Case study 37

Use of Alpha-Bio Tec. Universe Multi Unit Abutment System Components in Permanent Immediate Loading Full-arch Rehabilitations

Dr. D.D.S. Massimiliano Favetti

AlphaBio TEC Simplantology

About the Author

Dr. D.D.S. Massimiliano Favetti

Manager, Dentamed Clinic, Rome

Dr. Massimiliano Favetti graduated with honors from the University of L'Aquila in 1995 where he collaborated with the ENEA Research Center for the study of biocompatibility of metals in dentistry. He is a specialist in Prosthetics, Implantology and Oral Surgery and manages a private clinic in Rome. Since 2008, he has been a dental expert of the Civil Court in Rome.
Dr. Favetti's main interests are in the areas of piezoelectric surgery techniques and CAD/CAM systems for prosthetics and implantology and he is a guest speaker on these topics at conferences and courses. Since 2005, Dr. Favetti has deployed the Alpha-Bio Tec implant system.

Abstract

This case report discusses the treatment of a 58-year-old patient who has undergone upper arch restoration, the immediate implantation of 4 Alpha-Bio Tec. SPI implants and the realization of an Alpha Universe Multi Unit abutment system, the permanent immediate loading screwed prosthesis.

Background

Immediate loading full-arch implantoprosthetic rehabilitation is an increasingly widespread solution that contributes mechanically to the maintenance of primary stability and the acquisition of secondary stability during osseointegration. The greatest challenge encountered in diagnosing the restoration of an entire dental arch that is already irreversibly compromised, is to persuade the patient to accept the idea of finding themselves, even temporarily, totally edentulous and to wearing a removable complete denture. A current solution, which allows us to limit the edentulous period to the time that is strictly necessary for the realization of the prosthesis, is represented by the realization of immediate loading implants screwed onto at least 4 endosseous implants. Through strict accordance with a protocol that provides both surgical an prosthodontic planning, the function and aesthetics of the patient can be restored successfully within 72 hours after surgery.

This type of prosthesis, compared to traditional cemented solutions realized with ceramic-coated structures, involves a significant cost containment, both for the simplicity of execution and for the reduction of the number of implants required to realize them (1). 4 Implants of appropriate size are used and should be positioned in a symmetrical manner while trying to set a support polygon for the prosthesis. Very often, to avoid damaging important anatomical structures, such as the maxillary sinus or the mandibular canal, implants must be positioned with strong inclinations that must be compensated by resorting to the use of specific prosthetic components (2).

Case Overview

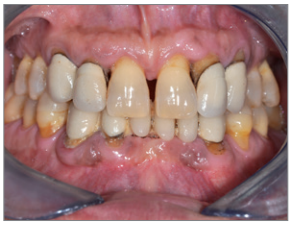
The 58-year-old male patient complains of pain in the posterior maxillary area when chewing. His medical history reveals that he is a former smoker and under cardiovascular control for the ectasia of the abdominal aorta and the obstruction of the left femoral artery.

Extraoral Examination

The patient presents perioral tissues that are adequately supported by the teeth. His smile line is low, with the exposure of only the incisal third of the upper front teeth.

Intraoral Examination

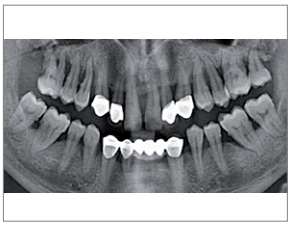
There are accumulations of plaque and tartar that justify a pathological periodontal probe and contribute to tooth mobility. The vestibular mucosa identifies a thick biotype while the palatine mucosa is heavily keratinized and lesion-free. Gingival recession is observed in all quadrants and there is a periodontal abscess in the right molar region. All prosthetic elements are incongruous (**Fig. 1**).



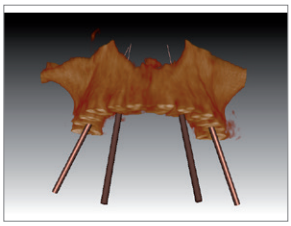
1 Initial situation - front view

X-ray Examination

The orthopanoramic X-ray shows diffuse bone resorption that, in the posterior areas of the upper arch, precludes the placement of endosseous implants without the use of regenerative techniques (**Fig. 2**). The analysis of the residual bone volume, by means of a 3D planning software, confirms the feasibility of an immediate loading, immediate post-extractive implantoprosthetic rehabilitation on 4 implants (**Fig. 3**).



2 Initial orthopanoramic view



3 3D planning

Materials Used

- SPI Ø4.2 L 13 mm implants (Alpha-Bio Tec, Israel)
- For anterior prosthetics - TCT abutment system: TCT 1.5 (Alpha-Bio Tec, Israel)
- For posterior prosthetics – multi unit system: Alpha Uni-Base 30°x1.5, and UniCover TCT

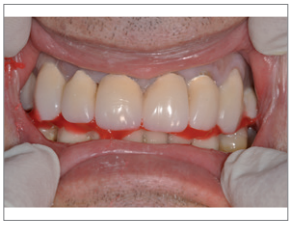
Additional Materials:

- Vicryl Rapid Suture 4.0 (Ethicon GmbH, Germany)
- Piezoelectric insert SB P0500 for the rectification of the premaxilla and PEC kit for the initialvpreparation of the implant sites (Silfradent, Italy)
- Medifuge blood phase separator to obtain the autologous membranes and the CGF fibrin blocks (Silfradent, Italy)

Treatment Plan

Following objective examination and radiographic evaluations, a surgical avulsion of all the upper teeth and their replacement with four endosseous Alpha-Bio Tec SPI implants immediately loaded with a permanent screwed prosthesis were performed. The implantation process was supported by the use of CGF (Concentrated Growth Factors) autologous growth factors, obtained obtained by centrifugation of whole patient blood to stimulate and accelerate the process of osseointegration and prevent postoperative pain and edema. The surgical phase was completed by the immediate impression for the execution of an immediate loading on the implants by means of a full-arch screwed prosthetic element.

In this type of treatment, it is essential that prior to surgery, a reliable transfer system of the vertical dimension of the patient is prepared so that, after surgery, the dental laboratory can quickly mount the work models on the articulator and make the prosthesis. In the described case, a provisional resin was used at the beginning of the surgical phase, between teeth 16 to 26. This was perfectly corresponded to the antagonist arch by using a low shrinkage modeling resin **(Fig. 4).**



4 Registration of the occlusal key

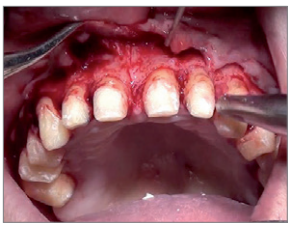
Surgical phase and Restoration

The patient is prepared pharmacologically by administration of 875 mg of amoxicillin and 125 mg clavulanic acid every 12 hours from the day prior to surgery, to be taken for 5 days. The surgical procedure involves, after local anaesthesia, the elevation of a full thickness flap with relief cuts in area 17 and 27 to expose the whole bone surface of the maxilla **(Fig. 5)**.

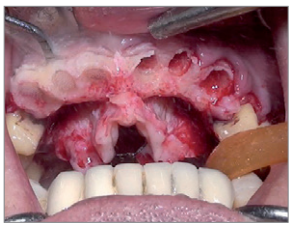
We first perform the extractions of the 6 front teeth and the adjustment of the premaxilla through the piezoelectric insert SB P0500 of the Surgybone system (Silfradent, Italy) (**Fig. 6**).

The first two implant sites are prepared more internally than the interradicular septa of 12/13 and 22/23, with an inclination such that the implant emergence profile is placed palatally compared to the ideal axis of the teeth. The implantary osteotomies must be undersized compared to the Alpha-Bio Tec SPI Ø 4.2 x 13 mm implants that they must accommodate, so that we could take advantage of the self-tapping and compacting characteristics of the implants themselves. This kind of preparation is critical to achieving high primary stability, above 35 Ncm (3), indispensable for the performance of immediate loading (**Fig. 7**).

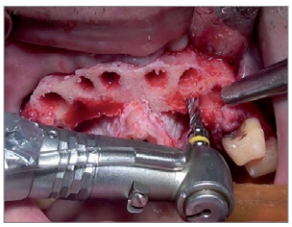
On the first two inserted implants we apply the relative prosthetic components (conical abutment TCT 1.5 mm) that allows the compensation of disparallelism up to 30 ° (**Fig. 8**).



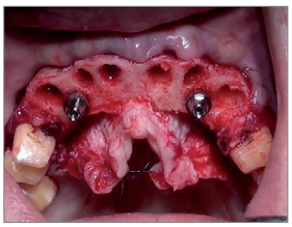
5 Full thickness flap from 17 to 27



6 Piezoelectric adjustment of the premaxilla



7 Preparation of the anterior implant sites



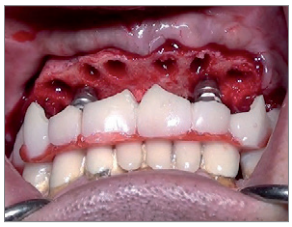
8 TCT abutments for screwed prosthesis in situ

After an appropriate modification of the provisional, we proceed to replace it on the back teeth that are still present and consolidate it with two impression transfers applied on the first two implants, inviting the patient to tighten the previously registered articulation key (**Fig. 9**).

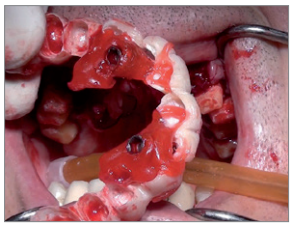
This way, it is possible to easily transfer the original intermaxillary relation to the dental technician, which is essential for the realization of an immediate loading prosthesis that does not require various occlusal adjustments at the time of delivery (**Fig. 10**).

The surgical intervention proceeds with the removal of all the posterior teeth and the preparation of the implant sites in area 15 and 25, necessary in order to accommodate two more Alpha-Bio Tec SPI Ø4.2 x 13 mm implants. To prearrange the prosthetic emergence as distally as possible and compensate for the presence of the maxillary sinuses, the posterior implants are placed at an angle of about 30°. The correction of this inclination is possible through the use of components of the Multi Unit Alpha Universe system that, thanks to a base with an inclination of 17° or 30° and a height of 15 or 25 mm (UniBase) on which you can apply various types of prosthetic components (UniCover), allow to parallelize all the placed implants with each other **(Fig. 11)**.

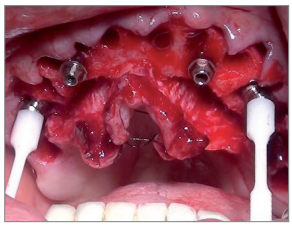
We apply the impression transfer on the TCT prosthetic components and complete the surgery by filling the post-extraction alveoli with a mixture of autologous growth factors CGF (Concentrated Growth Factors) and autologous bone particles, obtained by crushing the block that was removed during the rectification of the premaxilla. Out of a few blocks of CGF fibrin, we realize autologous membranes that we place in the area of the premaxilla to cover the site that underwent major surgical stress (**Fig. 12**).



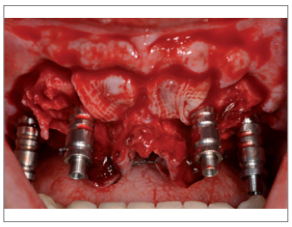
9 Recording the original vertical dimension



10 Registration details



11 Multi Unit Alpha Universe components on tilted distal implants



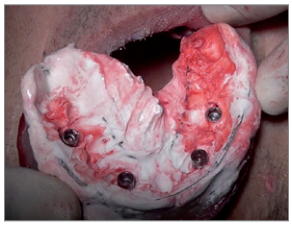
12 Transfer from positioned imprints and CGF autologous membranes

We then proceed to suture the flap and to register a precision plaster imprint which must ensure maximum dimensional stability to allow us to realize within 48 hours a permanent prosthesis screwed onto the implants (**Fig. 13**).

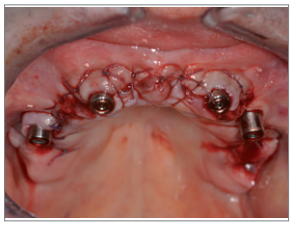
The intervention concludes with the application of the healing screws on the implants to keep the mucosal tunnels open in anticipation of immediate prosthesis placement (**Fig. 14**).

The post-surgical phase provides for the continuation of antibiotic therapy for another 4 days, to which is added the assumption of Ketoprofen every 8 hours for 2 days and 4 mg of Betamethasone for 3 days. Further, the patient must maintain good oral hygiene by using 0.2% chlorhexidine spray at least 3 times a day for 2 weeks.

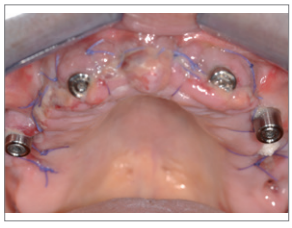
48 hours after the intervention, the tissues are in good condition with the patient who, thanks to the combination of drug therapy and CGF growth factor, has neither pain nor postoperative edema (**Fig. 15**).



13 Plaster precision imprint



14 Completed surgical phase



15 Tissue 48 hours following the intervention

Use of Alpha-Bio Tec. Universe Multi Unit Abutment System Components in Permanent Immediate Loading Full-arch Rehabilitations

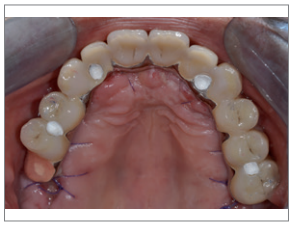
We proceed to the removal of the healing screws and screw a permanent full-arch prosthesis constituted by a coated molten metallic structure with composite dental elements and flanges in pink resin onto the implants (**Figs. 16 -16 B**).

The proper fit of the prosthesis on the TCT components is confirmed by a radiographic control performed after tightening the screws to 25 Ncm, in compliance with the instructions provided by the manufacturer (**Fig. 17**).

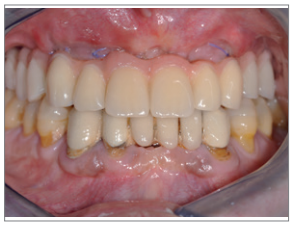
A patient receiving this type of rehabilitation is immediately put in the best conditions from the functional and aesthetic points of view (**Fig. 18**), however, must be motivated to comply with a controlled diet for the whole period necessary for the osseointegration of the implants.

The first control is carried out after seven days and the removal of the suture after fourteen days. Subsequent checks are performed at 30, 60 and 90 days. A significant initial bone resorption occurs, especially in immediate post-extraction sites; to create the right gingival compression, it is necessary to remove the prosthesis and send it to the laboratory to make the correct relining (**Fig. 19**).

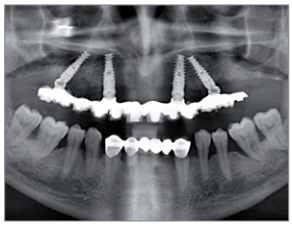
During this prosthodontic phase, in addition to the improvement of the flange in pink resin, it is possible to make some functional changes, such as the addition of the posterior teeth (**Fig. 20**), which up to this point, is to be avoided in order to reduce the size of the distal cantilevers (4). 18 Months after surgery, we observe a moderate reorganization of the tissues that, while generating a minimum space between the prosthesis and the mucosa (**Fig. 21**) that may be solved with further relining, does not cause any inconvenience to the patient who, in fact, is facilitated in his home hygiene.



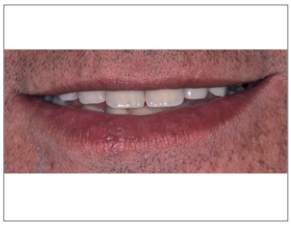
16 Permanent prosthesis - occlusal view



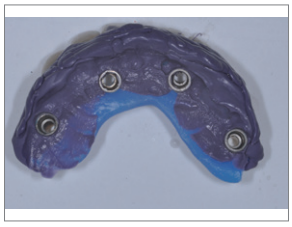
16B Permanent prosthesis - frontal view



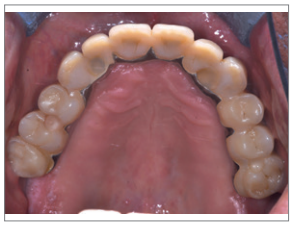
17 Radiographic inspection of the prosthesis coupling



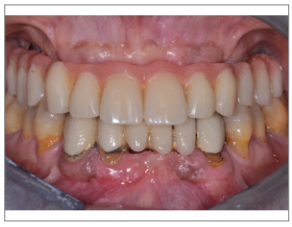
18 Patient's smile 48 hours after surgery



19 Denture reline 120 days after surgery



20 Adding a distal element when healing is complete



21 Control after 18 months

Summary and Conclusions

Clinicians who intend to propose immediate loading full-arch implantoprosthetic rehabilitation must carry out a careful evaluation of the conditions in which they will be operating, by studying the anatomy of the surgical site in great detail. Only with careful surgical planning will it be possible to prepare an appropriate prosthetic project that will ensure the long term survival of the rehabilitation (5). There are also other factors, all related to the reduction of biological impact during surgery, which can determine the success of prosthesis on immediate loading implants regardless of whether the implants are placed in immediate post-extraction sites or in mature sites (6). For example, the use of fixtures with a highly performant design, for which an undersized preparation of the implant site is required, offers the advantage of easily obtaining primary stability and reducing the need for bone regeneration. Even the possible piezoelectric preparation of the sites themselves and the use of CGF (Concentrated Growth Factors), obtained from the patient's blood through a blood separator, may contribute to the reduction of postoperative complications, laying the foundations for proper healing aimed at the osseointegration of the implants.

In view of the fact that in full-arch screwed rehabilitations it is almost always necessary to parallelize the prosthetic emergence of the implants, often by many degrees, it is crucial that the systematic choice presents suitable prosthetic components in catalog. Alpha-Bio Tec. Multi Unit Alpha-Universe System fully responds to this need by offering multiple solutions to correct diverging inclinations up to 45°, making both the surgical procedure carried out by the dentist and the prosthetic procedure by the dental technician,simple and easy.

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Alpha-Bio Tec complies with ISO 13485:2003 and the Canadian Medical Devices Conformity Assessment System (CMDCAS).

MEDES LIMITED
5 Beaumont Gate, Shenley Hill
Radlett, Herts WD7 7AR. England
T./F. +44.192.3859810

www.alpha-bio.net