthesis 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 secured with plaster to only one of the implants (Fig. 8).

Once the rigid impression tray was placed in the mouth, open-tray copings were then used and they were splinted to the structure with a special plaster 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 different analogues was ready, the plan...
With the lateral radiographs, the situation of the transitional abutments can be visualised, which is very important, as all the manipulation based on the different tests that need to be done will be carried out far from the head of the implant.

Once the fulcrum points and the inclination of the maxillary incisors for lip support had been analysed, the new upper arch was designed in order to give the patient a new occlusal plane and a new incisal position. The box plane helped us to obtain the correct plane and then we used the Fox plane test for the new design (Fig. 22).

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 test 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. That way, the axis of force when chewing food would fall on the alveolar process and not displace 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 once again checked with the teeth in position to give a final 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 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 prosthesis 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.

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).

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 every day 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.

Azentro for single tooth replacement

Azentro 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.

Each patient treated with Azentro gets a custom treatment plan, including surgical guide, instruments, drills, a case-specific Astra Tech Implant System or Xive implant, an Astra Tech Implant System custom healing abutment and an optional temporary restoration.

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 connects with qualified laboratories, and enables consistent, excellent results for patients.

Introducing Astra Tech Implant EV

The Astra Tech Implant System just got even better—with the new Astra Tech Implant EV. As one of the most well-documented implant systems in the market today—documented in over 1,000 publications in peer-reviewed journals—it continues to evolve and provide great clinical benefits.

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.

Conclusion

A lower jaw hybrid restoration is a good option for the rehabilitation of an edentulous mandible, and it should be included in the treatment options when evaluating a patient, as it improves aesthetics, functionality and proprioception. It is furthermore easy to clean, requires less prosthetic maintenance, and can be removed at any time and repaired at a very low cost.

Editorial note:
This article was originally published in implants international magazine of oral implantology, issue 4/2018.

Latest clinical data on Astra Tech Implant System

The Astra Tech Implant System Osseointegrated implants show excellent long-term clinical results, as described in the article by Winsdel 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 article, the success rate of implant-supported hybrid prosthetic treatments is high, as demonstrated by a systematic review published in 2014, which included 87 studies for evaluation. In a period of five to ten years, high survival rates of 93.9–100 per cent for the prostheses and of 87.9–100 per cent for the implants were found.*

In a retrospective study evaluating the main complications after rehabilitation with an implant-supported hybrid prosthesis, it was observed that the main complication was mucositis, which affected 24 per cent of the cases, followed by problems with the prosthetic screws in 13.7 per cent of the cases, including thread wear or loss, and the same percentage was found for fracture of the prosthesis teeth or prosthesis detachment. These problems were related to an incorrect record of vertical dimension, inadequate occlusion or a lack of passive fit of the metallic structure. Another problem encountered concerned the access to the entrance holes of the prosthetic screws (7.8 per cent)."
Astra Tech Implant System®

Simplicity without compromise

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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lished study* lead by Professor Hamerle from the University of Zurich, a randomized clinical multicenter study compared the use of short 6 mm OssoSpeed implants (Astra Tech Implant System) with 15 mm implants and grafting. In the study, they show important benefits when using OssoSpeed short implants: a simplified surgical procedure (no need for grafting), reduced surgical time (with 50%) and reduced surgical cost (with 50%), and higher patient satisfaction (due to less pain and less complications, as well as cheaper treatment).

Astra Tech Implant System’s OssoSpeed Profile implant is a solution for sloped ridge situations that can be used instead of bone augmentation. The OssoSpeed Profile implant has been evaluated in a 10-year study, showing well maintained hard and soft tissue levels. This data will be presented for the first time by Dr. Robert Noerken, Germany, at the EAO meeting in Lisbon.

The evolution of the Astra Tech Implant System

Since its launch over 30 years ago, Astra Tech Implant System has been one of the world’s most documented dental implant systems, with over 1,000 published scientific references in peer-reviewed journals. Ongoing clinical documentation demonstrates that Astra Tech Implant System provides surgical and prosthetic flexibility, maintains marginal bone levels, and delivers reliable and predictable clinical results as well as natural aesthetics, in the short and long term.

This top-of-the-line implant system features pioneering and groundbreaking innovations that are the result of knowledge and understanding of the biological and clinical processes involved in dental implant therapy. These innovations, such as implant-abutment connection, surface technology, and implant thread design, contribute to even better clinical results.

It was clear from the beginning that a successful implant system cannot be determined by one single feature alone. Just as in nature, there are several interconnected features working together. Astra Tech Implant System BioManagement Complex™ is the unique combination of key features—OssoSpeed®, MicroThread®, Conical Seal Design™ and Connective Contour™—that is at the core of Astra Tech Implant System.

With the right design philosophy, you get an implant system that provides the versatility needed to meet the needs of each individual clinical situation. When designing an implant system, several parameters need to be considered: long-term biological and clinical performance, ease of use and tactile variety and indication coverage, as well as mechanical integrity and robustness.

In addition, the design philosophy of the Astra Tech Implant System EV is based on the natural dentition utilizing a site-specific, crown-down approach. By using the natural dentition as a guide, implants, abutments, and abutment and bridge screws are designed to meet the requirements for mechanical integrity, bone quantity, load carrying capacity and biological response.

This evolutionary step—Astra Tech Implant System EV—was the result of a collaborative input and insights from dental professionals throughout the global dental community. 47 international participants and 700+ implant treatments in 14 countries. And the evolution and true dedication to improving implant dentistry continues today.

References

**Thoma DS, Haus R, Tutak M, et al., Randomized controlled multicentre study comparing short dental implants (6 mm) versus longer dental implants (11.5 mm) in combination with sinus floor elevation procedures Part 1: demographics and patient-reported outcomes at 1 year of loading. J Clin Periodontol 2015;42(1):78-86.**