Dental Implants and Surgical Instruments
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Società di Scienza Tramonte

Società di Scienza Tramonte (Tramonte Science Society) was born to disseminate the culture, the technique and the philosophy of the Italian School of immediate loading implantology: through scientific dialogue and comparison with other research institutes, associations, universities and implantologists; through study of solutions, material research, and refinement of treatment techniques; and by gathering the world’s most extensive documentation on clinical experience and immediate load Italian Implantology, from 1959 to the present day. Most of all, by training dentists seeking to specialize in immediate loading. Società di Scienza Tramonte offers courses of different levels to learn or refine the techniques of the Italian School of immediate load implantology.

Activities

Società di Scienza Tramonte deals with activities aimed at propagating and evolving immediate loading implantology’s culture, techniques and instruments according the Italian School. Its main activities are:

1. **SCIENTIFIC RESEARCH**
   about techniques, procedures and materials.

2. **IMMEDIATE LOADING IMPLANTOLOGY COURSES,**
   basic and advanced, for individuals and groups.

3. **CONSULTATIONS**
   in person and online, about clinical cases.

4. **PUBLICATIONS**
   The Society has extensive archives of immediate loading implantology documentation, from the 60s onwards: conventions, lectures, studies, articles, research and testing.

5. **IMPLANTS AND INSTRUMENTATION**
   Production and distribution of original Tramonte implants and surgical kits.
System description

The Tramonte implant is a self-tapping endosteal screw, and it is the forerunner and principal exponent of the Italian School of immediate loading implantology. This system enables immediate solutions for any totally and partially edentulous maxilla and mandible, thanks to the capacity of these implants to be loaded during the surgical procedure with a temporary prosthesis prepared beforehand, which remains in place for the time needed to achieve osteointegration. These implants are indicated for all types of prostheses, both fixed and removable.

Latest innovations

Six important innovations have been introduced with respect to the traditional version: 1. Rounded tip for better apical dispersion, and on a larger surface, of any electrical currents, and to decrease its aggression on areas to be respected. 2. Increased axial length of the tip, to allow for an easier and safer insertion into the previously prepared osteotomy. 3. Two different neck lengths to guarantee the best adaptation to the crest morphology. 4. Specific implants with ball attachment for removable upper and lower prostheses retention. 5. SLA surface treatment for all the implants in the catalogue. 6. Finally, the intraoral welder has become compulsory in the operating protocol of the Italian Implantology School.

Surgical technique

After administering local anesthetic, the pilot bur is advanced through the soft tissue in the desired location until contact with the crestal bone is achieved. Penetration of the cortical bone must be done at 800 RPMs. The speed must be reduced to 100 RPMs as the bur is further advanced to the desired depth (figures 1, 2). The pilot bur creates a pilot hole for subsequent burs to follow and avoids any sliding of the bur tip, should the ridge be too hard and smooth. It also produces a hole with the same diameter as the graduated length bur. When this first operation is completed, the proper graduated length bur is mounted on the handpiece. The graduated length bur is to be used to enlarge the surgical osteotomy by piercing the basal bone along the whole required depth at 100 RPMs (figures 3, 4). After withdrawing the graduated length bur from the osteotomy, the tap is mounted on the knob wrench, and its tip is inserted into the fresh osteotomy site and turned clockwise until resistance is felt in the bone. The knob wrench can be used to tap the osteotomy and to insert implants in the maxilla, because bone in this region is less compact. When the knob wrench has a good grip on the bone, it is replaced by the elbowed wrench, that allows the application of a greater force. In case there are teeth or implant heads that are too close to allow freedom of movement, the elbowed wrench must be fitted with its special extension.

The special T15 tap has a twofold purpose. First, it carves a female thread in the bone all around the osteotomy to facilitate implant placement, since the T12 implant is somewhat weaker under twisting stresses. Secondly, the tap finds easy access into the osteotomy because it has a conical shape, and it carves a conical female thread around the surgical socket with its base towards the cortical layer. The diameter of this base is 4 or 5 mm, the same as the last tap spire and the first one of the implant. When inserted, the implant finds in the cortical layer a 2 mm pilot hole and a 4 or 5 mm surrounding female thread, which greatly facilitates the engagement of its first spire.

Once the osteotomy has been thoroughly threaded, the tap is withdrawn by rotating it counterclockwise. Now the implant can be inserted until fully seated. Keep in mind that the implant axis, therefore the drilling direction, must correspond to the axis of the greater available bone length. It is important that the implants are placed in the most favourable way, even if the implant heads are not parallel as a result (figure 5).

When all implants have been placed, their heads can be bent using the elbowed key (figure 6), and parallelism can be perfected by using a carbide bur in a high-speed hand piece, trimming with a diamond bur and smoothing the results with another abrasive bur. When the implants are parallel, a 1.2 mm titanium bar must be welded to them for bracing purposes.
Warning

Implant success or failure may depend on several factors, but the main risks of these implants are:

1. Bone overheating during tapping, and even more during implant insertion. There are some safety maneuvers to be practiced, specific to the Tramonte implants. It is very important to be familiar with them.

2. Implant locking. A locked implant can be unlocked with the safety maneuvers.

3. Implant breaking. It is impossible to break an implant when following the Tramonte surgical protocol to the letter.

4. Bone tearing caused by excessive force in seating the implant. Surgical instruments are provided with a safety system, but in this case too it is essential to follow the protocol.

The surgical techniques necessary to insert a dental implant are very complex and require very specific training. These notes are just a brief summary of the method to be followed, and should not be seen as operating instructions under any circumstances. Specialistic training is essential for anyone wishing to approach this discipline. Various actions can lead to the loss of the inserted implants, and worse still, of the patient’s bone tissue. This product is intended for professional use by medical specialists or dental graduates. Its use by any other person is prohibited.

The “Vite Tramonte” (Tramonte screw) is a trademark of Società di Scienza Tramonte, under permission of Dr. Silvano Tramonte. These are dental implants based on fifty years of experience, are CE certified, and therefore comply with all European requirements. The CE mark indicates also that this product may be legally sold within the European Union and within the European Free Trade area. The world’s most advanced techniques make the Tramonte screw the ideal instrument for immediate loading.

The Cavaliere Laterale®, called “Snake Implant” by English speakers, is an advanced technique to treat atrophic mandibles with immediate loading.

Introduction

The greatest expression of the circulation of this implant technique was represented by the national and international congresses held by the historic GISI (Gruppo Italiano Studi Implantari, Italian Implant Study Group), founded and directed by Prof. Giordano Muratori. From 1970 to 1997, the GISI congresses saw the participation of the most distinguished experts, documented by their published conference proceedings.

The recent conversion of delayed-load implantology proponents to immediate loading has generated confusion in terms of concepts and definitions. The emerging implants used for immediate loading by the Swedish school, and identical to those employed for delayed loading, actually maintained the marked differences between the Swedish and Italian schools, since the immediate loading of the former is based on implants that are completely different from those employed by the latter.

These substantial differences require a separate classification of the two approaches and identification by the names of the two schools to which they refer: the Italian school, on the strength of over half a century of experience, and the Swedish one, which has yielded to clinical and scientific evidence only recently.

Despite its belated acknowledgement of immediate loading, the Swedish school managed to produce vast literature in a very short time, thanks to its comprehensive and widespread presence within academia. Such literature comprises studies on the II protocol (1-15), immediate loading with implants whose design features are still linked to delayed loading. Therefore, we feel it is essential to clarify the matter with a written protocol that can be used as a reference for the immediate loading and implant techniques of the Italian school. This chapter will thus attempt to remedy for this shortcoming by briefly outlining the principles and indications that constitute the Protocol and Guidelines of the immediate loading technique of the Italian school.

Definitions

Immediate loading is an incontrovertible physiological fact that occurs starting with embryonic development, which constantly applies forces and exerts functions on the skeletal apparatus (16).

Immediate loading induces two concomitant activities in the perimplant bone: functional activity and tissue cicatrization. The latter will evolve toward a reparative function (osteointegration) when there is an adequate load, or a defensive one (fibrointegration) in the presence of an inadequate load. Fibrointegration is one of the two phases of implant failure, the other one being mobility, culminating with implant loss. It is obvious that the basic principles and techniques pertaining to immediate loading are quite different and sometimes contrast with those employed for delayed loading, which envisions healing of the peri-implant tissue without any load. This partially explains why the surgical and prosthetic techniques can be perfectly outlined in a protocol in the case of submerged implants, while they can only partially be specified for emerging implants, whose range of applications is decidedly more complex, and subjects these implants to a wide range of situations that are unplanned and unpredictable in delayed-load implantology.

By definition, a protocol is a strict operating manual that should guarantee the success of the procedure, based on case selection and the exclusion of variables. This is what makes delayed loading and - to an even greater extent - immediate loading derived from the two-step implants, harder to manage.

Consequently, it is difficult to provide a suitable answer to the wide range of individual clinical situations. The exact opposite can be said of immediate loading with the implants and techniques devised by the Italian school.

Immediate loading according to the Italian school follows a protocol, wherever possible, and suggests the guidelines to preserve the full range of application options of these types of implants and this technique.

Therefore, a protocol is a set of standards that regulates the sequence, preparation and execution of serial procedures that can “predictably” lead to a certain result, it is a set of strict rules, dependent on each other, that – from
a mechanistic standpoint - influence a procedure, which should be adaptable to the different clinical situations and able to modulate a highly customized therapeutic answer. To eliminate the number of variables and keep all conditions under control, the procedure effectively becomes very selective, excluding from treatment a large number of patients. Conversely, a guideline is a “trail” to be followed wisely, one that is full of advice and suggestions. It influences but is not completely binding. In other words, it respects the patient's individuality and special needs, leaving the oral surgeon free to make the most of the situation while also ensuring indispensable scientific support and relevant results, and drawing on previous experience. Therefore, based on these considerations, we will identify three fundamental steps in immediate loading rehabilitation according to the Italian school: 1. First or preoperative phase: guidelines and protocol; 2. Second or surgical phase: guidelines and protocol; 3. Third or postoperative phase: guidelines and protocol.

**First or preoperative phase Guidelines**

During the preoperative phase we must obviously be sure to plan carefully, as we would do for any other implant surgery. The diagnosis will be based on the classic principles required to achieve both functional and cosmetic rehabilitation, where possible, while respecting at least the basic gnathological principle of a mutually protected occlusion (correct occlusal harmony as defined by Ugo Pasquini) (20). However, if we are planning a procedure with immediate loading, we will need more than this. There are absolute and relative contraindications to implant surgery in general and, as usual, they are equally important. In certain conditions the execution of immediate loading is more delicate and has a very high risk rate. Aside from all the diagnostic tests that are closely connected with the surgery (17-21), we also need additional data about our patient. We need to verify that the bone metabolism is that of healthy bone tissue with a physiologic turnover. For complete treatment of this topic, which goes beyond the scope of this chapter, readers can consult specific publications (22). Here we would merely like to point out that it is important to assess the normalcy of basic indicators such as: blood protein electrophoresis, transaminases, calcium, phosphatemia, urinary hydroxyproline, and for female patients in menopause, also BMD (bone mineral densitometry). Significant alterations in blood glucose, lipids, transaminases, calcium and phosphorus (both serum and urinary), phosphatase and hydroxyproline may indicate the presence of diseases that directly or indirectly affect the bone. These diseases do not fall within our area of competence, but we nevertheless recommend taking a cautious and careful attitude when planning implant surgery (23). If there are any pathologies, we can examine the data and refer the patient to a specialist, but nothing can be done when patients are unwilling to cooperate or are careless. Consequently, before placing immediate-load implants, it is advisable to examine their general attitude, psychology, and gender.

**Psychodiagnosis**

We can control, and sometimes intervene, by sending the patient to the appropriate medical specialist for one of the medical pathologies identified, but it is good to remember to keep a similarly cautious attitude regarding some psychological problems (character alterations, phobias, idiosyncrasies) that may be present in some patients. Psychological issues are by referring the patient to a specialist, but nothing can be done when patients are unwilling to cooperate or are careless. Consequently, before placing immediate-load implants, it is advisable to examine their general attitude, psychology, and gender.

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**Stress**

This is a very important factor, with no distinctions between men and women. In order to be evaluated carefully because it will unquestionably produce new parafunctions, repetitive behavior, microtraumas, increased sensitivity to pain and so on. Stress leads to hyperactivity of the fixures and consequent overloads. For these types of patients the prescription of mouthguards is a good rule of thumb, as is the short-term use of benzodiazepines (where needed).

**Histrionic personality**

This type of patient is naturally extroverted, essentially fond of social interaction and always at ease in such circumstances, and usually rather self-confident. Far from being an advantage, however, this actually poses a concealed and less manageable risk. In fact, these patients tend to feel “good” right after temporary prosthetic reconstructions, which will never fully dispel. They are also patients who conceal their troubles by referring them to the protocol will also help achieve this objective.

**Introverted personality**

This type of patient, unlike the preceding one, is pessimistic, reticent to relate, and easily depressed. These patients have a hard time understanding the appropriate use of their implants. They have many doubts that we will never fully dispel. They are also patients who conceal the truth. The fear of having ruined everything and the ensuing sense of guilt leads them to forget or deny certain facts. We should maintain a patient, respectful, blameless, sympathetic and attentive attitude. Our chief goal is to gain and maintain the trust of these patients, the trust they have probably never received from anyone and thus do not expect from their doctor either. It is, however, important to acknowledge their efforts in following instructions and show them a willingness to listen.
**Hypochondriac personality**

These patients are unwittingly against solving their problem. This opposition can be pathological, and it represents psychological discomfort or aggressive conflict. In their minds, they never find the right doctor or definitive treatment. The patient-physician relationship is usually doomed to fail because this is the only way that the patient is entitled to continue feeling sick and complain about the doctors who took care of him/her, then turning to yet other specialists. These patients represent a great diagnostic and therapeutic challenge, due to the problems the doctor must face in order to investigate the case and then the difficulty in identifying the “problem” to be solved. This is by no means a cooperative patient, despite his/her full (but only apparent) trust in the treatment.

There is nothing to gain by objecting with him/her and it is instead advisable to “share” his/her unshakable skepticism. In this type of patient, there can be phobic reactions to the implant after placement, bordering on rejection. Surgery must be planned with the utmost care, respecting of the timing of the patient, who should feel in control.

**Narcissistic personality**

These patients are not very reliable. They underestimate or do not properly evaluate the perception of minor irritation that should immediately urge them to consult the doctor. Their hypertrophic ego makes them feel overly self-confident, which often drives them to transgression; they refuse to recognize authority and tend to push things to the limit, looking for immediate satisfaction of their needs. For instance, a patient who has had to repeat medical procedures to perform two concomitant functions, i.e. chewing and osteointegration.

**Failure to understand the implications of the implant**

In this case, the patient fails to understand and/or remember that an immediately loaded implant is designed to perform two concomitant functions, i.e. chewing and osteointegration.

**Lack of proprioceptive sensitivity**

In completely edentulous patients this lack of sensitivity may lead to the exertion of excessive masticatory force (28).

**Parafuncitons**

Regardless of how they are caused or implemented, parafuncions represent the greatest danger during the first weeks after placement of immediately loaded implants. In edentulous patients the habits acquired with removable prostheses (parafuncions) remain, and this may cause overload. The forces applied on the implants will constantly lead to overload and this will always occur during lateral movements, since stress is almost never applied along the main axis of the fixture. In totally or partially edentulous patients, there is no way to avoid this. Consequently, prompt placement of a mouthguard is advisable (29).

**Planning protocol**

**Number of implants to be placed**

The number of implants to be placed depends on many factors and specific conditions, and as a general rule we should try to match the number of teeth to be replaced. If possible, all implants should be placed during the same surgical session (30-32).

**Implant size**

In order to implement immediate loading, it is advisable to choose (for equivalent cores) a fixture with a larger thread diameter, according to the density and thickness of the bone tissue, and to reach maximum depth, preferably deep bicorticalism, while respecting the anatomical structures that are considered to be at risk (mandibular canal, maxillary sinus), in order to maximize the ratio between the submersed and emerging structures. Any support implant, needles and/or mini-implants will be adapted to the existing bone morphology.

**Insertion axis**

The insertion axis should allow placement of the longest possible implant, respecting the ideal loading axis in the case of single-tooth implants or the resultant of the axes for bipods, tripods or multiple implantations. The lack of parallelism of the cores of endosseous implant fixtures permits greater stability under stress. Finally, the insertion axis should make it possible to achieve bicorticalism wherever possible.

**Surgical planning**

In general, it can be said that implant loading should be proportionate to the individual bone’s ability to withstand it. This necessarily implies a final assessment by the surgeon when he/she drills, taps the bone and inserts the implant. Consequently, this is the time to make final decisions regarding the size and morphology of the implant. Each implant must ensure maximum support of the site chosen for its placement. To accomplish this, several things must be done.

1) Choose implants that can best exploit the dimensional and morphological characteristics of the bone: screws that can ensure the broadest possible contact surface and maximum mechanical interpenetration with the bone, with wide threads and a large screw pitch for cancellous bone, and a narrower screw pitch for compact bone; bicortical screws to add support for the internal cortical bones, wherever possible; needles for cortical support even when dealing with very thin bone or for bipods or tripods joined together or connected to screws; blades to achieve maximum support for lateral loads in very narrow bone. To achieve this and all the following points, the implants should be adapted to the various bone morphologies, and should be parallelized by bending and/or drilling at the emerging site right after their insertion.

2) Crestal, basal, buccal, palatal or lingual bicorticalism (the maximum possible cortical support) must be implemented. When this is not feasible and support relies entirely on the thread, the implant should have wide threads and a large screw pitch that is inversely proportional to the type of bone: the lower the bone density, the greater the width and pitch of the screw.

3) Placement should coincide with the bone’s long axis, even if this means resorting to a fixture angled with respect to the ideal axis of the emerging post.

4) Divergent implants, both in the mesiodistal and bucoppelatal or buccolinguall direction, must be inserted in order to broaden the support base and thus achieve greater primary stability. It is important that the axes be divergent, counteracting each other, and that the resultant be as close as possible to the ideal loading axis.

5) Bipods and tripods, implant structures consisting of two or three implants, must be made with endosseous portions that diverge but are joined together at their emergence from the bone. This can be done by means of multiple implantations in the same site or close unparallel insertions, using various types of implants. The more difficult the case, the more useful and advisable the use of endosseous tripods.

**Second or surgical phase**

**Guidelines**

During the second phase, i.e. surgery, the most important objective is to achieve the best possible primary stability. This is done through extremely careful placements that are as atraumatic as possible, while trying to perform gradual drilling, without overheating the bone and with a very delicate insertion. Implant progression should be performed very carefully, without subjecting the bone tissue to excessive stress. The purpose of each placement is to achieve internal cortical support (bicorticalism) that can guarantee the best immediate primary stability. This represents a crucial moment because as soon as the inner cortical bone is reached, we must immediately halt progression to avoid applying extractive forces (“corkscrew” effect) on the medullary bone in contact with the coronal surfaces of the threads, as this will produce severe damage, causing vascular injury and subsequent ischemic necrosis of the bone in between. Only the surgeon’s experience and sensitivity can tell him/her when to halt. Therefore, the procedure requires the utmost attention and caution, resisting the temptation of trying to attain greater stability. Exceeding the limit during the coupling between the tip of implant and the cortical surface will inevitably lead to lesions and fractures between the bone contained in the thread and the portion that lies outside it. In the case of single-tooth implants, the protocol recommends stabilization by means of a second implant welded to the first one. The additional implant can be normal in size if there is enough space (molars), or it can be a needle implant or a screw with variable diameters if there is less space available (premolars and incisors) (Fig. 3).
Protocol

Welded bar

Let’s assume that surgery ends with welding of the supporting bar. This is a technique recommended to achieve immediate loading in the safest possible way: immediate splinting (30-34). It is done with a circular and/or rectangular section bar of Grade 2 titanium, with a diameter ranging from 1 to 1.5 mm, placed palatally or lingually with respect to the fixtures, laid above the mucosa without compression, and welded to each implant by means of the intraoral welder. This creates extremely stable, strong and reliable implant splinting. In the case of isolated implants, atraumatic splinting can be obtained using a provisional crown with retention wings fixed to the adjacent natural teeth, as long as they are stable.

An isolated implant stabilized by a diverging needle is much more reliable and predictable, so the technique that exploits a natural supporting structure should be employed only in those cases where the placement of a diverging needle is not feasible.

The use of the intraoral welder is indispensable. This need is acknowledged by the protocol, as its function is to ensure that the implants’ micromovements fall within an acceptable range and do not jeopardize the final osteointegration. Intraoral welding, when used by experienced implantologists, offers the following advantages:

1) It allows implant splinting at the end of the surgical session, and independently of the placement of a temporary prosthesis; this means that any decomposition or fracture of the temporary prosthesis will not affect the implants, which will still be protected by the stable primary splinting;

2) It creates reliable implant stabilization during the osteoclastic phase, which is the most dangerous moment for stability due to “grip” loss of the implant surfaces by the bone;

3) It dissipates and distributes the loads more effectively across the abutments, as well as any possible overload, even when the professional is able to provide the temporary prosthesis with an occlusion free of premature contacts (not always achievable), the patient’s movements cannot be controlled and this can lead to unwise or simply unconscious activities;

4) It is the only technique that permits bipods, tripods and unparallel insertions in the same area, and to obtain a single abutment by welding together the heads of individual implants;

5) It makes it possible to attain structures with axial compensation;

6) It can be removed before placement of the final prosthesis or be left in place, depending on the postoperative conditions and the degree of osteointegration. The welded bar should be kept in place for no less than 8 weeks, and ideally for 12.

Before proceeding with preparation of the final prosthesis, the bar should be removed to ensure proper evaluation of all implant abutments, but due also to the frequent need to adapt it to the final morphology of the soft tissues or the different requirements of the permanent prosthesis.

Final assessment of osteointegration is crucial: implants must exhibit optimal stability before placement of the permanent prosthesis. Even for implantologists with extensive experience, evaluation of strongly splinted implants, especially when positioned close to each other, is sometimes difficult and is directly proportional to the diameter of the bar employed.

Removal of the bar is thus a fundamental step for correctly diagnosing possible flaws in the osteointegration process of every single implant. Indeed, because of the visual obstacle represented by the bar itself, such flaws would remain hidden but still dangerously active.

In advanced implant surgery on patients whose bone conditions do not make removal advisable, the bar can be maintained or repositioned based on vertical dimensional modifications of the peri-implant mucosa.

After the welded bar has been removed, the state of osteointegration of immediately loaded implants will make them fully comparable to any other type of implant. In short, the bar no longer serves any purpose, as it has been well replaced by bone apposition around the implants. Keeping the bar in place when this is not absolutely necessary can lead to a less cosmetic prosthesis and reduced control over oral hygiene.

Keeping the bar in place offers the following advantages:

1) Protection of the peri-implant tissue: clearly, the presence of the bar allows a more efficient distribution and dissipation of loads, protecting the mucosa and peri-implant bone and reducing the risk of resorption (34); 2) preservation of the structure: isolated implants may be subject to several negative conditions (partial decementation and/or fracture of the prosthesis, occlusal or continuous trauma, parafunctions, etc.) that a perfectly splinted structure can withstand better; 3) an increased number of treatable cases: keeping the bar permits treatment of extremely difficult conditions caused by the volumetric or densitometric scarcity of the available bone.

The disadvantages of keeping the bar in place are:

1) Cosmetic problems, as morphological conditions do not always permit perfect or total concealment of the bar;

2) An unnatural sensation due to the internal position of the bar (lingual or palatal); particularly sensitive patients sometimes find it difficult to accept an unnatural presence that “forces” the tip of the tongue to a constant contact, with effects that can be unpleasant at times;

3) Hygienic problems, as perfect cleaning of the interdental spaces is not always possible;

4) Prosthetic problems, which arise not only from the complex morphology at the junction between the bar and the abutment, but also the significant height reduction due to the presence of the bar, causing retention or cementation problems;

5) A clinical visual obstacle, i.e. the presence of the bar makes it very difficult to observe any pathological peri-implant event, delaying diagnosis because it greatly diminishes signs and symptoms.

The presence of the bar in the patient’s mouth forever masks the complex morphology at the junction between the bar and the abutment, but also the significant height reduction due to the presence of the bar, causing retention or cementation problems;

6) It can be removed before placement of the final prosthesis or can be left in place, depending on the position of the available bone.

Third or postoperative phase

Protocol

The third or postoperative phase has several steps.

Place ment of the temporary prosthesis

An acrylic temporary prosthesis will be placed immediately in the same surgical session, establishing a correct vertical dimension and, more importantly, correct occlusion. The temporary prosthesis must be prepared in advance, placed, relined intraorally and properly cemented. The use of a reinforced temporary prosthesis is advisable to ensure optimum function for a period of no less than 2-3 months (23, 30).

The temporary prosthesis should respect occlusal principles, providing a balanced occlusion both at the centric relation position and during lateral movements. Sometimes a provisional crown with palatal or lingual retention wings, or with an interproximal-distal concavity can be used to support stabilization even further, exploiting the adjacent stable teeth in cases of isolated implants.

Application of immediate loading through immediate temporary prosthesis

Balanced load application allows faster and better osteointegration. To make a temporary prosthesis with the specific characteristics needed for immediate loading, the following principles should be respected.

Assessment of the applicable load: physiologic or reduced

The load should be proportional to the surface and support area of the implant, and to the overall bone quality. Therefore, we can distinguish the load as physiological when there is good bone quality, and reduced in all other cases. The load will be adjusted according to:

1) Reduction of the occlusal surface by reducing transverse diameters;

2) Underocclusion of the crown by reducing occlusal contacts;

3) Flat plane occlusion by eliminating occlusal contacts;

4) Progressive loading, starting from a very reduced occlusion and proceeding by progressive increases until correct occlusion has been attained.

Lateral stress control

With reference to lateral stress, we must clarify that in a theoretical stomatognathic model, lateral loads are nonexistent with the exception of the canine, which is the only tooth physiologically designed to withstand lateral forces (20). A gnatologically correct prosthesis based on this model does not have lateral loads. In a real patient showing parafunctions and automatics (bruxism, etc.), with intermaxillary relationships that are completely subverted by vertical and centripetal resorption, the application of lateral forces with significant angles with respect to the implant and the ideal loading axes is almost inevitable. Lateral load is always the most dangerous type of stress when applied to needle or screw implants, especially those with a small core, as this can lead to implant fracture (23) or mobility. We thus recommend careful evaluation...
of implant position with respect to mobile anatomical structures such as the tongue (19, 20, 36), cheeks and muscle insertions. The size of the tongue should also be taken in due consideration. The morphology, position and inclination of the antagonist teeth must also be assessed. Control can be achieved by means of:
1) correct canine disclusion, with a more pronounced slope if necessary, and possible reduction of the cusps of diatomic teeth, down to zero;
2) reduction of the buccolingual and buccopalatal surfaces;
3) reduction of the mesiodistal surface.

Follow-up

The occlusal check is performed with traditional means: articulating paper and specific detector solutions (Red Indicator) (37). The former is very practical, whereas the latter are more complex to use but very precise. Alternately, the occlusal check can be performed with the aid of more sophisticated electronic tools (23) such as electrondiagnosers, etc. The percussion sound test should be performed with the temporary prosthesis in place, which should be removed in case of doubt for direct examination of the implants. An implant emitting a non-metallic sound should be checked for mobility (possibly by cutting the welded bar). At this stage, X-rays are not decisive, since radiographic signs are visible only later.

Guidelines

Solutions to possible problems

Assessing the implant’s mobility is very difficult when the fixture is welded to the titanium bar. The percussion test remains the most reliable examination. When the implant, tapped at the top and along its main axis, produces a non-metallic sound, its stability should be assessed again upon removal of the welded element.

If the implant shows mobility, it should be removed and immediately replaced with another one with a larger diameter, or removed and replaced 30 days later with another one with the same diameter, in both cases after careful surgical curettage. The bar is then repositioned and welded to the implant. If the mobile implant is isolated, it should be removed nevertheless and replaced with another one with a larger diameter, and then immediately stabilized by a supporting needle. In the case of isolated implants, this type of double placement should be planned beforehand in order to avoid unscrewing, a common phenomenon observed with single immediate-load implants. Lateral forces can unscrew the implant during the peak of the osteoclastic phase (approximately around week 4-5), when the primary fixation becomes weaker (due to a decrease in bone compression). Isolated implants placed in the lower left and upper right areas are more readily subject to unscrewing during the postoperative osteoclastic phase, due to the action of the tongue, which pushes forward vigorously and applies a torque vector to the lingualpalatal surfaces of temporary crowns. A needle welded to the single screw counteracts rotation, thus preventing unscrewing. The Italian school is still the only one that since 1978 has availed itself of an extraordinary tool that can ensure reliable and predictable functionalization by splinting: Mondani’s intraoral welder (45).

Currently, the protocol that entails the exclusion of function is still considered the most advisable due to its predictability, since it is believed to provide greater protection of the primary stability during the crucial postoperative phase. Nevertheless, we should also note that the studies conducted to date have not investigated immediate loading with specific implants based on the principles of the Italian school (Apolloni, Bellavia, Bianchi, Garbaccio, Hruska, Lo Bello, Marini, Mondani, Mutaroli, Pasqualini, Pierazzini, Tramonti) and of prominent institutions such as the GISI, and ASI (Accademia Italiana di Stomatologia Implantotecnica) (46). Moreover, the principles of delayed loading, considered “dogma” for far too long, have been applied to immediate loading only recently, but absurdly applying techniques pertaining strictly to delayed loading. The apparent scientific bias of protocols in favour of delayed loading does not justify disregard for the existing techniques tested by the Italian school’s immediate loading. In reality, the importance of using implants with large threads and cortical support has never been fully recognized (47, 48), let alone the use of the intraoral welder. Schnitman (49) in 1990 and Wohrley (50) in 1992 had already demonstrated that osteointegration can be achieved and maintained with immediate loading. In 2002 Bertoli et al. (51) showed that Italian implants with wide threads and reduced emergent portions are more effective for immediate loading that those with narrow threads and a prosthesis connection. In 1999 Bianchi (18) employed immediate loading with temporary immediate splinting (with the support bar welded intraorally and parallel subsequent permanent prossthesis upon removal of the bar) for a very interesting case of immediate loading versus delayed load (see Chapter 11, pp. 154, 155).

Recent studies have acknowledged the effectiveness of intraoral welding for two-step implants as well (52-56). Histological Research has demonstrated the ability of implants with wide threads and narrow emergent portions to form an adequate epithelial seal (57), the indispensable prerequisite for optimal bone healing and subsequent osteointegration (18).

The choice of immediate loading is justified by virtue of an indisputable advantage in achieving more specific organization of the peri-implant bone, not only with respect to the bone/implant interface, but also as the expression of a morphostructural adaptation of the entire bone area affected by the propagation of functional stimuli (58-63). The regenerative phase of the surgical wound, after implant inclusion and with replacement of the hemostasia by the fibrocellular blastema, has significant potential from a qualitative and quantitative standpoint, due to the ability of the connective elements to differentiate into the distinctive cellular phenotypes of the support tissues. The local metabolic status, already enhanced by the induction of growth factors, can be further increased by the direct action of the mechanical loads, which also participate in the phenotypical expression of the undifferentiated connective tissue. As far back as 1995, Salama et al. (64) forecast the evolution of the implant protocol, from load-free healing to a protocol that emphasizes and ensures healing with loaded implants, albeit without overloading and preserving primary stability. Stability is obtained with an immediate loading protocol that can yield fully predictable outcomes, due to splinting of the implants to a titanium bar by intraoral welding. Immediate loading offers the great advantage of reducing rehabilitation time by enhancing the bone’s regenerative response according to the theory of the causal histogenesis of bone tissue (47, 65), not merely with the aim of bone healing, but also by influencing its formation and orientation, in keeping with the trajectory patterns suitable for the dissipation of force along the most appropriate directrices. The studies of Salama (64) (1995), Schnitman (49) (1997) and Tarnow (66) (1997) show that a prosthesis that can ensure the stability and immobility of the implants can produce a stable and predictable long-term bone/implant relationship.

Physiological and biodynamic principles of immediate loading

An immediately loaded implant is housed within a bone in a very active phase: reparative osteogenesis. The successful process leads to osteointegration, while its failure causes a defense reaction against the exogenous adverse solicitations: the attempt to expel the implant (early mobilization) or encapsulate it (fibrointegration). This means that, unlike delayed loading, immediate loading requires rapid action and prompt troubleshooting. It is imperative to act and solve any problem when the intervention can still be considered minimal and no significant bone loss has occurred yet. Above all, immediate loading requires a thorough understanding of the phenomenon and its biomechanical principles, and thus it means learning how to manage it. This is the exact opposite of delayed loading, which involves simply waiting for the bone reparative process to take place.

Immediate loading induces and enhances all the mechanisms involved in tissue healing by means of direct action on the restorative cellular capacity, increasing it (38) through the functional activation of homeostatic mechanisms, on the basis of the stimulus-response principle (39, 40). During the first 20–40 days after surgery, absolute immobility of the implant is crucial in order to prevent degeneration of the newly formed osteoid toward fibrous tissue (41). This fixation can be obtained through two antithetical protocols: exclusion of the function according to the Swedish school, or functionalization by splinting (42, 43) according to the Italian school, which ensures rigid stability and thus complete immobility of the implants through constant and perfect splinting of each implant (30, 32, 34, 44).
References


35. PASQUALINI M.E. Le fratture da fatica dei metalli da


42. LEDERMANN P. Kompendium des TPS-Schraubenimplantates im zahnlosen Unterkiefer. Berlin (Germany): Quintessence;1996.


Fig. 2 Courtesy of Franco Rossi.
Implants and instruments.

The “Tramonte Screw” is a trademark of Società di Scienza Tramonte under permission of doctor Silvano U. Tramonte. This implant is backed by over 50 years of experience, and it is approved by the European CE surgical register.

The most advanced surgical techniques in the world have made the “Tramonte Screw” ideal for immediate load.

**ENDOSTEAL SELF-TAPPING SCREWS**

The assortment of diameters and shapes guarantees to the expert implantologist the possibility of treating every bone configuration without resorting to regenerative (bone graft) operations.

<table>
<thead>
<tr>
<th>MATERIAL</th>
<th>Titanium grade 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>AVAILABLE DIAMETERS</td>
<td>2.5 - 3 - 4 - 5.5 - 6</td>
</tr>
<tr>
<td>AVAILABLE SHAPES</td>
<td>Cylindrical</td>
</tr>
<tr>
<td>AVAILABLE ABUTMENTS</td>
<td>mm 2x2 and 3x3</td>
</tr>
<tr>
<td>EMERGENCE</td>
<td>ø 1.85 - 2.00 - 2.25 / Length mm 3 and 5</td>
</tr>
<tr>
<td>SURFACE</td>
<td>Machined and polished coronally, SLA apically</td>
</tr>
</tbody>
</table>

**Reduced cylindrical screws**

This screw is suitable in extreme situations and requires greatly experienced operators. The square 2x2 abutment is well suited for remarkably esthetic results in the lower incisor area.

**Reduced cylindrical screws**

This screw is suitable in extreme situations and requires great experience. The Insertion must be done by appropriate screwdriver for speed-reducing contra-angle. Finger and elbowed key are available. The abutment base has to just touch the mucosa.

### DIAmeter 2.5

<table>
<thead>
<tr>
<th>SIZES AND CHARACTERISTICS</th>
<th>square abutment 2x2 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>THREAD MAJOR DIAMETER</td>
<td>2.5 mm</td>
</tr>
<tr>
<td>CORE DIAMETER</td>
<td>1.85 mm</td>
</tr>
</tbody>
</table>

**SURGICAL TECHNIQUE NOTES**

This screw is suitable in extreme situations and requires great experience. The Insertion must be done by appropriate screwdriver for speed-reducing contra-angle. Finger and elbowed key are available. The abutment base has to just touch the mucosa.

### DIAmeter 3

<table>
<thead>
<tr>
<th>SIZES AND CHARACTERISTICS</th>
<th>square abutment 2x2 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>THREADS MAJOR DIAMETER</td>
<td>3 mm</td>
</tr>
<tr>
<td>CORE DIAMETER</td>
<td>2 mm</td>
</tr>
</tbody>
</table>

**SURGICAL TECHNIQUE NOTES**

Whilst similar to the previous example this screw is however easier to insert. These screws are suitable in the inferior incisor zone where a good aesthetic result is obtained because of the narrow sizes. As regards to 2.5 mm, this screw is easier to insert because of the major core size. The abutment base has to just touch the mucosa.
**Normal cylindrical screws**

The standard implant is 4mm and 5mm in diameter and 3/4/5 threads in length. This is because the development of its surface is suitable for the average morphology of the trabecular part of the bone both in upper and lower bone. The 6 thread screw is seen as special implants and should only be used by expert implantologists.

<table>
<thead>
<tr>
<th>DIAMETER</th>
<th>SIZES AND CHARACTERISTICS</th>
<th>SQUARE ABUTMENT 3X3 MM</th>
<th>THREAD MAJOR DIAMETER</th>
<th>CORE DIAMETER</th>
<th>NECK LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>CNS405B03</td>
<td>13.75 mm</td>
<td>4 mm</td>
<td>2.25 mm</td>
<td>5 mm</td>
</tr>
<tr>
<td></td>
<td>CNS405B04</td>
<td>16 mm</td>
<td>4 threads</td>
<td>2.25 mm</td>
<td>3 mm</td>
</tr>
<tr>
<td></td>
<td>CNS405B05</td>
<td>18.25 mm</td>
<td>5 threads</td>
<td>2.25 mm</td>
<td>3 mm</td>
</tr>
<tr>
<td></td>
<td>CNS405B06</td>
<td>20.50 mm</td>
<td>6 threads</td>
<td>2.25 mm</td>
<td>3 mm</td>
</tr>
</tbody>
</table>

**SURGICAL TECHNIQUE NOTES**

It is the easiest implant to insert because of its favorable sizes. It is always better to use the tap. Always begin with the finger key. The abutment base has to just touch the mucosa.

In the 3, 4, 5 and 6 threads lengths this is the standard implant, as the development of its surface is adequate for the average morphology of the trabecular part of the upper and lower alveolar processes. The 6 thread screw is to be considered special and is advised to experienced operators.

<table>
<thead>
<tr>
<th>DIAMETER</th>
<th>SIZES AND CHARACTERISTICS</th>
<th>SQUARE ABUTMENT 3X3 MM</th>
<th>THREAD MAJOR DIAMETER</th>
<th>CORE DIAMETER</th>
<th>NECK LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>CNS403B03</td>
<td>13.75 mm</td>
<td>4 mm</td>
<td>2.25 mm</td>
<td>3 mm</td>
</tr>
<tr>
<td></td>
<td>CNS403B04</td>
<td>16 mm</td>
<td>4 threads</td>
<td>2.25 mm</td>
<td>3 mm</td>
</tr>
<tr>
<td></td>
<td>CNS403B05</td>
<td>18.25 mm</td>
<td>5 threads</td>
<td>2.25 mm</td>
<td>3 mm</td>
</tr>
<tr>
<td></td>
<td>CNS403B06</td>
<td>20.50 mm</td>
<td>6 threads</td>
<td>2.25 mm</td>
<td>3 mm</td>
</tr>
</tbody>
</table>

**SURGICAL TECHNIQUE NOTES**

The same is applicable for diameter 4, but the major thread share can overheat the bone or block the implant. In the first case shower the implant share still not inserted with abundant cold water, in the second case carry out the safety movement at the first sign of hardening. The special screws of 6 threads are particularly exposed to these risks. The screw of two threads requires a particularly prosthetic skill because of the minimum implant area. The abutment base has to just touch the mucosa.

**Short neck screws**

To be used as replacements of the normal cylindrical screws in case of reduced gingival thickness.

<table>
<thead>
<tr>
<th>DIAMETER</th>
<th>THREADS MAJOR DIAMETER</th>
<th>CORE DIAMETER</th>
<th>NECK LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>square abutment 3x3 mm</td>
<td>4 mm</td>
<td>3 mm</td>
</tr>
<tr>
<td>5</td>
<td>square abutment 3x3 mm</td>
<td>5 mm</td>
<td>3 mm</td>
</tr>
</tbody>
</table>

**SURGICAL TECHNIQUE NOTES**

It is the easiest implant to insert because of its favorable sizes. Is always better to use the tap. Always begin with the finger key. The abutment base has to just touch the mucosa.

**SURGICAL TECHNIQUE NOTES**

The same is applicable for diameter 4, but the major thread share can overheat the bone or block the implant. In the first case shower the implant share still not inserted with abundant cold water, in the second case carry out the safety movement at the first sign of hardening. The special screws of 6 threads are particularly exposed to these risks. The screw of two threads requires a particularly prosthetic skill because of the minimum implant area. The abutment base has to just touch the mucosa.
Oversized cylindrical screws

These implants are suitable for post-extractive placements.

**SIZES AND CHARACTERISTICS**

- **DIAMETER**: 5.5
- **THREAD MAJOR DIAMETER**: 5.5 mm
- **CORE DIAMETER**: 3.1 mm
- **SIZES**: CMS555B03 (13.75 mm, 3 threads), CMS555B04 (16 mm, 4 threads), CMS555B05 (18.25 mm, 5 threads)

**SURGICAL TECHNIQUE NOTES**

Always use the diameter 5 tap. The abutment base has to just touch the mucosa.

**SIZES AND CHARACTERISTICS**

- **DIAMETER**: 6
- **THREAD MAJOR DIAMETER**: 6 mm
- **CORE DIAMETER**: 3.5 mm
- **SIZES**: CMS605B03 (13.75 mm, 3 threads), CMS605B04 (16 mm, 4 threads), CMS605B05 (18.25 mm, 5 threads)

**SURGICAL TECHNIQUE NOTES**

Always use the diameter 5 tap. When replacing a mobile smaller diameter, ascertain that the cortical hole will accommodate the 3.5 mm core. The abutment base has to just touch the mucosa.

**TAPS**

Longitudinal cuts allow for a better cutting capacity.

**MATERIAL**: Titanium grade 5

**AVAILABLE DIAMETERS**: 4 - 5

**AVAILABLE SHAPE**: Conical

**DIAMETER**: 4

- **THREAD MAJOR DIAMETER**: 4 mm in its cylindrical share
- **CORE DIAMETER**: 2.25 mm
- **SIZES**: MSC040B03 (13.75 mm, 3 threads), MSC040B04 (16 mm, 4 threads), MSC040B05 (18.25 mm, 5 threads), MSC040B06 (20.50 mm, 6 threads)

**SURGICAL TECHNIQUE NOTES**

Be careful not to overheat the bone during the tapering. In case of compact bone, always use the safety maneuver. These taps can be used to insert the implant of diameter 4.0 mm. The abutment base has to just touch the mucosa.

**DIAMETER**: 5

- **THREAD MAJOR DIAMETER**: 5 mm in its cylindrical share
- **CORE DIAMETER**: 2.25 mm
- **SIZES**: MSC050B03 (13.75 mm, 3 threads), MSC050B04 (16 mm, 4 threads), MSC050B05 (18.25 mm, 5 threads), MSC050B06 (20.50 mm, 6 threads)

**SURGICAL TECHNIQUE NOTES**

Be careful not to overheat the bone during the tapering. In case of compact bone, always use the safety maneuver. These taps can also be used to insert an implant of diameter 5 - 5.5 and 6 mm. The abutment base has to just touch the mucosa.
### Lance-shaped burs

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Diameter</th>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>WIDIA and AISI 440C</td>
<td>2.25 mm</td>
<td>FRL022Z01</td>
<td>Prepares the initial osteotomy</td>
</tr>
<tr>
<td></td>
<td>2.25 mm</td>
<td>FRL022Z02</td>
<td>Calibrated: used to prepare a calibrated osteotomy for each available implant. Their sizes have been studied to guarantee maximum safety.</td>
</tr>
</tbody>
</table>

### Calibrated burs 1.85

For Reduced Cylindrical Screw of Diameter 2.5 mm

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Diameter</th>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRC025A06</td>
<td>1.85 mm</td>
<td>FRC025A06</td>
<td>28.50 mm</td>
</tr>
<tr>
<td>FRC025A10</td>
<td>1.85 mm</td>
<td>FRC025A10</td>
<td>34.50 mm</td>
</tr>
</tbody>
</table>

### Calibrated burs 2.00

For Reduced Cylindrical Screw of Diameter 3 mm

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Diameter</th>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRC030A06</td>
<td>2.00 mm</td>
<td>FRC030A06</td>
<td>28.50 mm</td>
</tr>
<tr>
<td>FRC030A10</td>
<td>2.00 mm</td>
<td>FRC030A10</td>
<td>34.50 mm</td>
</tr>
</tbody>
</table>

### Calibrated burs 2.25

For Implants of Diameter 4 and 5 mm and Short Neck Implants

<table>
<thead>
<tr>
<th>Material Type</th>
<th>Diameter</th>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FRC040B03</td>
<td>2.25 mm</td>
<td>FRC040B03</td>
<td>27.25 mm for implants diameter 45 mm and short necks in the same lengths 3 threads</td>
</tr>
<tr>
<td>FRC040B04</td>
<td>2.25 mm</td>
<td>FRC040B04</td>
<td>29.50 mm for implants diameter 45 mm and short necks in the same lengths 4 threads</td>
</tr>
<tr>
<td>FRC040B05</td>
<td>2.25 mm</td>
<td>FRC040B05</td>
<td>31.75 mm for implants diameter 45 mm and short necks in the same lengths 5 threads</td>
</tr>
<tr>
<td>FRC040B06</td>
<td>2.25 mm</td>
<td>FRC040B06</td>
<td>34.00 mm for implants diameter 45 mm and short necks in the same lengths 6 threads</td>
</tr>
</tbody>
</table>

### Finger wrench

**Material**
- Titanium degree 5

**Sizes and Characteristics**
- Available in two sizes

**Surgical Technique Notes**
- Maintain the tap or implant axis on the calibrated hole axis.

### Knob wrench

**Material**
- Titanium degree 5

**Sizes and Characteristics**
- Available in two sizes

**Surgical Technique Notes**
- Allows the continuation of the engagement of the tap and of the implant in the calibrated hole permitting the use of greater force on the finger wrench but retaining considerable sensitivity.

### Elbowed wrench

**Material**
- Titanium degree 5

**Sizes and Characteristics**
- Available in two sizes

**Surgical Technique Notes**
- Make sure the force exercised is maintained during the coaxial screwing in the calibrated hole. This wrench permits the evaluation of the force developed and, if necessary, use of the safety maneuver. It also enables parallelisation of the abutments.
**Extension for elbowed wrench**

**MATERIAL**
Titanium grade 5, AISI420F

**SIZES AND CHARACTERISTICS**
Available in two sizes

**PCP000A01**
for square 2x2 mm

**PCP000B02**
for square 3x3 mm

Allows to position the wrench in the abutment in the case of natural or artificial pillars being too close, as in the case of an isolated implant where the remaining interdental space would not permit the use of the elbowed wrench.

**Screw-driver for speed-reducing contra angle**

**MATERIAL**
Titanium grade 5

**SIZES AND CHARACTERISTICS**
For square 2x2 mm abutment

**AMR000A01**
with junction for contra-angle

**SURGICAL TECHNIQUE NOTES**
Allows the screwing down of the reduced screw by contra-angle. Should be used only by expert operators. Always finish by inserting the implant with elbowed wrench.

**Extension for calibrated burs**

**MATERIAL**
Titanium grade 5

**SIZES AND CHARACTERISTICS**
The bur receptacle is 12.5 mm, standard for all the contra-angles

**PFC000Z01**

Allows drilling when the contra-angle head can not arrive at the mucosa

**SURGICAL TECHNIQUE NOTES**
Being a extension of remarkable sizes it accentuates the errors of the insertion angle. Keep a careful control of this measure in connection with medium zones distal and buccal-palatal. The drilling is correct when the extension just arrives at the mucosa.

**Long wrench**

**MATERIAL**
Titanium grade 5, 420F

**Ratchet wrench**

**MATERIAL**
Titanium grade 5

**SURGICAL TECHNIQUE NOTES**
The ratchet wrench has been designed to insert only the tap. It can not be used to insert the implant: this could have serious consequences. It must be used only for the first insertion of the tap in the cortical bone. After that it is better to continue the insertion with the elbowed wrench. Furthermore the ratchet key does not allow the safety maneuver, and the speed it permits can overheat the bone. It can only unscrew the implant.

**Guide for ratchet wrench**

**MATERIAL**
Steel

**SURGICAL TECHNIQUE NOTES**
Its use allows the development of all the force of the ratchet wrench keeping centered on the axis of the calibrated hole. The correct use of this tool permits the insertion and tapping, even in the most unfavourable conditions.

**Compass for ratchet wrench**

**MATERIAL**
Steel

**SURGICAL TECHNIQUE NOTES**
Round end for ratchet wrench and hollow end 3x3mm for related abutment.

**Guide for ratchet wrench**

**MATERIAL**
Titanium grade 5

**SURGICAL TECHNIQUE NOTES**
Allows the joining of the ratchet wrench and the tap abutment.

**Exploded view**

Guide with the pilot hole for the ratchet wrench, ratchet wrench compass, for ratchet wrench and tap in assembly position.
COMPLETE SURGICAL KIT
The intraoral welder has been used successfully for the past 40 years by dental professionals, and it is now welcomed in university environments.

The intraoral welder is produced and marketed in compliance with current regulations. It is an instrument capable of splinting implants directly in the patient’s mouth, by sending a strong and short electrical impulse between two pieces of titanium. The impulse duration is so short (a few milliseconds) that the surrounding tissues are not heated.

This is the more powerful 300 joule version, with power cable connection adaptable to any different outlet in the world.

The 240 V version can be used on 110 V networks by connecting to a transformer.

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