A STUDY ABOUT 5700 IMPLANTS INSERTED DURING 18 YEARS IN 2500 INTERVENTIONS

CLINICAL RESULTS IN DIFFERENT ANATOMICAL AND FUNCTIONAL SITUATIONS

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Introduction

A study concerning 5700 implants of various shapes inserted during 2500 interventions in 800 patients is useful to understand which can be success expectations in different anatomic areas related with prosthetic function. Such a study permits to understand that there are situations in which the best choice, which fits to the case, can sometimes be located between the implant's techniques which are experienced and published just in some countries. As a matter of fact, there are some countries in which, less known, but useful implant techniques have been developed and checked about their success security. Some other techniques, which are no more in use in many countries, have been deepened and refined in other countries, correcting the problems which had lead to their abandonment. Many studies, apart of whose are still not known far and wide, demonstrate that the patients can be treated with secure techniques which permit to obtain results closer to the natural conditions than others more known.
So implant shapes as screws, blades, needles, cylinders, etc., have all good success expectations in ideal anatomic conditions but, in other anatomic conditions, which are far from ideal, their success results give different values, often inverted in comparison with ideal ones.

This statistic study is characteristic of the free professional way of working. All the patients have been followed during every step of the therapy, beginning from the first visit, passing through the operative sessions (surgical and non surgical), to the 5, 8 and 10 years control visits.
Some schools(1,2) have published studies whose conclusions are that it's possible to establish success prognosis of implants with a short follow up (1 or 2 years). On the opposite side the fellows of the Italian school have published numerous studies in which they have demonstrated the influence of occlusal unbalance in implant's prognosis, even after complete osseointegration(3). Therefore, it appears brighter to have a gate control after 5, 8 and 10 years.

Materials an Methods

For more than 18 years (8.3.1989-28.3.2007) the data concerning implant interventions executed have been collected. A proper database (FileMaker,Claris) has been compiled by registering:

- Surgical intervention progressive number

- Patient's progressive number
- Date of intervention
- Patient's sex
- Patient's name
- Other interventions progressive numbers
- Patient's age
- Age's range (11-20, 21-30, 31-40, etc.)
- Patient's current and past pathologies
- Intervention's description

Five, eight and ten years after intervention's date the patients have been contacted, and possibly visited, to check implants survival. The data collected in the database have then been inserted in a Microsoft Excel file, including:

- Up-to-date date
- Implant's type
- Global number of every type of implant inserted since the beginning of the study
- Global sums of implants of the same category (submerged screw implants; non-submerged screw implants; submerged blade implants; non-submerged blade implants; needle implants)
- Global implants failed before definitive prosthesis cementation
- Global implants failed after definitive prosthesis cementation
- Global implants failed more than 5 years later than intervention
- Global sums of implants of the same category failed before definitive prosthesis cementation
- Global sums of implants of the same category failed after definitive prosthesis cementation
- Global sums of implants of the same category failed more than 5 years later than intervention
- Global success percentage
- Global average success percentage of the same category
- Number of implants overcoming the 5 years duration
- Number of implants failed before 5 years
- 5 years success percentage
- Number of implants overcoming the 8 years duration
- Number of implants failed before 8 years
- 8 years success percentage
- Number of implants overcoming the 10 years duration
- Number of implants failed before 10 years
- 10 years success percentage
- Deceased patients

Deceased patients and nowhere-to-be-found patients have been excluded from the statistic.

Global data are referred to all implants inserted from the beginning until the date in which this publication has been completed. *Global success rate* is a date of course negatively influenced by passing of time. In fact, for example, if an implant has been inserted from 1989 since 1995 and we collect the dates in 2007, global success rate is influenced from implants which have passed the 10 years gate, but have gone to failure after 11-18 years.

Many implant systems have been used, whose selection has depended on:

1. Anatomic characteristics gathered observing diagnostic tests and the objective examination done at the beginning of surgical intervention;
2. Prosthetic function;
3. Standard or urgency situation.
4. Immediate or delayed load.

All interventions have been done under local anesthesia, giving to the patients, if there weren't contraindications, some anti-anxiety drops to prevent troubles tied to anxiety and an antihaemorrhagic pill to reduce bleeding.
Nearly all interventions in healed ridges have been done beginning by opening the soft tissues, to carefully examine the bone ridge, to correctly manage the soft tissues and to activate all the biologic post-surgical inflammation processes which lead to new bone regeneration and optimum soft tissues healing.
Post-extractive implants have all been inserted in fresh extraction sites.
Except for about 20 overdentures, treated with the O-Rings technique, the definitive prosthesis have all been cemented.

During the years some implant systems have been abandoned, preferring the most versatile, complete and safe. Some implant systems have been abandoned because they are no more on sale, even if they were good.

Discussion

All the data collected after 5, 8 and 10 years have to be related to the difficulty of the anatomic situation in which they have been used. Of course, you can expect that implant shapes which it's normal to utilize in wide, deep and dense bone ridges have better success rates than implant types which it's normal to utilize in thin, atrophic and empty ridges.
Some success criteria described in international literature seem to be too simplifying, because they exclude implants which haven't the same success rates compared with other implants which, nevertheless, are not suitable for difficult cases. By this way, the people who have difficult anatomic and functional situations couldn't hope anymore to be treated with a fix prosthesis on implants.
Many extreme situations can be resolved in a brilliant and safe way by using a combination of implant techniques, which contribute all together to resolve patient's handicap.
When ideal anatomic conditions are selected to make clinical studies just to get brilliant success rates, you can only conclude that the implant system that has been utilized has brilliant success rates in ideal conditions, which do not constitute a big percentage of the anatomic conditions that every oral surgeon sees in his office.
The same considerations should be done about the prosthetic solutions. A standard prosthetic solution on implants which is today universally used is the "overdenture" on screw implants located in the interforaminal area. The excellent success rates that all over the world are obtained by using this technique do not mean that this solution is really suitable to resolve patient's edentulism. As a matter of fact, you can't compare an "overdenture" with a fix prosthesis. The fix prosthesis provides teeth which are capable to

restore a chewing function similar to the natural one and, especially, to counterbalance the up-heaving force of the elevator muscles, restoring masticatory muscles and TMJ health.
*It's then necessary to study in depth mouth physiology in order to allow the greatest part of the population to be treated in the **right** way. It is particularly important to understand the importance of considering not only the success rates in ideal cases, but the success rates related to difficult cases too. Many implant shapes have not brilliant success rates because they are used just in the difficult cases in which they are suitable, in which they are the best and surest solution. There's no point in abandoning these implant shapes, which are precious to treat a part of the patients.*

In this study, many implant shapes have then been utilized to resolve patients edentulism (picture 1):

- Submerged screw implants (1682 implants)

Eight implant systems have been utilized (Or-Vit, Muratori, Biotec, Bellavia, Prodent, Acerboni, Medical Production, Medical Division). These implants have been utilized both in long time healed bone ridges and as immediately post-extractive implants, both with delayed load and with immediate load.

- Non-submerged screw implants (208 implants)

Three implant systems have been utilized (B.T.I.(194), Or-Vit(10), Stark(4). These implants have been utilized both in long time healed bone ridges and as immediately post-extractive implants, just with delayed load.

- One-piece screw implants (1928 implants)

Six implant systems have been utilized (Tramonte, Garbaccio, Mondani, Pasqualini, Or-Vit, AZ). These implants have been utilized both in long time healed bone ridges and as immediately post-extractive implants, both with delayed load and with immediate load.

- Submerged blade implants (80 implants)

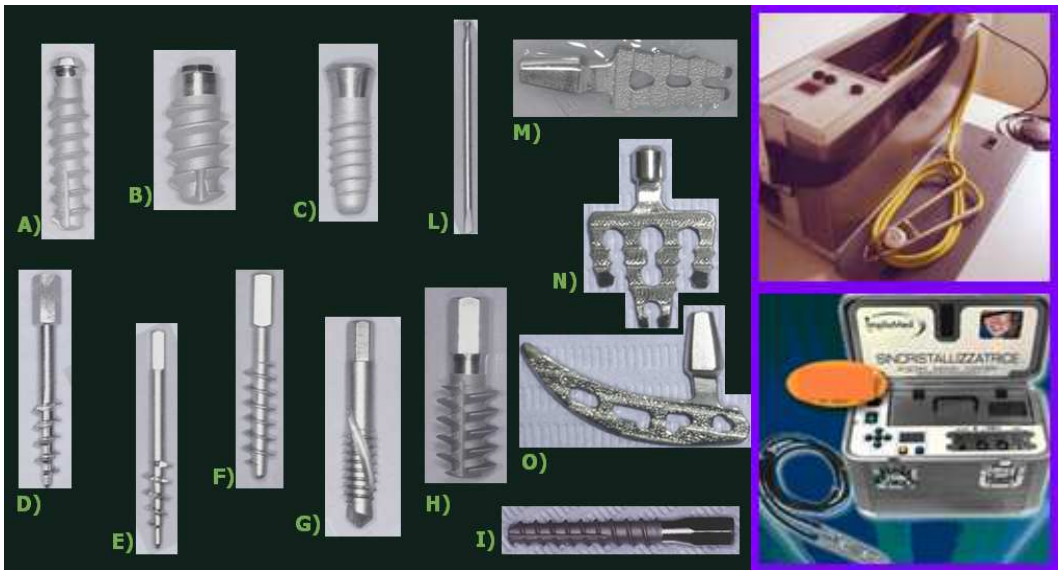
Two implant systems have been utilized (CEAM, CAMI). These implants have been utilized just in long time healed bone ridges, just with delayed load.

- Non-submerged and One-piece blade implants (473 implants)

Two implant systems have been utilized (Pasqualini non-submerged blade implants; AZ one-piece blade implants). These implants have been utilized just in long time healed bone ridges, both with delayed load and with immediate load.

- Needle implants (1158 implants)

One implant system has been utilized (Acerboni). These implants have been utilized both in long time healed bone ridges and as immediately post-extractive implants, both with delayed load and with immediate load.



Picture 1
Various shapes of endosseous implants utilized
A) Or-Vit submerged screw implant; B) Or-Vit wide diameter submerged screw implant; C) Stark non-submerged screw implant; D) Pasqualini one-piece screw implant; E) Garbaccio one-piece screw implant; F) Tramonte one-piece screw implant; G) Mondani one-piece screw implant; H) Or-Vit wide diameter one-piece screw implant; I) Or-Vit one piece screw implant; L) Acerboni needle implant; M) AZ one-piece blade implant; N) Pasqualini blade implant; O) Ramus blade implant.
At right: two models of Mondani endo-oral welding machine today on sale

In table 1 you can see the indications to utilize the different implant shapes.

Implant shape	Healed ridges	Imm.post-extr.	Delayed load	Immediate load
Subm. screws	X	X	X	X
Non-sub.screws	X	X	X	
Onepiece screws	X	X	X	X
Subm. blades	X		X	
Onepiece blades	X		X	X
Needles	X	X	X	X

Table 1
Range of utilization of every implant shape

In many cases implants have been joined together by means of using a Mondani intra-oral welding machine and a titanium wire or bar(4). The importance of joining together the implants in improving success rate is today universally recognized. Anyway, many Italian and foreign authors agree on this topic since a long period of time (1,4).

Results

The patients considered in this study have been classified in ranges of age. In table 2 it's possible to see that: 0,5% of the interventions have been done in patients who were between 11 and 20 years old; 3% between 21 and 30; 8% between 31 and 40; 15,7% between 41 and 50; 27% between 51 and 60; 29,2% between 61 and 70; 15% between 71 and 80; 1,5% between 81 and 90; 0,05% between 91 and 100.

Age	11-20	21-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
Prc	0,5%	3%	8%	15,7%	27%	29,2%	15%	1,5%	0,05%

Table 2
Interventions related to ranges of age (period 1989-2005)

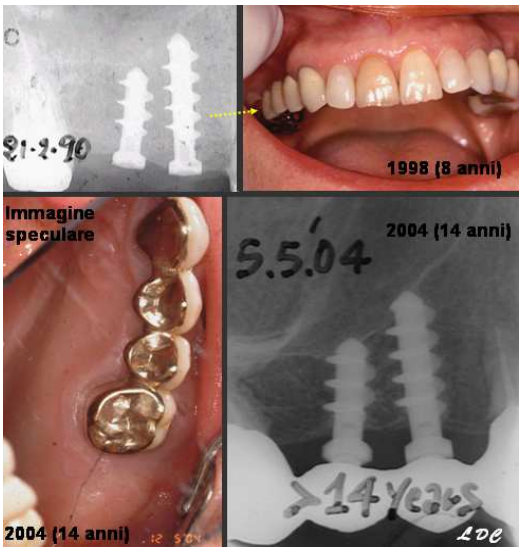
No difference in success rate has been noticed in relation to patient's different ages and sex, according with other authors conclusions(1).

Submerged screw implants (utilized since 1989)

The whole number of submerged screw implants utilized is of 1682. Global success rate has been of 94,2%.

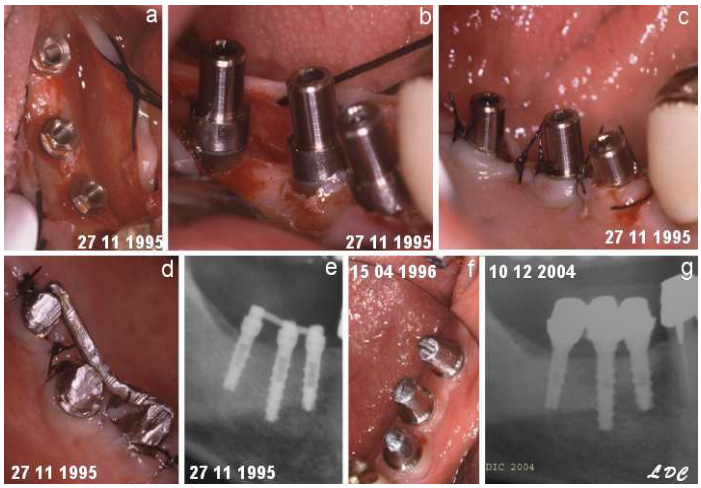
Due to the good clinical results, Or-Vit implant system has been used more than other systems. Or-Vit implants (picture 1_A) have been used both in healed ridges and as immediately post-extractive since 1989. They had a global success rate of 96,6% (1335/1381), a five years success rate of 98,9% (850/859), an eight years success rate of 96,2% (484/503), a ten years success rate of 94,2% (231/245). These dates are very good, if you think that these implants have been used both in ideal and atrophic anatomic situations. Immediate load has been applied during the period 2000-2005 on 29 Or-Vit submerged screw implants. Two implants have been lost (93,1% survival rate).

Some other good implants, as Muratori ones (picture 2) even if they can have good long term success rates, have been abandoned because actually, from a prosthetic point of view, there are better choices on sale.



Picture 2
Superior left. 21.2.1990: two Muratori submerged screw implants have been positioned in zones 1.4 and 1.5, following the maxillary sinus cortical bone. Superior right: picture taken after 8 years. Inferior left: picture taken after 14 years. Inferior right: X-ray taken after 14 years

Since 1995, submerged screw implants have been used with immediate retention too. This has been done to obtain a very good soft tissues result in just one intervention(5). Healing abutments have been screwed inside the implants (picture 3:b), in order to do immediate soft tissue repositioning around implant's profile. After having done the sutures (picture 3:c), the healing abutments have been joined together by a titanium wire (picture 3:d,e), welded inside the mouth, without any danger. This has been done to maintain them in position and to protect implants from tongues pressure(6,7). Immediate retention has been removed after osseo-integration, and definitive abutments have been cemented (picture 3:f). After 9 years (picture 3:g), the horizontal bone level is maintained.

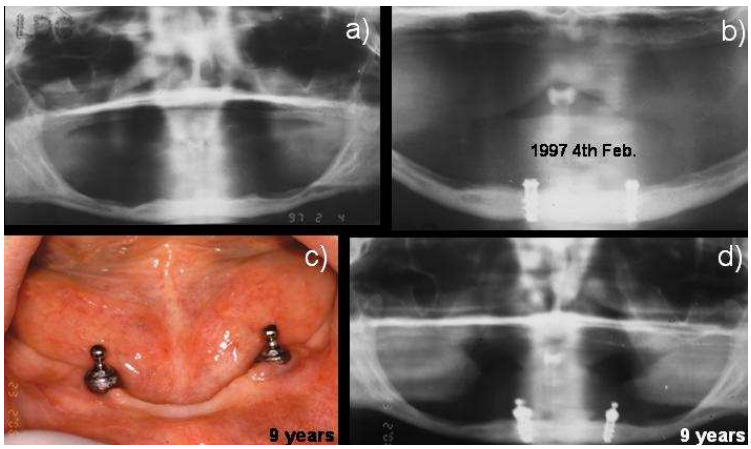


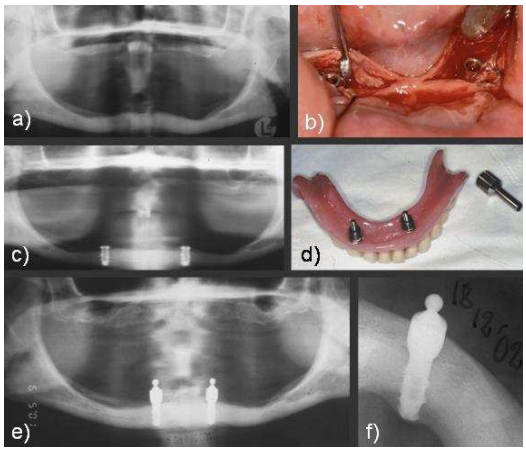
Picture 3
a)Three submerged Or-Vit screw implants have been positionez in the 4.6-4.7 zone.
b)Three specially made healing abutments have been screwed into the three implants.
c)The sutures have been done.
d)The three implants have been welded together with a titanium wire.
e)X-ray taken at the end of intervention.
f)Soft tissues view after definitive abutments positioning.
g)X-ray taken 9 years after intervention.

Acerboni implants, submerged version of Mondani screw implants (picture 1_g) have been used both in healed ridges and as post-extractive implants since 1994. They had a global success rate of 94,3% (84/89), a five years success rate of 94,3% (84/89), an eight years success rate of 93,4% (57/61), a ten years success rate of 92,8% (39/42).

Or-Vit wide diameter screw implants (picture 1_B) have been used in fresh extraction sites since 1997. The global success rate has been of 100% (61/61). Of course, the same success rate has been collected at the 5 years (37/37), 8 years (13/13) and 10 years (8/8) barrage.

Twenty cases of severe mandibular atrophy have been treated since 1997 with a couple of Or-Vit submerged screw implants and an overdenture laying on the O-Rings technique. No failure has occurred during the period of time 1997-2007 (pictures 4 and 5).





Picture 4
a) Pre-intervention orthopantomography.
b) Two submerged screw implants have been positioned in zones 4.2 and 3.2
c) Picture taken 9 years after intervention (2006)
d) Orthopantomography taken 9 years after intervention (2006)

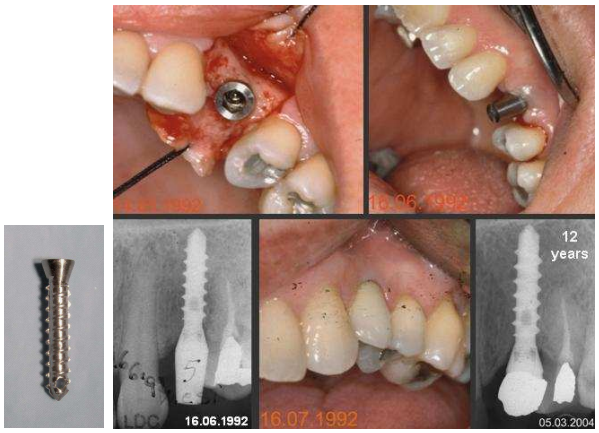
Picture 5
a) Pre-intervention orthopantomography.
b) Picture taken during intervention.
c) Two submerged screw implants have been positioned in zones 4.2 and 3.2

d) Picture of the overdenture made for the patient
e) Orthopantomography taken at end of work
f) After one and half year, it's possible to see the new bone regenerated around implant apex

Non-submerged screw implants (utilized since 1991)

The whole number of non-submerged screw implants utilized is of 208. Global success rate is of 85,5% (178/208).

B.T.I. implants (picture 6) have had a global success rate of 80% (161/194), a five years success rate of 95,5% (172/180), an eight years success rate of 93,7% (105/112), a ten years success rate of 84,5% (71/84). As the reader can see, it looks like failures increase after more than eight years. It's important to say that these implants have been used in many posterior atrophies. This fact, of course, do not facilitate long term implant duty. Anyway, due to the fact that this implant mark is no more on sale since 2001, Stark implants (picture 1_C), very similar to B.T.I. ones, have taken their place in author's professional practice.



Picture 6
B.T.I. non-submerged screw implant
Picture 7
Images of intervention, abutment positioning and X-ray control after 12 years of a B.T.I. implant positioned in 2.4 zone

One-piece screw implants (utilized since 1990)

The whole number of one-piece screw implants utilized is of 1928. Global success rate is of 93,7% (1807/1928). These implants have been used in every anatomic situation, with immediate load. One-piece implants are suitable to treat atrophic thin ridges, with immediate load. It's normal that atrophy and immediate load lead to less enthusiastic success rates. Many implant failures have been resolved by replacing the implant with another one.

Pasqualini (picture 1_d) and Garbaccio (picture 1_e) one-piece screw implants have been used in healed ridges and as immediately post-extractive implants in the interforaminal area and in the anterior superior area, in every anatomic situation. They have had a global success rate of 95,0% (617/649), a five years success rate of 96,0% (319/332), an eight years success rate of 89,7% (134/149), a ten years success rate of 87,0% (81/93).

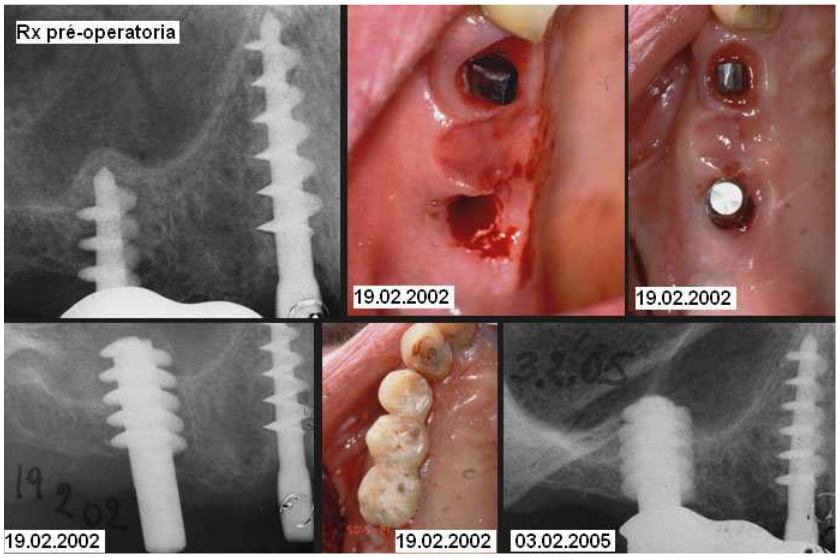
Mondani (picture 1_g) one-piece screw implants have been used since 1991 especially as immediately post-extractive implants, in the interforaminal area and in the posterior superior areas. They have had a global success rate of 89,6% (699/780), a five years success rate of 93,1% (608/653), an eight years success rate of 89,1% (434/487), a ten years success rate of 84,5% (312/369).

Tramonte (picture 1_f) one-piece screw implants have been used in healed ridges in the posterior inferior sector, since 2000. Their global success rate is of 98,9% (94/95).

AZ one-piece screw implants, much similar to Garbaccio screws (picture 1_e) have been used as immediately post-extractive implants in the interforaminal area and in the posterior superior area, since 1999. Their global success rate is of 99,1% (109/110).

Or-Vit one-piece screw implants (picture 1_i) have been used in healed ridges and as immediately post-extractive implants in every zone of the mouth, since 1998. Their global success rate is of 97,2% (177/182). After 5 years, their success rate was of 98,3% (60/61).
Or-Vit one-piece wide diameter (5,5-7,0-9,0 mm.) screw implants (picture 1_h) have been used, since 2001, to treat fresh extraction sites in the superior arch, with an alveolar expansion technique(8). Their global success rate is of 98,9% (96/97).

The data over 553 implants immediately loaded, post-extractive of teeth, collected during the period 1995-2005, show a global survival rate of 98,3%.
In some cases, since 1999, implants inserted soon after extraction of implants have been immediately loaded, with good results. This has been possible by means of using wide diameter one-piece screw implants (pictures 1_h and picture 8).



Picture 8
a) The damaged screw implant in zone 1.6
b) The implant has been extracted
c) A screw seven mm. large and 20 mm. long has been immediately positioned
d) X-ray taken soon after
e) The implant has been immediately loaded, together with the pre-existing other screw
f) Bone regeneration under load after three years

The data about the 45 implants immediately loaded, post-extractive of implants, collected during the period 1999-2005 show a global survival rate of 97,7%(8).

	Post-extractive implants immediately loaded	Post-extractive of teeth (1995-2005)	Post-extractive of implants (1999-2005)
Number of implants	598	553	45
Number of interventions	290	249	41
Global survival rate	98,2	98,3	97,7

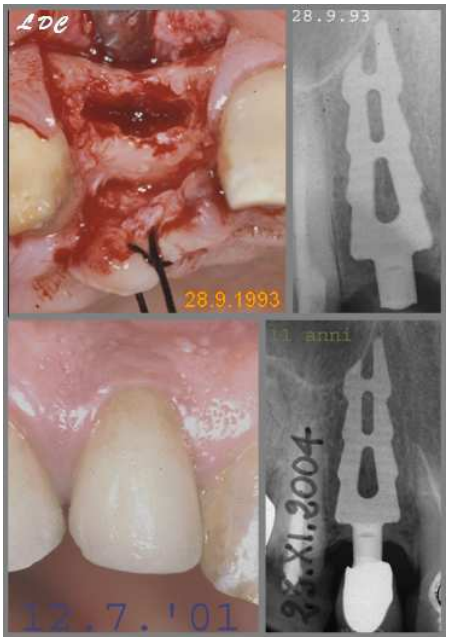
Table 3
Immediately loaded post-extractive screw implants

Submerged blade implants (utilized since 1990)

Submerged blades have limited indications. As a matter of fact, the goblet in which the abutment is destined to be inserted has to be larger than 3,5 mm. to maintain adequate characteristics of mechanical strength. For consequence, they are suitable just to bone ridges which are enough wide at bone surface level and thin in depth(9). Moreover, it's rather difficult to create the slot in which the blade perfectly fits.

The use of these implants in posterior ridges has been abandoned by the author in 2001 because of some fractures in the posterior sectors, probably due to excess of masticatory stress related to too small metal thickness in the connection zone. Although in the anterior sectors it's possible to get very good results (picture 9), by means of using one-piece blade implants you can get a better prosthetic profile.

The 5 years success rate is of 92,5% (74/80), 8 years is of 87,1% (68/78), 10 years is of 80,0% (57/71).



Picture 9
Upper images: intervention picture before implant positioning and X-ray after implant positioning
Lower images: picture after 7,5 years and X-ray after 11 years

One-piece blade implants (utilized since 1989)

Blade implants have been utilized to treat thin bone ridges both for delayed load and for immediate load. They've been used both in deep ridges and in atrophic ridges. Their global success rate has been of 93,2% (441/473), five years success rate of 98,8% (330/334), eight years success rate of 87,8% (217/247), ten years success rate of 85,9% (171/199). Data analysis shows very good results after 5 years and worse results after 8 and ten years. This probably happens because of implants inserted in atrophic posterior sectors, which combine a bad crown/root ratio with the biggest chewing effort.

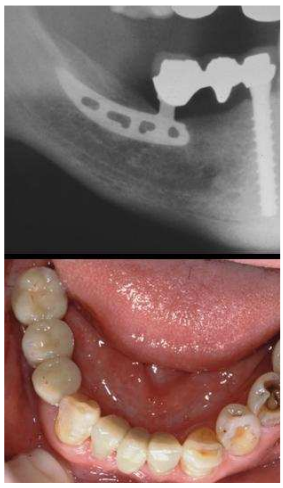
Prosthetic results can be very good following Linkow protocol in a proper way (picture 10).

Picture 10
Upper and inferior left images: intervention pictures and X-ray
Lower central and inferior right images: picture before and X-ray after definitive crown cementing

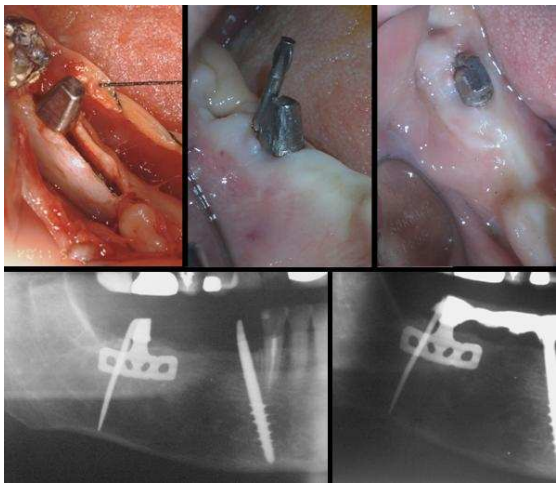
During 5 years (june 2000-june 2005), a study about immediate load applied on an one piece blade implant inserted in the posterior inferior sector (zone sixth-seventh) and an

one-piece screw implant inserted in the fourth zone (mesial to mental foramen) has been done (picture 11). The two implants have been put in retention with a titanium bar soon after insertion, by means of using the Mondani intra-oral welding machine.
Twenty-seven emi-mandibles have been treated with 27 one-piece blades and 27 one-piece screws. In one case, the blade implant hurt under pressure with the provisional prosthesis and, for consequence, it's been stabilized by means of welding a bicortical needle implant to blade's abutment before fix prosthesis application (picture 12). In two cases, the screw implant has been substituted by another, wider, screw implant, immediately loaded. Today's data about this study are then:

- 100% success rate with blade implants immediately loaded in the sixth-seventh zone, (one has been saved by a needle implant). 96,2%(26/27) if we consider the hurting blade implant, then healed, as a failed one.
- 93,1%(27/29) success rate with one-piece screw implants immediately loaded in the fourth zone.



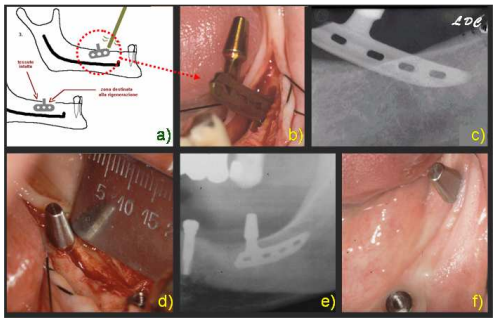
Picture 11
Bridge 4.4-4.6 on one-piece blade implant and one-piece screw implant



Picture 12
Needle implant utilized to stabilize a blade implant. Up: images 1)of blade implant positioning, 2) of needle implant positioning after few months, to stabilize the blade before finishing prosthetic work. Down: X-rays before and after definitive bridge cementing

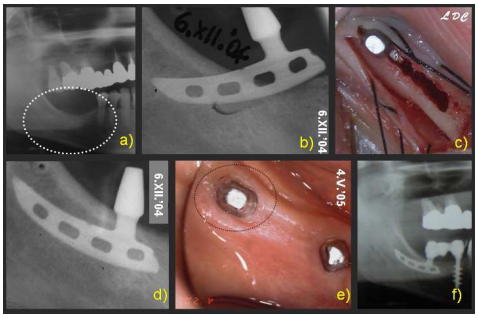
E.D.E. (Endosseous Distal Extension)

Since june the 18th, 1993, I began to use a technique of blade implant insertion which is particularly conservative. My idea is to make a slot which is as long as the distance between the distal edge of blade's abutment and the mesial edge of the blade. By using this technique, it is possible to insert one part of the blade under untouched cortical bone and soft tissues. These tissues aren't therefore subject to bone ridge reabsorption, which is never predictable. After a period of time during which I've been using standard implants, I began to use Linkow ramus blade implants(10), to reduce slot dimensions and to insert almost all implant's length under untouched tissues (pictures 13, 14, 15).



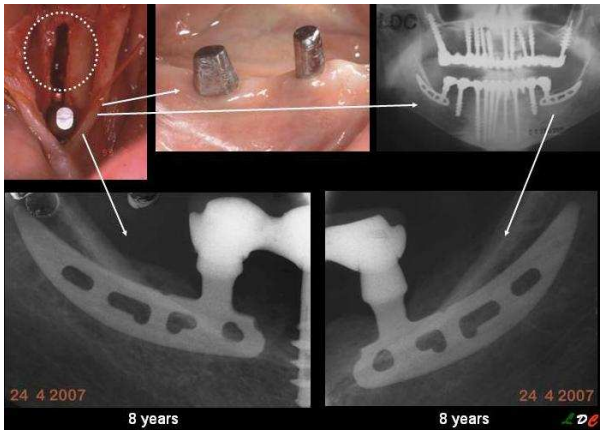
Picture 13

a) EDE technique procedure scheme
b) Implant inclination during positioning
c) X-ray taken to check correct implant direction
d) The blade has reached the definitive position
e) X-ray: bone tissue distal to blade's abutment is intact
f) Soft tissues look before impressions



Picture 14

a) X-ray of the ridge which has to be operated
b) X-ray taken to check correct implant direction
c) The blade has reached the definitive position
d) X-ray: bone tissue distal to blade's abutment is intact
e) Soft tissues look before impressions
f) X-ray taken after definitive prosthesis cementation



Picture 15

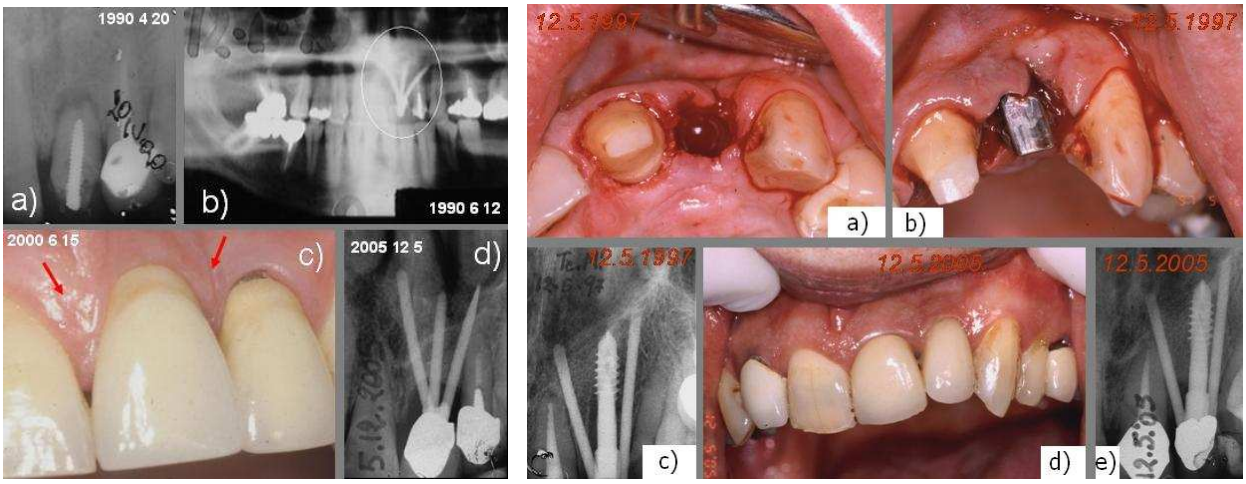
a)Blade implant after positioning in 4.7 zone: the implant has gone beneath intact hard and soft tissues, while the milled mesial bone (circled) does not overhang any part of the implant
b)Soft tissues outcome around blade and screw abutments
c)Orthopantomography taken after end of prosthetic works in both arcades. Two blade ramus implants have been positioned by means of making use of EDE technique
d)X-ray of right blade after 8 years
e)X-ray of left blade after 8 years

This technique has been published in Italian language(11) and Russian language(12).
Analyzing the period 1993-2005, success rate at five years, by means of using this technique is 96% (49/51). Since the moment I began to use ramus implants, this technique has reached its perfection.
Eight ramus blade implants, inserted with EDE technique, have been immediately loaded since 2002, with complete success.

Immediate load has been applied during the period 1995-2005 on 54 one-piece blade implants, in 41 patients. Six implants have been lost in the same patient. No implant has been lost in the remaining 40 cases. If we use the universally accepted Kaplan-Meier estimator, in which you have to consider just one implant per patient, you get a success percentage of 97,5% (40/41).

Needle implants

Needle implants have been used in particularly difficult cases. Sometimes they have been used to treat post-extractive alveolus with immediate loading (picture 16). Some other times they have been used to stabilize screw or blade implants immediately (picture 17) or in necessity cases (picture 12).



Picture 16

a) X-ray of the 2.1 zone: the root has to be extracted and there isn't enough bone to insert a screw implant and load it immediately

b) Three needle implants have been inserted immediately after extraction and immediately loaded

c) Picture of the soft tissues surrounding the implant after 10 years

d) X-ray after more than 15 years

Picture 17

g) The damaged lateral incisor 2.2 has been extracted

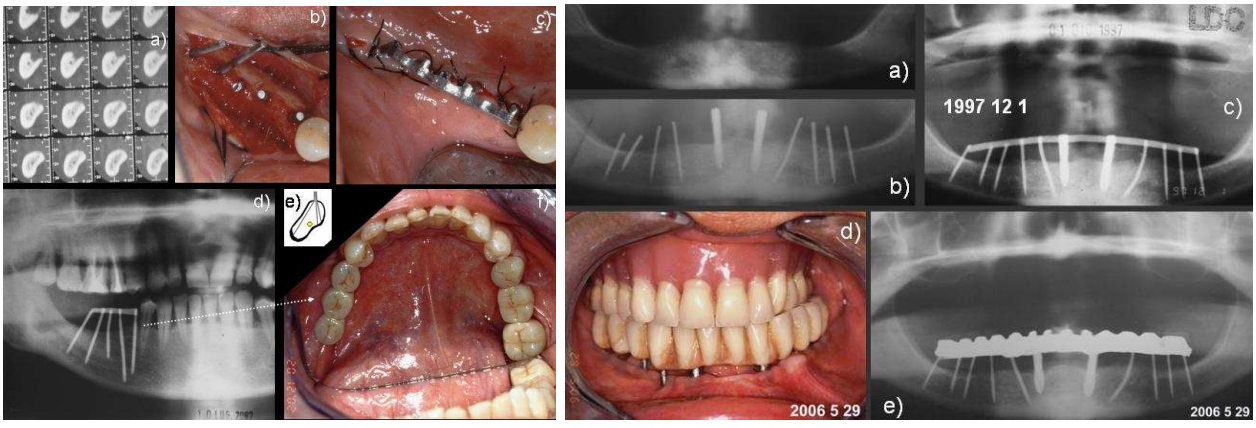
h) One one-piece screw implant and two needle implants have been immediately inserted and welded together

i) X-ray at end of intervention

j) Picture after 8 years

k) X-ray after 8 years

The most precious application of needle implants is in working out distal atrophies with D3-D4 bone cases. Using a proper surgery, it's possible to pass along inferior alveolar nerve's side, reaching deep cortical bone, without sensitivity change problems and with immediate load. This technique is very safe and predictable (pictures 18, 19).



Picture 18

a) TC of an inferior right ridge severe atrophy
b) Five bicortical needle implants have been inserted
c) The five needles have been welded together (after suture)
d) X-ray taken at the end of the intervention, before provisional prosthesis cementing
e) Scheme of needle implants insertion passing along alveolar nerve's side
f) View of the definitive prosthesis

19

a) Pre-intervention situation
b) X-ray taken during intervention
c) X-ray taken at intervention end
d) Clinic view after more than 8 years
e) After more than 8 years, the radiographic situation is perfect and the patient is asymptomatic and happy of the choice she did

The statistic results obtained by using this technique in posterior distal atrophic ridges with immediate loading are very good. 285 needle implants have been inserted, in 89 atrophic ridges, passing along nerve's side during the period of time 10.1.1996-14.5.2006. These implants have all been immediately welded together and immediately loaded. 2 implants have been lost, with a global success rate of 99,2% (283/285). No patient has had a permanent lip anesthesia. Just 2,5% of the patients has had a temporary anesthesia. 97,5% of the patients has had no consequence from the intervention.

Considerations

By examining statistics, it has been established that screw implants failure is more frequent during the period of time which follows the intervention, before building the definitive prosthesis. On the contrary, blade implants are almost always destined to success, but, probably due to the more difficult situations in which they are employed, they are more subject to failure after 5 years from intervention. It has to be said that, examining just cases in which they have been used in narrow ridges, but enough deep, they don't give failure problems after a lot of years as well.
Needle implants are a safe solution in posterior distal atrophic ridges and when used as single implants. When used to try to save failing implants, statistics, of course, are worse.

Conclusions

Such a study, allows 1) to get important conclusions about frequently asked questions about which implant shape is suitable to resolve clinic cases; 2) to conceive a schema to choose the correct implant shape in any clinical case; 3) to help to reduce failure risks.

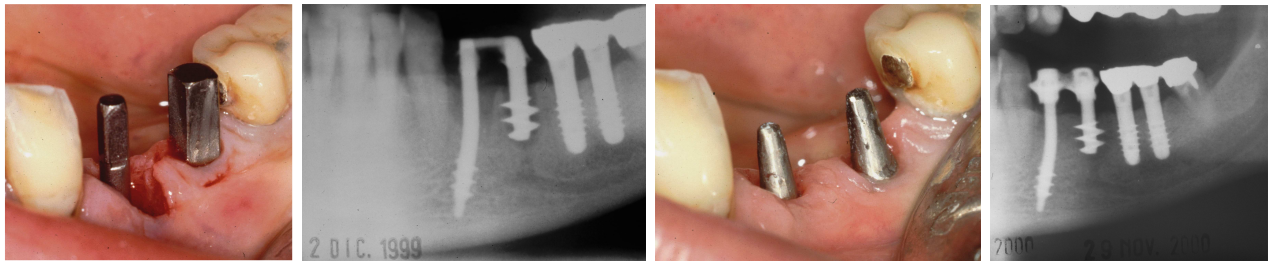
Some frequently asked questions are:

1. Is it better to use a cylindrical or a conic screw implant? Some authors are sponsoring conic implants(1), other ones cylindrical ones(13). Many different shapes of implant have been used during these 18 years of practice. There are two aspects which must be considered: 1) surgical procedure; 2) success expectations. With conic implants, it's much easier to find the surgical hole and to engage it, 'cause implant's apex is smaller than it. On the opposite side, it's absolutely necessary to have a high precision measurement and preparation of the hole, because the implant must fit perfectly to it. With cylindrical implants, this problem does not exist. It's possible to deepen implant insertion some millimeters more than the

measure which had been wrongly calculated. Cylindrical implants have more difficulty in finding hole access. A third choice is to use implants with cylindrical neck, but conic coils, as, for example, Garbaccio screw implants are. These implants find easily the hole access and have the same characteristics of cylindrical implants in relation with their neck. As a matter of fact, conic implants present vertical bone loss around them more than the cylindrical ones. My choice, coming from the implant practice described before, is to use cylindrical neck implants, with conic or cylindrical coils and an adequate smooth neck to prevent coils exposition in case of bone loss.

2. Is it better a Smooth or Rough surface? During ten years, in the same type of clinical cases, rough blade implants and smooth ones have been used. No difference of success rate has been noticed. Some authors today say that the rough surface is better for immediate loading, others say the opposite. Rough implants have a better grip during surgical insertion, but it's easier to find colonies of bacteria on their surface in case of exposition. You could suppose that, after osseointegration, a wider contact surface could be better, but still now there aren't clarifying studies about this topic.
3. Is it better that the screw implant has wide or little coils ? Little coils screw implants have been introduced to treat mental zone, where the bone is normally particularly dense. In zones in which the bone isn't dense, they sometimes have problems of osseointegration(14). Wide coils implants seem to be more useful to treat both dense bone and less dense bone.
4. Is it dangerous to get close to the alveolar nerve? If there isn't a traumatic contact, you can pass with implants near the nerve without any problem. You have to be very careful, using smooth cylindrical implants, as needle implants are. Screw implants without wide coils can be used as well. You never have to use drills passing along nerve's side. That is the main cause of damage. Coming from over, you can gently deepen your implant until canal roof, after using low rotation speed drills reaching the precise measured depth. TC, of course, is strictly indicated.
5. Is it better a blade implant or a screw one? These two types of implant have different indications. Blade implants are the first choice in thin ridges, because they permit not to loose bone integrity and, for consequence, they can be immediately loaded, too. By splitting the ridge to insert screw implants, bone integrity is lost. On the opposite side, using a blade implant in a wide and empty ridge can lead to failure, overall if it isn't bicortical. In these cases a screw implant has a better chance of success.
6. Which has to be the relation with cortical bone? The importance of bicorticalism, discovered from doctor Dino Garbaccio a the end of the sixties, is today universally recognized(15,16). Bicorticalism has to be looked for with any implant, reducing therefore the influence of the differences of spongy bone density on success expectations. In the posterior lower sector, you can get bicorticalism reaching the mylohioid cortical bone too(17). This is particularly important with blade implants and needle implants. In immediately post-extractive implants, the alveolar cortical bone permits to get a solid anchorage.
7. Is it possible to insert immediately post-extractive Implants? The analysis of more than 2000 screw implants inserted immediately after extraction during 1092 interventions (period 8.3.1989-31.12.2006) has given the following indications: excellent success rates are gotten by inserting the implant using the alveolus as an access, but then by-passing the apical alveolar cortical bone to penetrate the

healthy deeper bone until the implant reaches the cortical bone deep inside. In this way, the implant gets an excellent stability even if the four alveolar walls are not integer. It's often possible to apply immediate load on these post-extractive implants. These results suggest that the Tubingen d'Hoedt protocol(18), based on the presence of the four walls and to load absence, has to be related just to Frialit implants and similar root form ones.

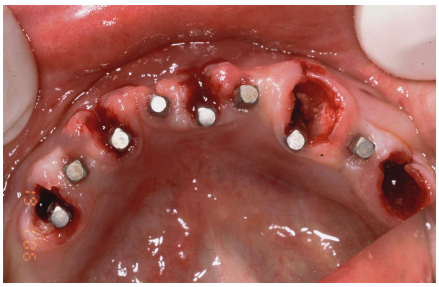


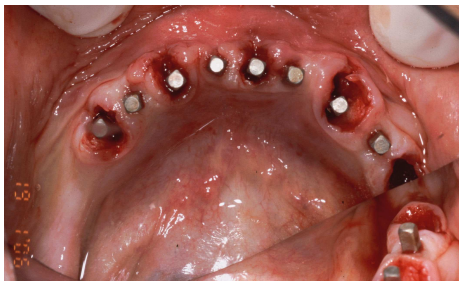
Pictures 20-24: Two screws immediately post-extractive of a tooth (zone 34) and of an implant (zone 35). Immediate load soon after intervention. Soft tissues outcome and x-ray after three years

8. Is there an universal insertion technique for screw implants? Yes. An experience on 3818 screw implants (1682 submerged, 208 non-submerged and 1928 one-piece) with a 18 years follow up, has indicated that there are rules which are valid for any implant. Using a gentle technique it is possible to insert implants close to delicate anatomic structures without running useless risks. A) It' very important to use first a high speed metal drill to open the superficial hole and to deepen the hole for some millimeters, so that to give the direction that we want and to avoid the risk that the following low speed drills are driven by the lowest bone densities. B) Then you have to use the first 2-2,5 mm. low speed drill (about 25-30 RPM) reaching the cortical bone deep inside. C) It' better now to check the correct position with a radiography. D) It's then possible to continue with the following wider drills, taking care that the last one is wider than implant's neck, to avoid bone compression.
9. Is it possible to enter the maxillary sinus? Sometimes it's suggested. That's because, when, for example, the alveolar walls are lost, it's better to bite the cortical deep bone to have better stability (picture 8). It's better to use mini-sinus-elevation scalpels to facilitate implant's insertion. Using a correct technique and, of course, sterile instruments, you can expect no consequence, even if it' better to tell the patient that he can have one or two drops of blood from the same hand side nostril. An antibiotic therapy is indicated.
10. Is it possible to treat inferior atrophic ridges affected by osteoporosis ? An experience of more than 11 years in using bicortical needle implants passing along inferior alveolar nerve's side has demonstrated that it's possible to treat this kind of ridges, immediately loading implants after insertion. During 11 years, 285 needle implants passing along nerve's side and reaching deep cortical bone have been inserted, welded together and immediately loaded. Just two implants have been lost. Just 2,5% of the patients have had a temporary lip anesthesia, progressively desappearing. No permanent anesthesia. The patient's compliance with this technique is very good, overall comparing it with alternative techniques usable in this kind of cases.
11. Can you load immediately post-extractive implants ? There's no contraindications. You have to correctly valuate the bio mechanical forces and implant stability, exactly as you do with implants normally inserted and immediately loaded. Many times, they are more stable than other implants, because they have the alveolar

bone anchorage too. In this study, about 600 post-extractive implants have been immediately loaded, 40 of them immediately post-extractive of implants, as shown in picture 8.

12. Are there problems of fracture curving emerging implants ? Some studies on computerized finished models show that it's dangerous to curve implants. Clinical results are completely different. That's because computerized studied are based on extra-osseous curves, as if you curve implants after osseo-integration. In real practice you have to curve implants *during* intervention, so that the curve remains intra-osseous after osseointegration and, for consequence, there's no extra-osseous weak point (pictures 25-26). The implants have to be made in grade 2 titanium, in order to be curved without stress for the metal.





Pictures 25: Four screws immediately post-extractive in zones 43, 41, 32 and 34.
Picture 26:The four implants have been curved at intervention end as it had been done with the previous four screws.

13. Is it important to put implants in retention? Several studies show that it's one of the main important things to guarantee success, overall with immediate loading. You can tie in retention together emerged and submerged implants(19). After osseointegration, you can eliminate the retention to build the definitive prosthesis.
14. Can you load implants without retention? Yes, you can, but not in atrophy conditions. If you have to load a single implant, or some implants enough deep and wide, you can do it. But if there are difficulty situations the retention is important to reduce to the max failure probabilities. In fact, when an implant gets detached from the retention, often it begins to slightly move and to hurt to the patient. If it remains detached, it'll easily be lost. If it's quickly welded again, it stops hurting and it goes to success.
15. Are they useful submerged implants ? Any implant is useful. Submerged implants are particularly useful to treat cases in which it's better to avoid immediate loading and tongue's expansion effects. They have good solutions for the prosthesis, but they give problems related to the connection, too. As a matter of fact, bone doesn't live over the connection line and this fact causes problems overall in the esthetic area, because the papilla isn't sustained by bone (pseudo-pocket effect)(20). Although some authors have tried to solve this problem introducing non-submerged implants and modifying implant's connection to follow papilla's profile, the simplest solution appears to be using emerging implants (picture 27).

Picture 27

a) Non-submerged screw implant which follows the papillary profile
b) Non-submerged screw implant
c) Emergent one-piece blade implant

16. Are there different rules for implants in comparison with teeth ? Prosthetic rules are the same, and bone troubles due to pathologic occlusion are the same. These subjects have been well described by professor Pasqualini in his textbook entitled "occlusal pathologies"(3) in which he reinforced many thesis about occlusal pathologies related to teeth suggested by many renowned authors(21,22). Short bridges anchored to one teeth and one implant are long lasting, if the tooth is in conditions. Longer bridges give often, after many years, problems at the teeth, which can be dangerous for implants tied together with them. A particular property of endosseous implants is to well resist to continuous forces in orthodontic applications.
17. How have you got to model the prosthesis on blade implants? It's very important to understand that occlusal forces have to be, as much as it is possible, axial to the implant. This is important to protect implant's neck from fracture. Anyway, a neck 1,5 wide in full titanium is a good guarantee against fracture.
18. Prosthesis elements have to be separated or joined together? In ideal conditions they should be separated one by one, as it happens in nature. But it's very difficult to have ideal conditions and, sometimes, they are not so ideal as they appear. Many times the bony depth is different zone by zone, crown root ratio is different zone by zone, often there are occlusal problems, with pathologic static and dynamic functions. Therefore to join together teeth can be the right solution to minimize risks. In physiologic occlusion, bridges with teeth joined together are long-lasting.

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