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ENGLISH

# IMMEDIATE LOADING IMPLANT REHABILITATION IN COMPROMISED SITES

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Alpha Bio TEC Simplantology

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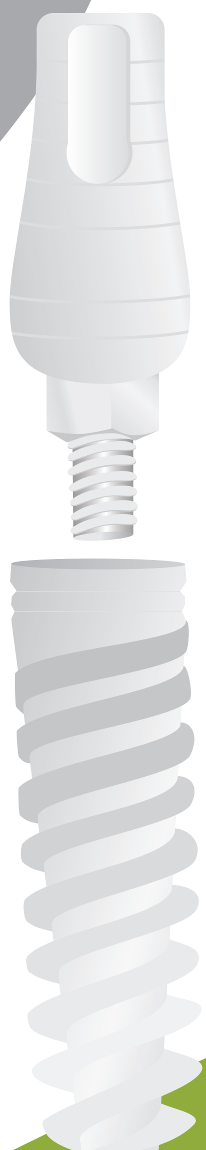

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# IMMEDIATE LOADING IMPLANT REHABILITATION IN COMPROMISED SITES



**KEYWORDS:**
**COMPROMISED SITES - NARROW AND SHORT IMPLANTS - GROWTH FACTORS - IMMEDIATE TEMPORISATION**

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## INTRODUCTION

Oral implant surgery is constantly evolving and the high level of predictability has led to a review of certain requirements that were originally considered essential for long-term success (1).

Traditional guidelines imposed a waiting time of at least 2 months for bone remodelling following extraction and thereafter 6 months of healing without functional loading (2-3) were required for implant osseointegration.

This delayed loading protocol was a cautious approach, yet somewhat empirical, as, however, it was never experimentally verified (4).

As such, over the last few years, dental implantology has evolved significantly and the original protocols have been modified thanks to a number of studies which include: single-stage surgery (5), immediate post-extraction implant positioning (6) and immediate temporisation (7, 8).

These studies have for some time confirmed how the technique of immediate loading also results in a high level of success both from a clinical and a histological perspective without the conventional waiting period (9,10). A pioneer, Lazzara in 1989 (11), suggesting the use of post-extraction implants, was responding firstly to the need for a reduction in treatment time that was being increasingly demanded by patients, and secondly probably to the preservation of bone volume following an extraction.

In any case immediate loading tends to stabilise the biological compartment, allowing optimum conditioning of the hard and soft tissues, factors crucial to the success of prosthetic implant treatment especially in areas of high aesthetic value.

This therapeutic approach may however be a lot less viable in sites with dimensional impairment following extractions or atrophy due to lack of use, unless the method shortly to be demonstrated is utilised.

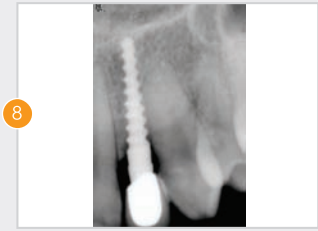
The loss of dental elements involves bone resorption which, depending on the area, can be vestibular or lingual/palatal. Classification of edentulous maxillary bones was performed based on studies of 300 skulls. Minor differences were noted in the shape and in the resorption of basal bones, while significant variations were noted in the edentulous alveolar processes. In general, the changes in shape follow a predictable process and resorption is also different according to the site in which it occurs:

- in the intraforaminal region of the mandible, bone resorption is almost

1


CGF block manipulation
2


ARRP implants in IV quandrant area
3


X-ray inspection at 12 months
8


Temporary prosthesis
9


Final prosthesis
10


entirely vestibular with a horizontal trend;
- behind the mental foramen it is predominantly vertical;
- in the upper maxilla it is horizontal on the vestibular side of the entire arch (12).

This means that losing a dental element in the upper arch or in the lower intraforaminal arch, we will have a vestibular bone defect with significant opportunity. In order to position an implant with predictability, the bone tissue must envelope it along its entire length and have sufficient vascularisation for maintenance of the supporting bony structure.

In cases of edentulism, where the bone tissue is insufficient in size, the application of surgical techniques is required that permit modification of the bone profile (13). Numerous techniques have been proposed to increase the bone volume: bone regeneration, grafting and split crest.

In 1992 Gottlow (14) presented 88 sites in which the technique of guided tissue regeneration GTR had been applied, obtaining an increase of around 2 mm.

In 1994 Simion et al. (15) demonstrated that it is possible to carry out vertical regenerations of around 7 mm.

In all the cases, however, substantial contractions of the graft material were highlighted. It thus becomes necessary to perform interventions with additional assessments, in order to achieve the required volumes.

The split crest technique has also undergone considerable development in recent years thanks to the use of piezoelectric instruments, which ensure improved cutting linearity and thickness of cutting instruments less than traditional cutters (16-17-18).

This technique consists of creating a vertical incision, with or without unloading cuts, allowing, through the use of expanders, dilation of the bone section and insertion of the implants.

In certain cases, however, if the residual bone tissue is extremely thin, it may not be possible to apply the previous techniques resulting in the need to perform a block graft. This consists of extracting a block of bone from a donor site and inserting it at a recipient bone site employing osteosynthesis screws (19). Romanos (20) demonstrated that it is possible to perform bone grafts and subsequently, during the implant phase, to have a tissue response similar to the conventional technique, also with immediate loading of the implants.

The afore - mentioned surgical approaches have the undoubted advantage of recreating the bone volumes that existed prior to the process of atrophy, but also the major limitation of having to subject the patient to operations which are of great biological and economic cost and in the case of block grafts requiring further surgery. Moreover, it is virtually impossible to load the implant immediately after a regeneration.

A therapeutic alternative, aimed at reducing the biological impact, time and cost of the operation, can be to use smaller implants that are immediately loaded, in association with autologous growth factors (CGF, Silfradent Srl, Italy). (21 - 22 -23).

This approach also tends to increase acceptance by the patient with respect to the treatment plan.

The purpose of this study is to evaluate the success rate of narrow and short implants positioned in an atrophic alveolar procedure in the absence of additive operations and then immediately provisionalised.

Final ceramic prosthesis

4


Pre-surgical radiological assessment

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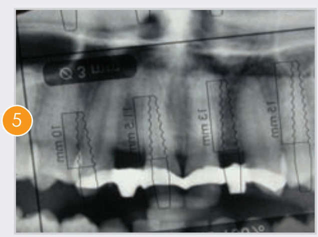

Pre-surgical clinical assessment

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X-ray inspection at 12 months

7


Transfer caps

11


Flap intervention

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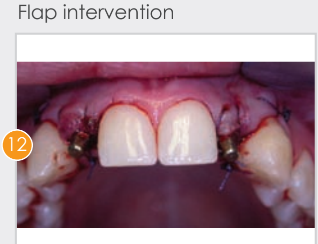

Flapless intervention

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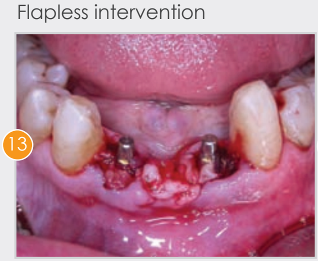

Radiological assessment with insert

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## MATERIALS AND METHODS

The operating protocol provides for the use of ARRP (Alpha-Bio Tec Ltd., Israel) implants, that is single-stage implants, in cases where small diameters are used (3 - 3, 3) and SPI (Alpha-Bio Tec Ltd., Israel) implants for reduced heights. Both have a coil geometry that provides excellent primary stability in accordance with a proper fit.

Patients were not selected in any particular manner, only those presenting absolute contraindications to surgery were excluded.

Evaluation of therapeutic success, this being an ambulatory study, relied solely on radiological findings, of the values of the peri-implant survey and of the clinical evaluation; subject to further evidence of the invasive and instrumental techniques. On the other hand, Zarb and Albrektsson suggested a clinical based definition that: "Osseointegration is a process whereby alloplastic materials obtain a clinically asymptomatic rigid fixation with the bone and this rigid fixation is maintained even under loading".

The small diameter ARRP implants were placed in areas with low aesthetic impact (figs. 3-4) or at sites where a small diameter implant is an essential choice from a volumetric perspective, yet lends itself to positive aesthetic outcome, namely the lower incisors and upper lateral incisors (figs. 5-8).

SPI implants were used without site exclusion, both in the maxilla and in the mandible.

All the fixtures were inserted according to basic surgical concepts aimed at preserving bone tissue tropism and at the same time ensuring good primary stability.

Immediately after implant placement, or at most within 48 hours, adaptation is performed along with functionalisation of the interim implant, seeking to exclude lateral forces (fig. 9).

The patient is also asked to follow a soft diet during the first month in order to then gradually increase the loadings. The final ceramic restorations (fig. 10) are realised, according to the standard healing times, through a conventional fixed prostheses imprint or using the appropriate transfer copings for single-stage implants (fig. 11). This type of imprint is also performed for SPI two-piece implants with the aim of leaving the abutment untouched after the first surgical stage. In these cases, selection of the abutment is performed employing the paraguide system.

The first stage in many of these interventions has been the opening of a full-thickness flap taking into account the small crestal sizes which required full visibility of the bone architecture (fig. 12).Where possible, an access flap was created with paramarginal incisions about 2 mm away from the nearby dental elements, in an attempt to respect the papilla. With a number of post extraction implants, however, where alveolar integrity was guaranteed, no access flap was created (Fig. 13) (24).

Correct orientation of the alveolar implant was evaluated using a diagnostic wax in order to evaluate the possibility of using a single-stage implant.

This type of system is particularly efficient for small diameters, eliminating the risk of secondary prosthetic component fractures, and is beneficial in the maintenance of low bone volumes as in the absence of implant-abutment gap, it does not lead to the formation of peri-implant biological space.

The surgical cavity was created by using piezoelectric inserts (25) and a combination of traditional drills and was then filled with a fibrin block and growth factors. This block was obtained from the blood of the patient through venous extraction and subsequent physical treatment of the same in a CGF rotor (Silfradent Srl, Italy).

SPI type fixtures 8 and 10 mm in length were used for short implants. This implant, in fact, is able to guarantee excellent primary stability, both maxillary and mandibular, even for very short lengths. In the upper arch, the surgical site is prepared.

In one case, an 8 mm SPI 3.75 implant was chosen to replace an upper canine milk tooth in the presence of an included adult canine, as the patient refused to have the same extracted. Here also immediate provisionalisation was performed (figs. 14-15-16-17-18-19).

## RESULTS AND CONCLUSIONS

62 ARRP implants were positioned with a variable diameter of 3 or 3.3 and a variable length of between 10, 11.5, 13 and 16 SPI implants with a length of 8 or 10 mm; the survival rate was 96, 2%. It is then immediately evident that this surgical technique is more predictable than the pre-implant regenerations. The cases presented are currently being provisionalised with a minimum follow-up of 12 months.

The choice to perform this method was determined by the need to make the long waiting times between the expansion or bone graft intervention and the final provisionalisation more comfortable and by the possibility of conditioning the soft tissues, often greatly altered in their shape and appearance as a result of regeneration interventions, through the temporary prosthesis.

The shape of the implants in fact guaranteed remarkable stability even in compromised sites and allowed for immediate provisionalisation. It was therefore possible to condition the tissues in an attempt to achieve the best aesthetics and then, after the standard months of integration, to create the final prosthesis.

Harvey (26) also documented how to

Paraguide system

15

Paraguide system

16

Immediate temporary implant

17

Final crown

18

optimise, in the aesthetic areas, the profile of the soft tissues after positioning an implant with an immediate non-functional interim implant. The level of peri-implant tissues is maintained without resorptions and with an implant success of 97.2% also by using the immediate provisionalisation implant technique. Brunsk (27) initially, then Smuzler-Moncler (28), on the basis of extensive bibliographical review, identified the existence of a micro-movement tolerance range of the bone implant interface, of between 50 and 150 microns. Staying within this range, maintenance of the primary stability is guaranteed and osseointegration is not compromised, indeed it is promoted. In addition to this mobility, interposition of fibrous tissue and compromising of osseointegration is found to occur. Immediate provisionalisation thus permits monitoring of soft tissue maturation and in any case the attaining of osseointegration (29).

These concepts already present in the literature for standard implants are also applicable specularly to single-stage small implants as well as to short implants, albeit in combination with autologous growth factors.

This methodology, in accordance with the guidelines suggested by the literature and the instruments used, allows a high degree of predictability of the aesthetic and functional result, in association with a reduction of surgical aggression and therapeutic timeframes.

X-ray inspection at 12 months

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