



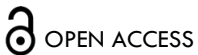
CASE REPORT

Italian School One Piece Implants Stabilized with Electrowelded Titanium Needle for The Rehabilitation in Aesthetic Area of Single Post-Extraction Edentulies with Immediate Loading

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ABSTRACT

The stabilization of an one piece implant with an electrowelded titanium needle is a technique introduced at the end of the seventies of the last century to increase the primary stability, already acquired by means of the wide thread and bicorticalism, of the one-piece implants of the Italian school such as the Tramonte screw, especially in immediate loading rehabilitations of single edentulous upper front teeth and thus make the success of immediate loading predictable.

The stabilization of a one piece implant is achieved by inserting a titanium needle (Scialom type) divergent from the axis of the main implant, a needle which must reach and impact the deep cortical bone and be welded with the intraoral welding machine to the one piece basic screw, to form a single prosthetic abutment.

In addition to enhancing primary stability and increasing resistance to static and dynamic stress, given that by forming a single body with the implant it extends the support surface over a larger surface, needle stabilization also carries out an anti-rotational action, opposing the "unscrewing" effect that can be caused by the pressure exerted by the tongue during swallowing.

Needle stabilization also helps to avoid those micromovements which, when they exceed 150 microns, can prevent the osseointegration process, leading to the failure of the immediate loading implant.

Needle stabilization has proven to be particularly effective in the immediate loading of post-extraction single implants in the upper frontal sectors, with reduced bone depth, or with poorly mineralized bone.

Keywords: One piece implant, Italian school of implantology, Intraoral welding machine, Needle titanium implant.

Introduction

The Authors present an implant-prosthetic method that uses one-piece implants from the Italian School electrowelded to a titanium needle to guarantee immediate stabilization and make the success of immediate loading predictable. To increase the resistance to static and dynamic occlusal stresses, the one-piece implants of the Italian school, especially in the presence of poorly mineralized bone, can offer better results if combined with cylindrical needle implants which extend the support surface over a larger area, enhance immediate primary stability and thus speed up osseointegration times. Needle stabilization also carries out an important anti-rotation action, opposing the "unscrewing" effect that can be caused by the pressure exerted by the tongue during swallowing and helps to avoid micromovements which, if they exceed 150 microns, can prevent the osseointegration process, resulting in the failure of the immediate loading implant.¹⁻³

This method is mainly used in cases of single-edentulism associated with bone atrophy and/or reduced volume of the upper anterior sector also as an alternative to regenerative and/or appositional surgery techniques and allows immediate loading with a temporary fixed prosthesis at the end of the same surgical session.^{4,5}

The procedure is certainly more demanding for the operator than traditional techniques, but it brings a series of advantages to the patient as the possible extraction of compromised teeth, the positioning of the implants, the introduction of biomaterials and the application of fixed temporaries are carried out with a single surgical operation, significantly reducing both the number of clinical sessions and the biological cost and discomfort of patients. Once the tissues have healed, the maneuvers to create definitive crowns are comparable to those performed on natural teeth.⁶⁻⁸ This technique, used to replace the lack of a tooth in particularly aesthetic areas with bone atrophy, has been using the protocol of the Italian School of Implantology for a time interval of approximately 30 years and with a case history of 620 cases.

To demonstrate the above, two particularly educational clinical cases and related follow up are described.

The clinical cases presented were carried out in accordance with the ethical standards established in the Declaration of Helsinki and the patient's consent.

Materials and Methods

The stabilization of the one-piece titanium implant of the Italian school, bicorticalized according to the Garbaccio technique⁹, is obtained by inserting a titanium needle (Scialom type¹⁰) divergent from the axis of the main implant, a needle which must respect the integrity of the adjacent teeth and be pushed in depth until it reaches and impacts the deep cortex to exercise its stabilizing function. It is then welded to the one piece screw underlying the osteo-mucosal emergence in order to form a single prosthetic stump.^{11,12}

The welding is carried out with the Mondani intraoral welder¹³⁻¹⁷. According to our protocol it is essential that

the main implant and the stabilization needle are solidly bicorticalized. "One Piece" titanium implants, Tramonte screw type¹⁸, with a thread diameter of 4.5 mm and an elongated abutment with a diameter of 2.5 mm that comply with CE regulations were used. The length of the implant in the bone is variable, depending on whether the deep cortex is reached, in specific cases the cortical plate of the nasal passages (bicorticalism), essential to obtain primary stability. A Scialom-type titanium needle with a diameter of 1.2 mm and variable length always depending on the bicorticalism is used as a support structure.

The preparation of the implant site of the one piece screw is performed with Pasqualini self-centering drills, with a progressively increasing diameter from 1.1 mm to 2.5 mm, mounted on a micromotor with liquid cooling (saline solution). Self-centering burs have a sharp triangular tip and a beveled triangular spine. This important feature allows the creation of very precise and minimally traumatic osteotomy tunnels for the recipient bone⁵.

The insertion of the needle uses the same initial preparation of the site with the 1.1 mm probe drill with which the cortex is reached. The 1.2 mm needle is inserted into the bone hole thus obtained and accompanied along the path prepared with the press-fit technique¹⁹.

The regeneration of the bone deficit (in cases where it is present) is managed with a mix composed of a porcine bone putty, 200-500 micron hydroxylapatite with nanometric surface microgranulometry and polylactic - polyglycolic acid.

A freeze-dried bovine pericardial membrane is positioned to protect the heterologous graft.

Immediate loading is made with acrylic resin crowns while the definitive prosthesis is made of metal-ceramic. The indicated method involves the use of local anesthesia (articaine 4% with adrenaline 1:100,000), antibiotic coverage (amoxicillin tablets 2 g/day for 5 days) and anti-inflammatories as needed (NSAIDs).

Results

CLINICAL CASE N°1

This is a 65-year-old Caucasian man who complains of serious discomfort in his severely compromised upper left incisor which is mobile (grade III) and the site of frequent abscesses. The periodontal probe penetrates its entire length causing a fair amount of bleeding. The radiographic examination shows bone loss around the root of the incisor which affects the entire socket.

Currently the incisor is temporarily splinted to the adjacent teeth with light-cured composite material. Careful examination of the x-rays allows us to highlight the presence of a portion of intact alveolar bone which, extending beyond the root of the compromised tooth, reaches the cortex of the nasal passages. It is therefore possible to formulate a therapeutic plan that involves carrying out in a single session the extraction of the compromised incisor, the post-extraction insertion of a one-piece bicorticalized Italian school implant stabilized with a titanium needle also bicorticalized and

electrowelded using an intraoral welding machine to the main implant to form a single prosthetic abutment. The cementation of a temporary prosthesis in acrylic resin allows for immediate loading.

This portion of healthy bone, contrary to what is normally supported 6, is suitable for the insertion of implants with immediate loading even in the presence of periodontal disease, as long as both the static balance and the dynamic balance of the occlusion are restored and respected 7.

The single replacement of the front teeth is the most classic of the implant prosthetic indications even in cases of marked bone atrophy. The photographic and caption sequence explains in detail the evolution of the case with the immediate prosthesis of the frontal single implant facilitated by stabilization with a welded needle.

The case was followed for 10 years (2008 - 2018). Fig. 1,2,3.



Fig.1 After antibiotic therapy based on amoxicillin started 5 days earlier, the incisor is extracted without damaging the gingival margins, providing for a thorough surgical cleaning of the alveolus. Throughout the operation the socket is frequently cleansed with antibiotic solution (rifamycin 90 mg/18 ml)

The osteotomy is performed according to the protocol described with the Pasqualini self-centering drills which, having a maximum diameter of 2.5 mm, cause the least possible damage to the already seriously compromised bone of the socket. It is very important, when carrying out the osteotomy, to minimize further damage to the alveolar bone to avoid making subsequent regenerative maneuvers more burdensome. The osteotomy must not follow the course of the natural alveolus but a path parallel and contiguous to the cortical bone of the palate until it reaches the cortex of the nasal passages. The one-

piece Italian school implant with the body of the threads (fixture) of 4.5 mm in diameter is inserted into the 2.5 mm osteotomy. The threads penetrate "cutting" into the osteotomy without damaging the cortical bone. The implant must reach and impact the cortex of the nasal passages creating bicorticalism.

In this case the needle impacts the cortex of the nasal spine. To correctly create a single prosthetic abutment it is advisable to create a groove in the abutment of the main implant in which to house the needle before welding.



Fig.2 Taking into account the small size of the abutment, there will be no tension on the vestibular mucosa, which, being no longer supported by the vestibular wall of the alveolar juga, tends to collapse.

It is therefore possible to introduce the filling biomaterial and the pericardial membrane without generating tension in the vestibular mucosa itself, an indispensable condition for promoting bone regeneration and complete aesthetic recovery.

At the end of the surgery, a temporary acrylic resin prosthesis is cemented, carrying out the immediate loading of the implant in a single session (Fig.2). The temporary remains in situ without undergoing changes for

4 months and is removed after the radiographic check which shows the complete bone regeneration of the alveolus and the observation that the mucous membranes, with an orange peel appearance, have not undergone any retraction compared to the original position end of intervention (Fig. 2). The festooning with clearly visible papillae allows the creation of the definitive metal-ceramic prosthesis in a short time, created according to the desired aesthetic standards.



Fig.3 The following photographic sequence shows how the complete regeneration of the alveolar bone and the aesthetics of the prosthesis were maintained over time. The case was followed for 10 years (2008 - 2018).

CLINICAL CASE N°2

58 year old Caucasian man with the upper left central incisor in the expulsion phase due to occlusal trauma. As in case No. 1, the same rehabilitation procedure was

followed and despite the small residual bone crest, the subsequent single definitive gold-porcelain prosthesis remained valid in the follow-ups of the following 9 years (2009 - 2018). Fig. 4.5.



Fig. 4 As in case No. 1, the same rehabilitation procedure is followed, with one difference.

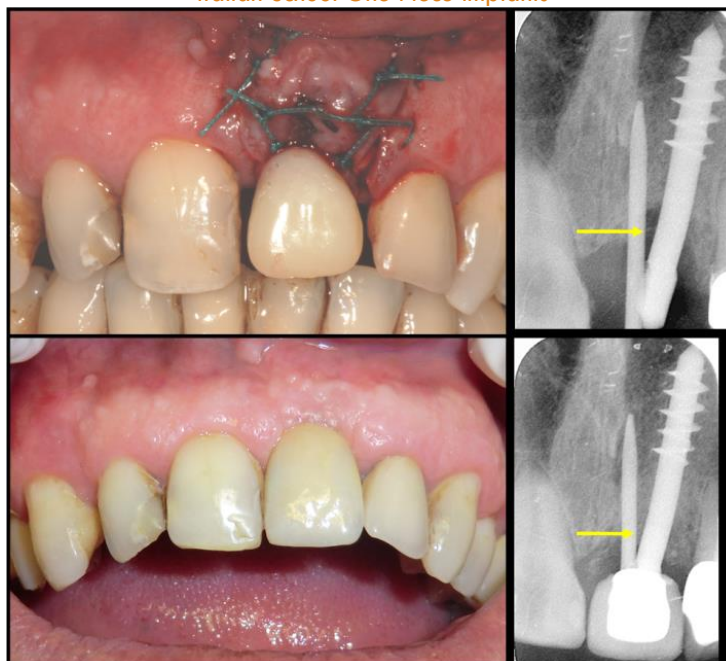


Fig. 5 In this case, given the severe vestibular bone loss, it was necessary to detach the flap to create a double papilla by suturing the mucosa in the center and thus have sufficient mucosa to cover the vestibular deficit and protect the filling biomaterials necessary for bone regeneration of the socket. Comparing the two x-rays, the first taken at the end of the surgery and the second with the final crown in place, we can see how the bone regeneration has been completed not only in the entire socket but also at the bifurcation level of the implants (yellow arrows); bifurcation that is located inside the alveolus, not inside the crown.

Discussion

Immediate loading is particularly indicated in cases of single-dentulism, when the aesthetic conditions require timely therapeutic intervention.

The photographic sequences, very didactic, make significant the use of one piece bicorticalized implants from the Italian School which, welded to a stabilization needle to form a single stump, constitute a prosthetic support of very high resistance. The welding of the two implants, as has been demonstrated, does not produce inflammatory alterations of the peri-implant tissues^{20,21}. This minimally invasive surgical technique allows for real and immediate loading to the benefit of the patient.

In the presence of anatomical situations with marked alveolar atrophy or particularly reduced bone thickness, when regenerative and/or appositional surgery cannot or does not want to be performed, the use of the method indicated above is particularly reliable and effective.^{22,23}

The minimally invasive surgical technique of one-piece implants with stabilization needle allows you to benefit from the aesthetic and functional advantages of temporary fixed prostheses already at the end of the operation, without damaging the process of reparative osteogenesis. The provisionals will be replaced by the definitive prosthesis after healing of the soft tissues and osseointegration.

However, it is necessary to operate not only in compliance with the protocols for inserting emerging one-piece implants, but also in compliance with gnathological rules. It is known that the front teeth, due to their natural inclination, develop transverse stresses in contact that are not coaxial with the major axis of the roots, unlike premolars and molars which produce forces that are dispersed along the major axis and are consequently better tolerate.

Both temporary and definitive prostheses on frontal implants, if they are not performed in compliance with static balance and dynamic occlusal balance, become particularly traumatic and can cause immediate loading failure with the consequent loss of the implant.²⁴⁻²⁶

Conclusions

The single replacement of the upper front teeth is the most classic of the implant prosthetic indications with stabilization needle and immediate loading.

With the evidence of the reported clinical results we have obtained long-lasting restorations, providing rapid aesthetic and functional restoration.

The stabilization of the one-piece implant with an electrowelded titanium needle during the surgical procedure guaranteed optimal primary stability and allowed immediate loading to be achieved, solving the aesthetic and functional problem with a single surgical procedure.

However, the prosthesis of single frontal implants requires adequate knowledge of occlusal physiology. The importance of correct occlusion is reflected in the duration of implant rehabilitation.^{27,28}

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Conflicts Of Interest

The authors of this manuscript declare that they have no conflicts of interest, real or perceived, financial or nonfinancial in this article.

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