

Full arch implant rehabilitation: a case report

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Partial or total loss of teeth not only affects facial aesthetics but also vital functions such as chewing and phonation. In this case, an implant-supported restoration is a good alternative to conventional full prostheses for patients with edentulism. The use of implants considerably improves the retention of a prosthesis and its functionality, thereby improving the patient's quality of life.

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Prosthetic treatments of the edentulous jaw with dental implants are divided into two categories: fixed and removable restorations¹.

The factors that determine the type of implant-supported restoration for a complete edentulous patient are the amount of space from the bone to the occlusal plane (prosthetic space) and the lip support. When the space available for the prosthesis is less than 10 mm and there is lip support, a fixed porcelain-to-metal restoration is advisable. When there is more than 15 mm of prosthetic space and absence of lip support due to bone resorption, an implant-supported overdenture restoration is recommended, which will give that lip support not provided by the bony structures of the patient¹. The patient can remove the overdenture for cleaning and maintenance, since the space underneath the prosthesis is not directly accessible with the prosthesis in place.

However, when the prosthetic space is between 11 mm and 15 mm, and the bone structures provide sufficient lip support, a hybrid prosthesis can be considered.

A hybrid prosthesis consists of a cast metal framework covered by acrylic, which supports artificial teeth. The original design of the hybrid prosthesis developed by Swedish researchers using the two-stage endosseous implant system developed by 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 resin². Zarb et al. described the treatment of severely resorbed complete edentulous maxillae with a hybrid prosthesis using a metallic structure with acrylic artificial teeth, with prosthetic spaces larger than 15mm³.

An incorrect adaptation between metal structures and implants can cause bone loss and failure of



osseointegration, and this is clinically decisive. It is generally accepted in literature that passive settlement 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 may cause mechanical and biological complications. The loosening of both the prosthesis and the abutment screws and even the fracture of different system components have been attributed to the lack of support and maladaptation of the prosthesis.

A 68-year-old patient consulted us with a complete upper mucosal-supported denture, with which he was relatively comfortable, and his own teeth on the lower arch. However, the remaining natural dentition suffered from very advanced periodontal disease with attachment loss of more than 80%; these teeth had Class II and III mobility, which made it very difficult to chew.

The proposed treatment plan for the patient was to extract the lower teeth and rehabilitate the lower arch using implants and a fixed prosthesis to maintain the same comfort as with his natural teeth, and for the upper arch to replace the full denture.

Normally, when teeth are extracted from a complete arch and an immediate restoration is placed, it creates a problem





Fig. 3: Frontal view. Patient smile.



Fig. 4: Frontal view. Patient initial picture.

of adaptation for the patient, especially in the lower arch area. To help the patient during this period of healing and osseointegration of the implants, two provisional implants were placed.

Once the extractions were healed, 6 Aadva Tapered Regular Implants 4x10 mm were placed, at the position of molars, first bicuspid and anterior incisors. The bone quality and quantity were good, and once the expected osseointegration time had passed, healing abutments were placed. In this case, two abutment diameters were used, narrower (SR Abutment 3.8 x 2 mm) for the incisor and bicuspid areas where there is less inserted gum tissue and wider (SR Abutment 4.3 x 2 mm) in the posterior area.

After this second phase, there was a waiting period for the tissues to heal prior to the start of the prosthetic phase. Therefore, an impression was taken with closed tray copings, which is very simple but does not give a very exact replica; This was used to make a metal rigid impression tray that was secured with plaster to only one of the implants.

Once 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 set, everything was registered with a vinyl polysiloxane impression paste. This technique

gives a very accurate master cast, so a very good fit was ensured.

Once the final model with the different analogs was ready, the planning started. First, the old complete upper denture was analysed. In this type of cases it is very useful to do a lateral analysis. We placed a narrow lead foil strip on the upper and lower central incisor before photographs and X-rays were taken. This served as a reference for the relationship between the position of the anterior teeth and the bone.

With the lateral X-rays, the positioning of the transitional abutments can be seen; this is very important since all the manipulation from the different tests that need to be done will be carried out far from the head of the implant.



Fig. 5: Initial situation. Intraoral view.

Full arch implant rehabilitation: a case report



Fig. 6: After extractions. Frontal view.



Fig. 7: After extractions. Occlusal view.



Fig. 8: Healing Abutments. Occlusal view.



Fig. 9: Healing Abutments. Frontal view.



Fig. 10: Closed tray coping impressions.



Fig. 11: Closed tray coping impressions. Occlusal view.

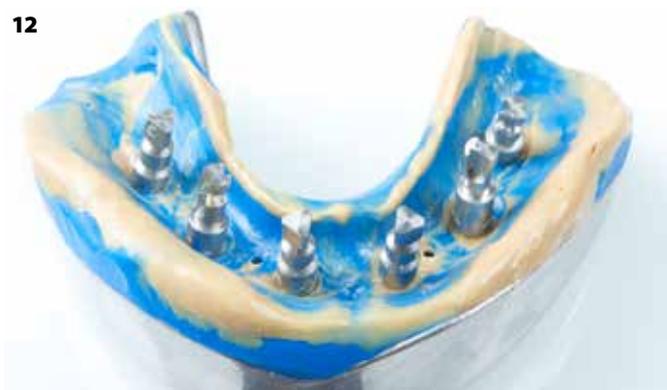


Fig. 12: Preliminary impression.



Fig. 13: SR abutments at gingival level.

Once the fulcrum point and inclination of the upper incisor for lip support were determined, we could start to design the new upper arch, giving the patient a new occlusal plane and a new incisor position. The Fox plane helped us to obtain the correct plane and we used the Kois Bow as the craniomaxillary reference.

Once the models were placed in the articulator and adjusted to the parameters from the patient, the laboratory technician created a wax-up for both the upper and lower arches so the correct fit could be assessed, including the patient's occlusion and aesthetics.

As the images show, the upper arch was narrower than the lower one because those teeth were lost much earlier, which means that for a correct functioning of the complete upper prosthesis while chewing, the posterior sectors had to be placed at a crossbite. This way, the force will act on the alveolar bone ridge when chewing food and will not cause displacement of the prosthesis.

Once confirmed that everything worked properly, the next step was constructing the metal structure based on the wax-up design. This was once again checked with the teeth in position as a last confirmation prior to the final

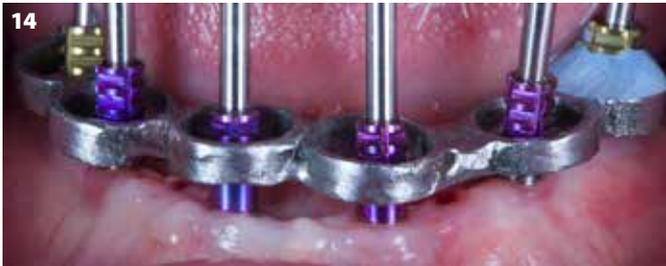


Fig. 14: Rigid Metal Tray Impresion.



Fig. 15: Rigid Metal Tray Impresion with plastic dam.



Fig. 16: Fixing with plaster.



Fig. 17: First step. Final impresion.



Fig. 18: Final impresion.



Fig. 19: Master Model.

Full arch implant rehabilitation: a case report



Fig. 20: Wax test. Smile parameters.



Fig. 21: Fox plane test.

manufacturing. At that time, confirmation of the modifications made could be verified by using the lead foil strip, as well as confirmation of the occlusion.

That was the moment when the final prostheses were made; the upper one was made as wide as possible in the



Fig. 22: Panadent Articulator phase.

posterior area to retrieve maximum stability, and the lower one was placed on implants. It was fit in the mouth and small adjustments had to be made to correct the small misalignments that normally occur in manufacturing.

The treatment of a complete edentulous patient using oral rehabilitation on implants begins by discussing treatment expectations and a meticulous intraoral and extraoral examination, following a systematic workflow to help in the diagnosis. This includes studying photographs and X-rays, which have evolved remarkably in recent times; analysing models on a semi-adjustable articulator and following a protocol to select the proper prosthetic rehabilitation on implants, choosing from overdentures, hybrid prostheses or fixed prostheses.

Implant-supported hybrid prosthesis can be an alternative treatment procedure when a fixed restoration of porcelain metal does not meet a patient's requirements for aesthetics, good phonetics, proper oral hygiene and oral comfort^{11,12}.

Brida et al. proposed an edentulous patient classification system for implant-supported fixed prosthesis, classifying them into four types according to the following factors:

- amount of tissue loss
 - position of the anterior teeth in relation to the location of the residual ridge
 - lip support
 - smile line
 - need for prosthetic material for gingiva color (pink acrylic)
- Class I includes patients who require gingiva-colored prosthetic material such as pink acrylic to obtain aesthetic



Fig. 23: Lead foil on the old denture for X-ray evaluation.

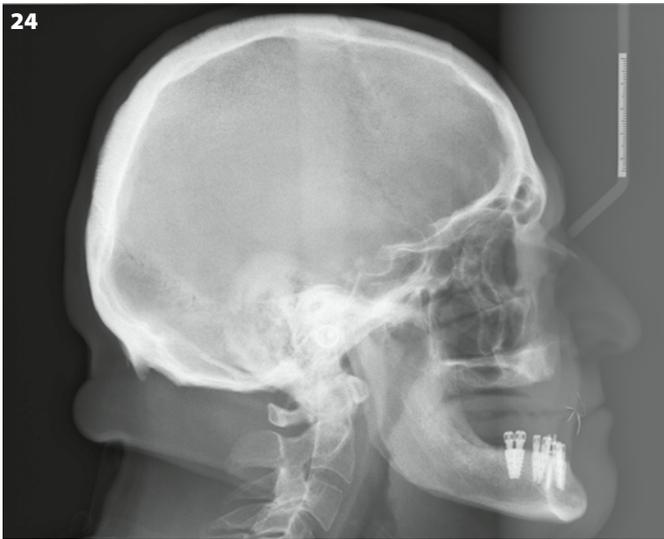


Fig. 24: Lateral X-ray.

tooth proportions and optimal prosthesis contour, providing an adequate lip support.

Class II is for patients who require pink acrylic only to obtain esthetic tooth proportions and for prosthesis contour. Lip support is not a consideration since the difference in lip projection with and without any prosthesis is generally insignificant.

Class III contains patients who do not require gingiva-colored prosthetic material.

Class IV is assigned to patients who may or may not require pink acrylic, depending on the result obtained after surgical intervention¹⁰.

Our case was classified as Class II.

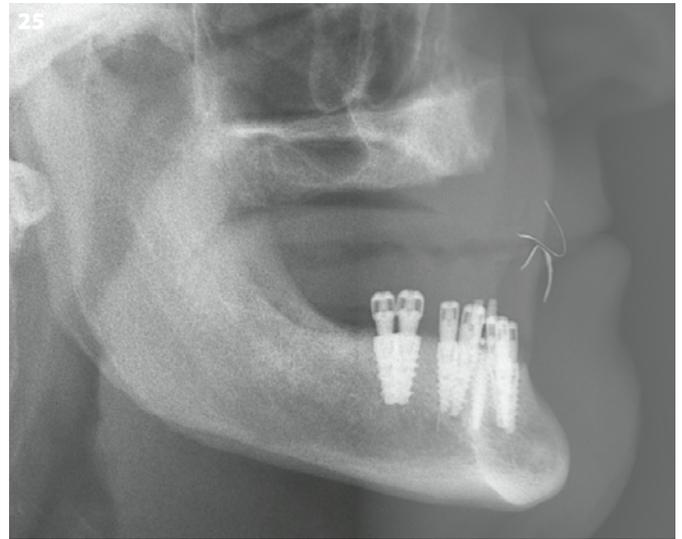


Fig. 25: Close up. Lateral X-ray.

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 in the bulkiness of metal substructure and in the height of crowns



Fig. 26: Wax-up.



Fig. 27: Wax-up frontal view.



Fig. 28: Models in the correct position.

Full arch implant rehabilitation: a case report



Fig. 29: Left view wax-up.



Fig. 30: Right view wax-up



Fig. 31: Frontal view wax-up.



Fig. 32: Model in the articulator. Lower design.

compared to the metal supported porcelain prosthesis. In addition to these aesthetic advantages, hybrid prostheses work as shock absorbers, reducing load forces on implants¹³.

The success rate of implanted-supported hybrid prosthesis treatments is high, as demonstrated by a systematic review published in 2014, which included 18 studies for evaluation, high survival rates were found (5 to 10 years) from 93.3% to 100% for the prostheses and from 87.9% to 100% for the implants¹⁴.

In a retrospective study where the main complications after rehabilitation with an implant supported hybrid prosthesis were evaluated, it was observed that the main complication was mucositis that affected 24% of cases, followed by problems with the prosthetic screws in 13.7% of the cases, including, for example, thread wear or loss, and with the same frequency (13.7%) fracture of the prosthesis teeth or

prosthesis detachment. These problems were related to an incorrect record of vertical dimension, an inadequate occlusion or lack of passive adjustment of the metallic structure. Another problem encountered was the access to the entrance holes of the prosthetic screws (7.8%)¹⁵.

Making a lower jaw hybrid restoration is a good option for rehabilitation of edentulous maxilla, and it should be considered as a treatment option when evaluating a patient as it improves aesthetics, functionality, and proprioception; it is easy to clean, requires less prosthetic maintenance, can be removed at any time and repaired at a very low price.

REFERENCES

1. Misch CE. Contemporary implant dentistry. 3ra. Edición. St. Louis, Missouri: Mosby Elsevier, 2008.
2. Gonzales J. The evolution of dental materials for hybrid prosthesis. *Open Dent J*, 2014; 8: 85-94.

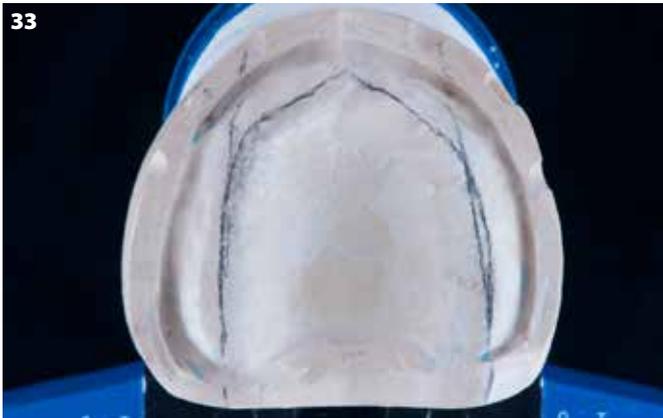


Fig. 33: Upper arch.



Fig. 34: Model in the articulator.



Fig. 35: Final wax-up Frontal view.



Fig. 36: Final wax-up.

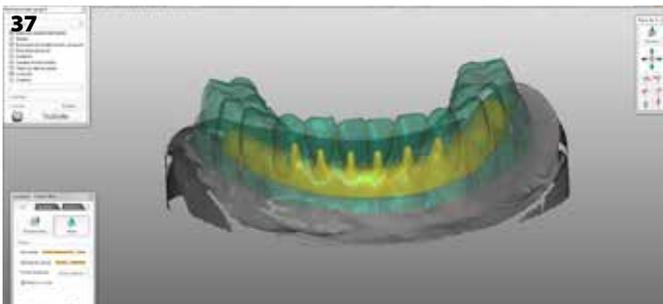


Fig. 37: Aadv software. Structure design.



Fig. 38: Anterior view, final wax-up.

3. Zarb GA. The longitudinal clinical efficacy of osseointegrated implants a 3 year report, *Int J Oral Maxillofac Surg*, 1987; 2: 91-100.
4. Cobb G, Metcalf M, Parsell D. An alternative treatment method for a fixed-detachable prosthesis. A clinical report. *J Prosth Dent*, 2003; 89 (3): 239-243.
5. Shibli JA, Piatelli A, Lezzi G. Effect of smoking on early bone healing around oxidized surfaces: a prospective, controlled study in humans jaw. *J Periodontol*, 2010; 81: 575-583.
6. Bain C, Moy P. The association between the failure of dental implants and smoking. *Int J Oral Maxillofac Implants*, 1993; 8: 609-615.
7. Grunder U, Gaberthuel T, Boitel N. Evaluating the clinical performance of the osseotite implant: Defining prosthetic predictability. *Compend Contin Educ Dent*, 1999; 20: 628-640.
8. Bain C. Long-term satisfaction in dental implant patients. Toronto: 16th Scientific Meeting Academy of Osseointegration, 2001.
9. Balarezo JA. Prótesis sobreimplantes en el edéntulo total: Planificación y elaboración. Lima, Perú: Editorial Savia, 2014.
10. Brida A, Agar J. A classification system of patients for esthetic xed implant-supported prostheses in the edentulous maxilla. *Compend Contin Educ Dent*, 2010; 31(5): 366-8.
11. Tarnow DP, Emtiaz S, Classi A. Immediate loading of threaded implants at stage 1 surgery in edentulous arches: Ten consecutive case reports with 1- to 5-year data. *Int J Oral Maxillofac Implants*, 1997; 12(3): 319-2.
12. Real-Osuna J, Almendros-Marqués N, Gay- Escoda C. Prevalence of complications after the oral rehabilitation with implant-supported hybrid prostheses. *Med Oral Patol Oral Cir Bucal*, 2012;17 (1): 16-21.

Full arch implant rehabilitation: a case report



Fig. 39: Lead foil test for the new design, intraoral situation.



Fig. 40: Lead foil test for the new design.



Fig. 42: Final restorations. Frontal view.

13. Qamheya AH, Yeniol S, Arisan V. Full Mouth Oral Rehabilitation by Maxillary Implant Supported Hybrid Denture Employing a Fiber Reinforced Material Instead of Conventional PMMA. *Case Rep Dent*, 2015; 841745.
14. Kwon T, Bain P, Levin L. Systematic review of short (5-10 years) and long-term (10 years or more) survival and success of full-arch fixed dental hybrid prostheses and supporting implants. *J Dent*, 2014; 42 (10): 1228-41.
15. Egilmez F, Ergun G, Cekic-Nagas I, Bozkaya S. Implant-supported hybrid prosthesis: Conventional treatment method for borderline cases. *Eur J Dent*, 2015; 9: 442-8.



Fig. 41: Final restorations. Lateral view.



Fig. 43: Final smile.



Fig. 44: Final restorations.