



Deploying Alpha-Bio Tec's NeO for Combined Immediate Post-extraction Implant and Flapless Implantation



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Dr. Massimiliano Favetti graduated with honors from the University of L'Aquila, Italy in 1995, where he collaborated with the ENEA Research Center on the study of biocompatibility of metals in dentistry. Dr. Favetti specializes in prosthetics, implantology and oral surgery. Since 2008, he has been on the Board of Experts, Italian Civil Court, Rome. His main interests are piezoelectric surgical techniques and CAD/CAM systems for prosthetics and implantology; he has been a guest speaker on these topics at various conferences and courses. Dr. Favetti has used the Alpha-Bio Tec. implant system since 2005. He is currently the owner of Dentamed Clinics, Rome.

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Abstract

The upper molar area often presents challenges for immediate implantation. In addition to favorable anatomical conditions, such as divergent roots and a barely pneumatized maxillary sinus, it is necessary to have high performance implant systems available, able (despite the limited availability of bone typical of these conditions) to achieve high primary stability.

This case study presents a 41-year old patient who, following, the failure of a fixed prosthesis on her natural teeth, was rehabilitated using two Alpha-Bio Tec's NeO implants. A flapless implant was selected to be inserted in area 15 and an immediate post-extraction implant in area 16.

Background

An immediate post-extraction implant presents tremendous advantages for the patient in reducing the edentulous phase and the number of surgical steps. In order to be placed successfully, such an implant requires careful planning, optimal site preparation and the utilization of suitable implants by the clinician^[1].

The utilization of immediate implants is a viable alternative to replacing missing teeth in cases of severe periodontal disease, periapical pathology, extensive cavities or incurable fractures^[2].

In extreme conditions, such as poor bone density, it is recommended to utilize spiral implants, with which it is possible to obtain adequate primary stability^[3].

The new Alpha-Bio Tec's NeO implant features a very refined design, allowing for easily obtained high torque values as a result of its ability to stabilize bone tissue. This feature becomes even more important when operating in complex post-extraction sites, such as in multi-rooted teeth, where the scarce bone availability needs to be optimized. Another feature of this new implant system is its versatility – its ability to be used in any bone density and for any surgical technique, from flapless implants to those combined with regenerative procedures.

Overview

The patient is a 41-year old woman, moderate smoker (5-6 cigarettes per day), with no meaningfully adverse health history. The patient reports pain around an old implanted prosthesis in the maxillary right quadrant. Clinical examination of the area reveals inflammation and gingival bleeding around tooth 16, while a radiographic evaluation of the area shows good bone availability. The recommended approach is to remove the existing bridge (14 – pontic – 16), place a new crown on tooth 14, place an implant using a flapless technique in the area of the missing tooth 15, extract tooth 16, and place an immediate post-extraction implant as a replacement of tooth 16.

Extraoral Examination

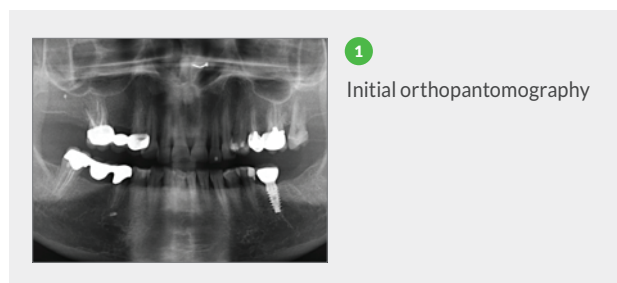
Patient presents toned perioral muscles and a high smile line that permits full exposure of the front teeth, also due to protrusion of the maxillary central and lateral incisors.

Intraoral Examination

Good level of oral hygiene and absence of tooth mobility. Thick mucosal biotype with no evidence of lesions. All teeth show signs of wear and tear as a result of parafunctional activity, which may also be the cause of the widespread gingival recession. Mucosal swelling is evident in the area of tooth 16. Some incongruous prosthetic artifacts exist.

Radiographic Examination

The initial ortho-panoramic radiography (**Fig. 1**) shows sufficient bone availability to enable the implant placement in areas 15 and 16 without adopting regenerative techniques.



Materials Used

- Ø 3.75 x 11.5 mm NeO implant (Alpha-Bio Tec., Israel) in area 15
- Ø 4.2 x 10 mm NeO implant (Alpha-Bio Tec., Israel) in area 16
- Temporary TLAC-AR abutment (Alpha-Bio Tec., Israel) on implant in area 15
- HS6-5 healing screw (Alpha-Bio Tec., Israel)
- Final TLAO-2 abutments (Alpha-Bio Tec., Israel) on implants in areas 15 and 16

Additional Materials

- Absorbable haemostatic sponges (Cutanplast Dental; Ogna Lab, Italy)

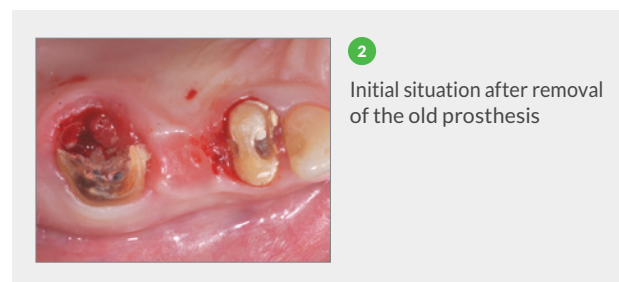
- Non-absorbable polyamide suture (Supramid; B. Braun Melsungen, Germany)
- Temporary polycarbonate crown (InLine, BM. Dental, Italy) on implant in area 15
- Final crown in IPS e-max CAD (Ivoclar Vivadent, Italy) on tooth 14
- Final crowns with Prettau® CAD zirconium structure (Zirkonzahn, Italy) and ZirPress veneering (Ivoclar Vivadent, Italy) on implant areas 15 and 16

Treatment Objectives and Work Plan

The treatment plan includes the removal of the existing prosthesis in the maxillary right quadrant and the placement of two implants: in area 15 using a flapless technique and in area 16 as an immediate post-extraction implant. Immediate screw retained prosthetic rehabilitation in area 15 is scheduled after the end of the surgical phase to reduce any imperfections resulting from missing teeth. The final prosthesis, expected to be placed approximately 3 months after surgery, will be constructed by creating a ceramic crown with chair side CAD/CAM technique on tooth 14, and zirconium-ceramic crowns on the abutments in areas 15 and 16.

Surgical Phase

The old bridge was removed after administering plexus anesthesia. Impairment of tooth 16 (unsalvageable) was evidenced (**Fig. 2**).



The extraction of the root residues revealed a very well represented inter-radicular septum, enabling implant placement (**Fig. 3**).



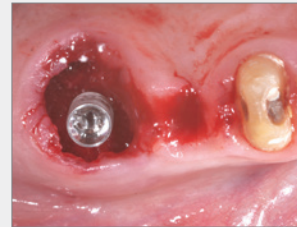
3
Inter-root septum after
extraction of tooth 16

A mucosal operculum in area 15 was performed while simultaneously preparing the two implant sites. The passage of a 2 mm pilot drill revealed low bone density (D3), and therefore under-preparation of the sites was decided upon in order to obtain the necessary primary stability. For the site in area 15, which received an Ø3.75 x 11.5 mm implant (NeO, Alpha-Bio Tec., Israel), it was sufficient to use a 2 mm drill up to 11.5 mm depth. Area 16 was prepared to receive the Ø4.2 x 10 mm implant (NeO, Alpha-Bio Tec., Israel) with a 2 mm drill to 10 mm depth; a crest housing was created for implant installation with a 2.8 mm drill to 4 mm depth (**Fig. 4**).



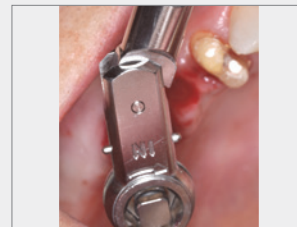
4
Under-preparation of the
implant sites

The geometric characteristics of the NeO implant, making it self-tapping and self-compacting, allows it to reach high torque values even in compromised sites (**Fig. 5**).



5
NeO implant insertion in
inter-root septum of tooth
16

The progression of the implant within the site is gradual, and the steep rise in the insertion torque occurs only in the last few millimeters, easily reaching values of 50 Ncm (**Fig. 6**).



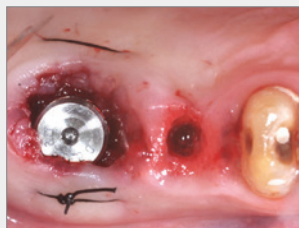
6
Tightening of NeO implant
with dynamometric ratchet;
high insertion torque (50 Ncm)

At directly accessible sites, it is advisable to use a straight manual driver that allows, where enough bone density is present, altering the implant placement trajectory in order to optimize the prosthetic axis. In fact, the NeO implant features such a powerful apical thread that it is possible to use it as an actual osteotome (**Fig. 7**).



7
NeO implant insertion with
manual driver in area 15

The surgical procedure was completed by filling the post-extraction alveoli of area 16 with absorbable hemostatic sponges (Cutanplast Dental, Oгна Lab, Italy), applying a healing screw on the implant (HS6-5, Alpha-Bio Tec., Israel) and suturing the area with non-absorbable polyamide pseudo-monofilament (Supramid, B. Braun Melsungen, Germany) (**Fig. 8**).



8
Placement of healing
abutment and suture in
area 16

Immediate loading of the implant in area 15 was accomplished by modifying a temporary abutment (TLAC-AR, Alpha-Bio Tec., Israel) (**Fig. 9**).



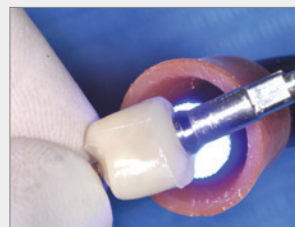
9
Grinding of temporary
TLAC-AR abutment

To avoid clogging the opening passage during the provisional fitting procedures, a long transfer screw was used to hold the temporary abutment in place and then the suitably pre-constructed crown, pre-molded in polycarbonate (InLine, BM. Dental, Italy), was fitted over it (**Fig. 10**).



10
Placement of temporary
crown on abutment

The provisional crown was bonded to the abutment using a flowable composite and then the screwed-on crown was removed from the patient's mouth. This procedure allowed adjustment of the screwed-on provisional outside of the oral cavity (**Fig. 11**), thus achieving a high degree of accuracy in the finishing and polishing of the emergence profile (**Fig. 12**).



11
Realization of screwed on
provisional



12
Finished and polished
temporary crown

The provisional crown was attached to the implant by tightening the screw to 20 Ncm and closing the hole with another flowable composite (**Fig. 13**).



13

Application of temporary abutment and closing the hole with flowable composite



15

Damaged provisional at 35 days after surgery

To limit the risk of overload on the implant, the provisional was adjusted to eliminate contacts in both in centric occlusion and in lateral and protrusive movements (**Fig. 14**).



14

Provisional without occlusal load



16

Application of healing screw in place of provisional

The patient was discharged with a recommendation to adhere to the following drug regimen: Amoxicillin + Clavulanic Acid: 1 g every 12 hours for the following three days, Ketoprofen 1 g every 8 hours on the first day and as needed in the following days, Chlorhexidine 0.2% spray at least 3 times a day for the next 7 days.

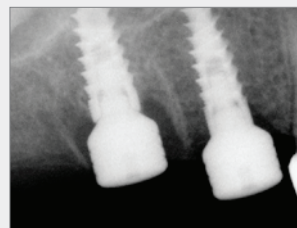
Additional Check-Ups

A week after surgery, the sutures were checked and removed. As the patient reported no discomfort, her follow up check-up was planned a month after surgery.

At 35 days after surgery, despite all the recommendations provided to the patient about the diet to be followed during the healing period, she showed up at the follow-up visit with a damaged screwed-on provisional on 15, evidently due to some masticatory overload (**Fig.15**).

The decision was made to remove the provisional and (to avoid additional stress that could effect the implant stability) to apply a HS6-5 healing screw instead (**Fig. 16**).

The intraoral radiography did not show any evidence of bone loss around the implants (**Fig. 17**).



17

Intraoral radiography at 35 days after surgery

Prosthodontics Phase

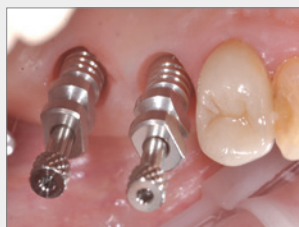
During the osseointegration phase, the old crown was replaced on tooth 14 with AIPS e-max CAD integral ceramic (Ivoclar Vivadent, Italy) produced directly in the dental clinic in a single

session with the CAD/CAM Cerec system (Sirona, Germany), (Fig. 18).



18
Crown in IPS e-max CAD on tooth 14 made with Sirona Cerec

At 90 days after surgery the final impressions were taken with a single-phase individual open tray procedure, positioning the HTLO impression transfers (Fig. 19) on the implants utilizing VPES (Vinyl Polyether Silicone) EXA'lence GC (GC EUROPE, Belgium), (Fig. 20).

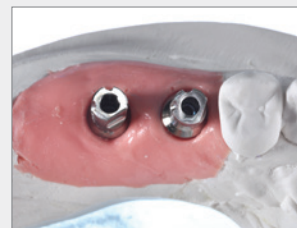


19
Alpha-Bio Tec. HTLO transfer placed on implants



20
Dental impression in VPES with open tray technique

Two TLAO-2 (Alpha-Bio Tec., Israel) abutments were provided to the laboratory. After pouring plaster models, the abutments were modified by grinding them to 0° (Fig. 21).

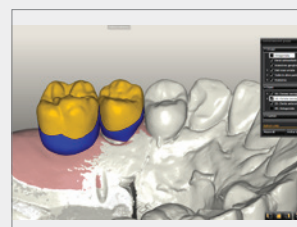


21
TLAO-2 abutments prepared on model

It was decided to adopt a fully digital work flow that, in addition to maintaining accuracy of the details of the impressions, also allows for optimizing execution times, reducing costs and achieving remarkable aesthetics. The CAD/CAM (Zirkonzahn, Italy) system first allowed us to perform scans of the prepared models (Fig. 22), followed by the design of the two crowns of 15 and 16 with the pressed zirconium technique (Fig. 23) and finally, milling of the prosthetics.

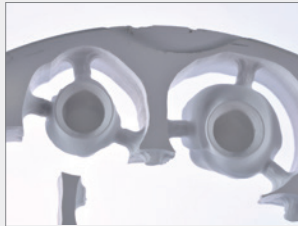


22
CAD/CAM scanned models

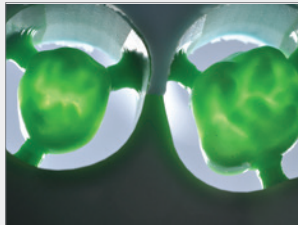


23
CAD design of teeth 15 and 16 for press technique on zirconium

The structures were milled from hard Prettau® zirconium (**Fig. 24**), while the anatomical occlusal details were milled from hard castable resin (**Fig. 25**).

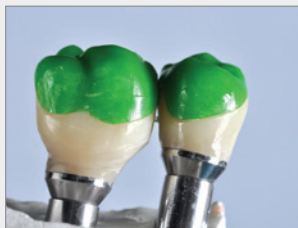


24
Milled structures from
hard Prettau® zirconium
disks



25
Anatomical details milled
from hard castable resin

After sintering the structures in zirconium and controls on the model (**Fig. 26**), the crowns were sent for fitting trying in the patient's mouth.



26
Controls on the model

The intraoral test was carried out without difficulty and basically consisted of the optimization of occlusal contacts (**Fig. 27**) using articulating paper of 40 microns thickness.



27
Intraoral occlusal
functionalization

Once sent back to the laboratory, the crowns were finalized with structural ceramization techniques by means of die casting, utilizing ZirPress Ivoclar ceramic (Ivoclar Vivadent, Italy), characterized by saturating the surface of the color (**Fig. 28**).



28
Crowns designed in the
laboratory with ceramic
die casting technique

In the final session, the abutments were positioned by tightening them to 30 Ncm (**Fig. 29**) and crown shape, color and contacts were crosschecked (**Figs. 30-31**) prior to cementation.



29
Abutment 30 Ncm
tightening torque



30

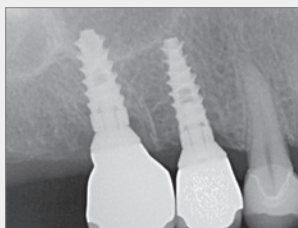
Cemented crowns



31

Control of occlusal contacts after cementation

The final radiographic control (**Fig. 32**) was performed to ensure not to leave any residual cement, and highlights the fit of all the prosthetic structures.



32

Final X-ray

Summary

State-of-the-art techniques and technologies applicable to implant prosthetics make it possible to recommend quick solutions to a patient, such as the immediate insertion of implants post-extraction and flapless surgery interventions, wherever possible.

In addition to extremely thorough planning, it is essential that suitable implants are available in order to proceed to their immediate placement and, if appropriate, to their immediate prosthetization. The Alpha-Bio Tec. NeO implant represents the ultimate expression of the versatile features of an implant, as it can be implanted in virtually all conditions, from conventional implants to immediate implant surgery, and deploying all techniques, from flapless surgery to immediate loading. The predictability of a prosthetic implant treatment depends on many factors. Consequently, in addition to high-quality implants and prosthetic components, it is essential to achieve a high level of prosthesis. The new CAD/CAM technologies, new materials and new laboratory techniques^[5] can help in this endeavor, while also minimizing technical execution time as described in this case.

References

1. Romanos GE. Wound healing in immediately loaded implants. *Periodontol* 2000. 2015 Jun; 68(1): 153-67
2. Tarazona B, Tarazona-Álvarez P, Peñarrocha-Oltra D, Peñarrocha-Diago M. Relationship between indication for tooth extraction and outcome of immediate implants: A retrospective study with 5 years of follow-up. *J Clin Exp Dent*. 2014 Oct 1; 6(4): e384-8
3. Danza M, Zollino I, Paracchini L, Riccardo G, Fanali S, Carinci F. 3D finite tooth number analysis to detect stress distribution: Spiral family implants. *J Maxillofac Oral Surg*. 2009 Dec; 8(4): 334-9
4. Kapos T, Evans C. CAD/CAM technology for implant abutments, crowns, and superstructures. *Int J Oral Maxillofac Implants*. 2014; 29 Suppl: 117-36
5. Abduo J, Lyons K. Rationale for the use of CAD/CAM technology in implant prosthodontics. *Int J Dent*. 2013