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Complete oral rehabilitation in atrophic jaws with immediate load implants

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COMPLETE ORAL REHABILITATION IN ATROPHIC JAWS WITH IMMEDIATE LOAD IMPLANT*

* English translation of the Spanish original.

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The clinical case of a 58 years old male, partially edentulous patient with pronounced atrophy of his jaw bones is presented.

The patient did not tolerate a removable prosthesis at all.

Applying the criteria of Strategic Implantology, extraction of all teeth was planned and done. Then BCS® strategic implants and an immediately produced fixed and definitive prosthesis was delivered in less than one week.

Keywords
- Strategic implant®[1]
- Basal Implantology
- BCS® implants[2]
- KOS® implants
- Implants and immediate load
- Avoid bone grafting
- Avoid sinus lift
- Bone atrophy and immediate loading

1 Strategic Implant® is a registered trade-mark
2 KOS® & BCS® are registered trade-marks

Introduction

Placement of implants in atrophic jaws is a major surgical challenge because of the limited amount of available bone structure and the lack of available surface for osseo-integration.

The procedures of maxillary sinus lift and mental nerve displacement are frequently applied to overcome the unfavorable anatomical problems and to adapt their future biomechanical conditions.

Despite acceptable success rates, these approaches imply unpredictable degrees of surgical morbidity at donor and/or reception sites.

Patients often refuse to undergo multiple procedures which delay their oral rehabilitation and add surgical and financial risks. The typical patient however usually accepts with greater enthusiasm the possibility of an immediate surgical and prosthetic treatment with implants, especially if the extraction and the implant placement is done during the same appointment. They also appreciate, if the future teeth have been planned prior to insertion of the implant, because they can see the aethetic outcome in advance. If possible the insertion of fixations without flap or sinus lifting lifting should be planned. Implans are today not undergoing the procedure of "biologic osseointegration" as it was done in the past. Instead "osseofixation" is acchieved in the 2nd and 3rd cortical, which barely ever resorb over the time. The implant abutments are then bent parallel to achieve greater functional and esthetic success. This also makes the lab work easier.

In this article, we are going to show the advantages of applying this surgical and prosthodontic approach with the devices which have been named Strategic Implant®.

"Strategic Implantology" requires knowledge and skills necessary to enable the practitioner to carry out treatments where surgery and prosthetics are adding up to a unique and stable result. It is advisable to strictly follow the protocols as described in the textbooks which are provided by the International Implant Foundation, Munich since 2012 (see list of references) . The anchoring of the implants in the second and sometimes third cortical, as well as the polygonal distribution of the same are essential for the technique and durability of the result. Likewise the periodic control of the occlusal and masticatory situation, according to the principles of Strategic Implantology.

Case Report

A 58 years old Caucasian male patient requested rehabilitation of the masticatory system, preferably with fixed teeth due to nausea, and under psychological and functional aspects.

The patient had no hereditary or personal history pointing towards unability for receiving dental imlants or medical treatment, nor surgery in general. He did not report drug abuse nor allergies.

Toxic habits: Patient is a smoker of admitted 20 cigarettes a day and a moderate drinker. He does not visit regularly dentist and prefers a short intervention and shortest possible treatment.

Fig. 1 Partial edentulous patient, remnant teeth with poor periodontal prognosis.

We consider the indication of planning a complete oral rehabilitation under the criteria of strategic implantology very suitable, and the patient accepts the treatment. In the clinical examination, partial bimaxillary edentulism is observed (Fig. 1), with presence of 25 and 27 in upper maxillary; 32, 33, 34 and 42, 43, 44 and 45 in the lower jaw. All remaining teeth had a poor prognosis, from the point of view periodontal and not suitable for rehabilitation with immediate fixed prosthesis with the criteria of Strategic Implant®.

We performed the complementary exploration Rx panoramic orthopantomography and CBCT (cone beam CT Carestream®), observing a bone atrophy of the upper jaws (Fig. 2) and inferior (Fig. 3) Division C (compromised bone) (Classification of Misch and Judy 1985 Fig. 4).

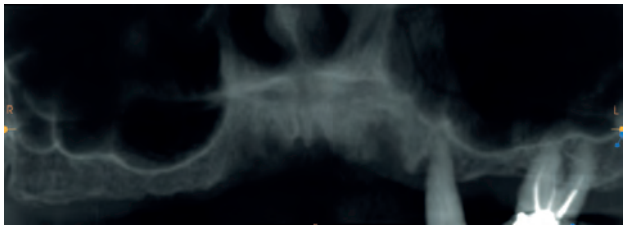

Fig. 2 Panoramic view of TAC scan in upper maxillary , atrophy Misch type C.

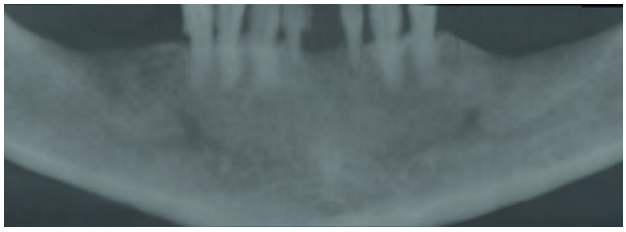

Fig. 3 Panoramic view of TAC scan in lower jaw.

Bone division C

- Width (bone C-w): 0 to 25 mm
- Height (bone C-h): < 12 mm
- Angulation of occlusal loading (bone C-a) > 30 degrees
- Space crown height (ECA) > 15 mm

Fig. 4 Characteristics of the atrophy, type C of Misch and Judy.

Proceed to take the study pictures, impressions and assembly of models in articulator. We performed a pre-operative determination of the acceptable vertical dimension (Fig. 5) and determined the position of the lips in relationship to the future teeth (Fig. 6). Teeth were tried in in this position. (Fig. 7a and 7b).

Fig. 5 Record bases and oclusion rims in impression compound for determination of the vertical dimension, lip support and inter maxillary relationship.

Fig. 6 Clinical determination of lip competence.

Fig. 7a Elaboration of a try of teeth.

Fig. 7b Assessment of try teeth, clinical control of incisal exposure, lip support and intermaxillary relationship.

We establish the intermaxillary relationship (Fig. 8a, 8b and 8c) and prepare a surgical guide (Fig. 9) that guide us in the bending of the implants to place the pillars in the most appropriate prosthetic position since the placement of the pillars will be determined by the bone structure of the patient.

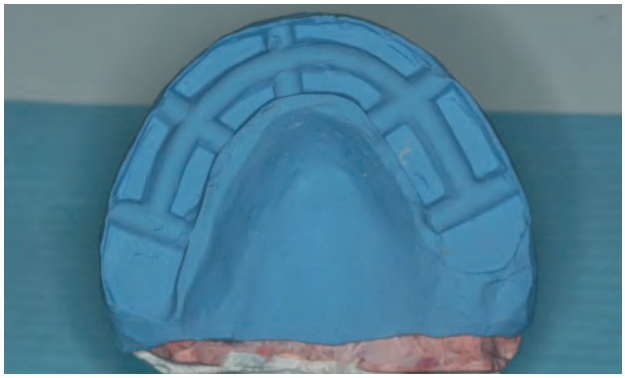

Fig. 8a Transfer of the upper jaw with silicone.

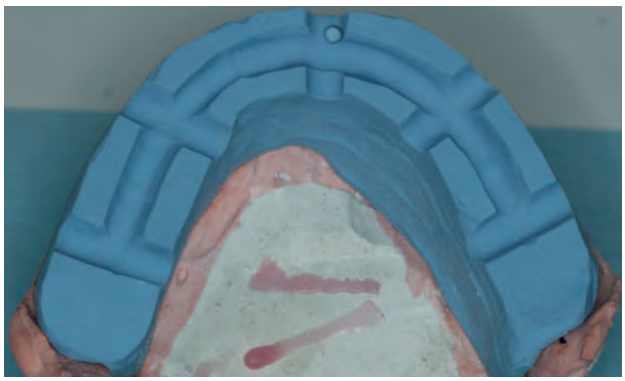

Fig. 8b Transfer of the lower jaw with silicone.

Fig. 8c Interrelation of jaws.

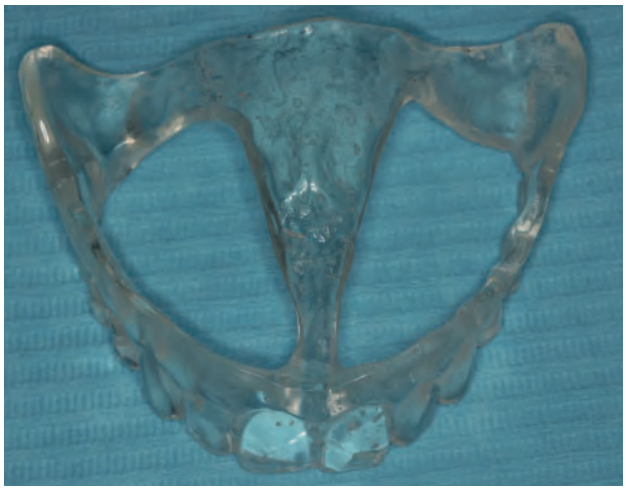

Fig. 9 Surgical guide reproducing exactly the shape of the immediate provisional prosthesis.

We had prepared a complete combined implants and soft-tissue borne denture for upper and lower jaw preoperatively for relining on the implants immediately after surgery (Fig. 10a, 10b and 10c). The patient can leave the office the same day with his immediate provisional prosthesis and start oral functionality with the advantages that it allows, in the sense "aesthetic-social" and in the sense of rehabilitation of the immediate masticatory function.

Fig. 10a Provisional prosthesis of the upper jaw immediately after surgery. Later, it will be relined with resin.

Fig. 10b Provisional prosthesis of the lower jaw.

Fig. 10c Provisional immediate intraoperative.

The palate of the upper denture can also be removed after the position of the upper tooth arch has been determined.

The placement of 10 implants for immediate loading in the maxilla and 9 BCS® implants in the lower jaw was planned. During surgery in the upper jaw, especially in the intercanine zone, we chose to place three KOS® implants instead of the BCS®, utilizing the opportunities & possibilities which the bone offered. (Fig. 11a, 11b and 11c).

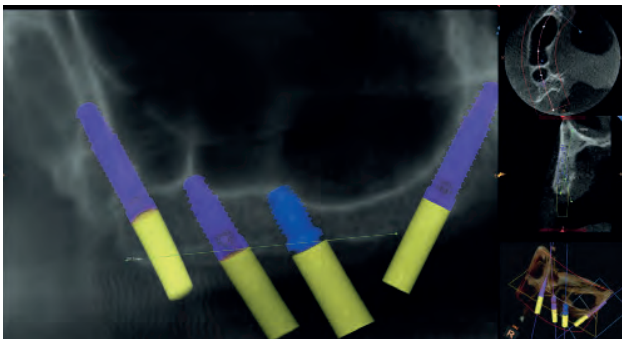

Fig. 11a Thickening marked at the basal level secondary or internal at the tuberosity level and the septum by Underwood.

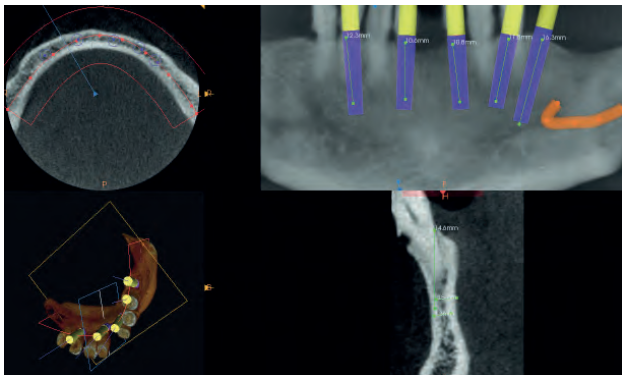

Fig. 11b Hourglass shape of the Mental Symphysis zone.

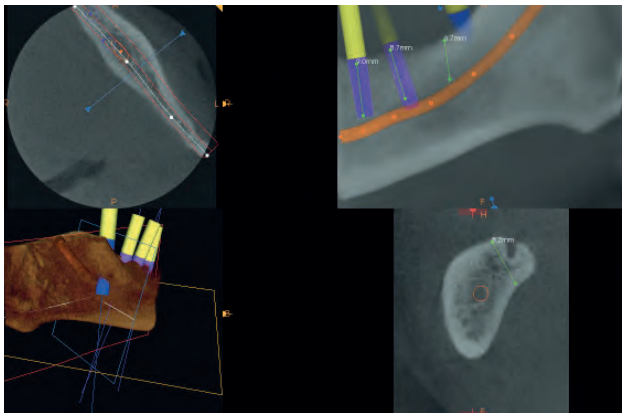

Fig. 11c It is observed high densification of the internal cortical at level of the mylohyoid line.

Before the surgical procedure we perform a thorough disinfection with Betadine in the oral cavity incl. all teeth and the tongue. According to our experience (and logically) this step gives more savety against infection than preoperative antibiotic therapy, which we administer only to anxious patients and more for psychological reasons than for anything else. During the surgical procedure, we observed and utilized a very compact 2nd cortical, both in the maxillary tuberositary and behind this bone (Fig. 11a) as well as in the lingual and mylohyoid area of the mandible (Fig. 11c). This favors the stabilization of the implants enormously.

We proceeded with implants in the first quadrant, beginning distally in the tubero-pterygoid region, where the pterygoid wings are very low because of the atrophy of the tuberosity zone. We reached excellent fixation in the tuberosity & the pterygoid plate of the sphenoid bone (i.e. the 2nd and 3rd cortical). We placed three BCS® implants with Ø 3.5 and 17mm, 14mm and 10mm of length.

For the instrumentation, we used initially the pilot drill BCD1, then we applied the Twist drill Ø 2.0 in 21mml or 30 mml and later placed the implant with the help of the handgrip and the AHB-adapter. Subsequently in the second quadrant we performed the extraction of 25 and 27 and placed an implant BCS® Ø 3.5 and lenght 14mm in the tuberosity zone taking advantage of the alveolus of the distal root of the molar extracted an another one of 10 mm for mesial. The preferred method of treatment would have been however the engagement of another implant in the tubero-pterygoid plate.

All implant placements in the upper jaw are performed with the handgrip and with manual torque, applying percussion with a surgical hammer when reaching to the second cotical especially in the tuberosity regions, to obtain good primary anchorage.

Between the anterior wall of the left maxillary sinus and the socket of tooth 25 we placed one implant BCS® Ø 3.5 of 10 mml and another one anterior to it, thereby also until obtaining good primary stability. In such reduced bone areas with low quality of the bone, placement of the implant is done very carefully. as an alternative the placement of an implant with 5.5 mm diameter would have been a good option in this area.

In the premaxilla, due to having only 1.5 mm bone height (Fig. 12a and 12b), we initiated BCS® insertion through the palatal aspect of the maxilla, but dehiscence occured in the palatine wall (Fig. 12a and 12b). We changed the treatment plan and inserted three implants in the anterior region (KOS® B Ø 3.2 of 12 mm in 11 and 22 and KOS® Ø 3.7 of 10 in area of 13-14).

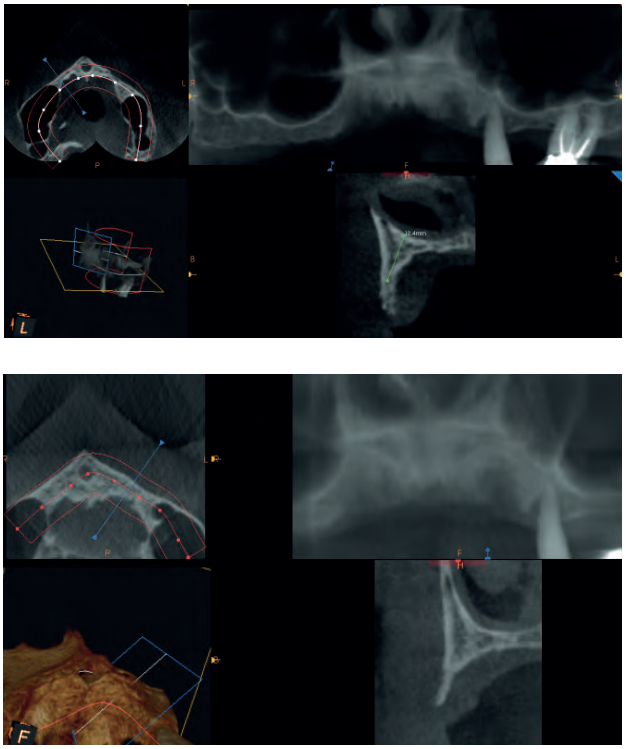

Fig. 12a and b Cuts of the TAC scan in premaxilla, with severe atrophy of the same in different sections.

For this we open a flap and were able visualize the real anatomy. There these KOS® implants by their conic geometry and compression design allowed comfortable insertion without fracture of the cortical bone in a flapless approach (Fig. 13).

In the lower jaw we inserted into the molar zones (posterior to the first and second molars) two implants on each side with a pilot drill BCD 1 and spiral drill Ø 2.0, using a straight handpice and approximately 15.000 RpM. Insertion of the implants was done with the handgrip in lingual and

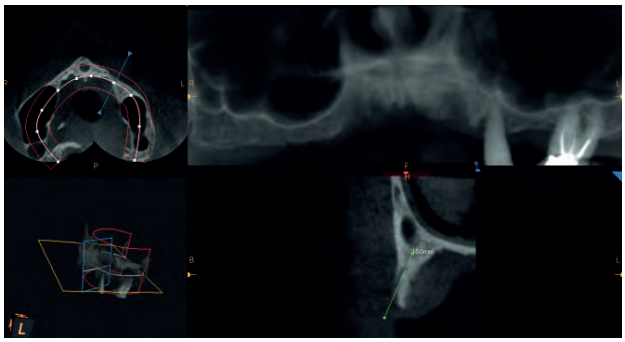

Fig. 13 Making changes in the position of the cut in the TAC scan. In the mesiodistal sense we find some areas more propitious for implant placement.

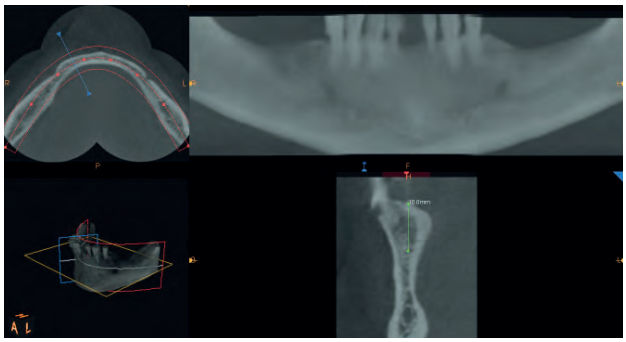

Fig. 14 Angulation of the implant in its insertion in the direction of the mylohyoid line.

distal direction right down to the the mylohyoid line BCS®. Implants in the diameter 3.5 mmd and of 10mm length are placed (Fig. 15). For this technique the 2nd cortical is fully penetrated towards the floor of the mouth. In the distal mandible no endangered structures (like dangerous the sublingual arterial anastomosis) in the inter-foraminal region are to be expected.

In anterior mandibular region, which is very dense, due to the hourglass-type morphology of the mental symphysis (Fig. 14), there is no necessity to place long implants although a lot of vertical bone is visible on the radiograph. BCS® implants are placed until they reach the isthmus of the two corticals (buccal and lingual), resulting in bicortical engagement. On the panoramic picture these implants appear short, but in the clinical reality they are anchoured rigidly with almost 80 Ncm. We placed four BCS® implants of Ø 3.5mm 14mm and one of 10mm.

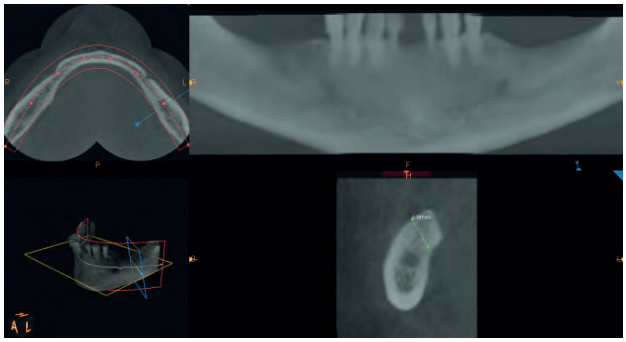

Fig. 15 Anterior region of the mandibular symphysis in form of "hourglass".

At the end of implant surgery, we adapt and reline the immediate provisional prosthesis. For taking impressions we use impression caps for the abutment head (small or large), do an inter-maxillary registration at the correct vertical dimension, and cement the temporary with a temporary cement (Fig. 10c).

Fig. 10c Provisional immediate intraoperative.

Subsequently, on the second day, the metal try-in was done, we determined the color of the teeth, removed some of the the stitches and performed a thorough intra-oral disinfection with Batadine® again.

On the third postoperative day we cemented the definitive prosthesis (Fig. 17), after the adjustment of occlusion following the parameters established by Ihde & Ihde (Libro de Recetas de la Masticación 4.):

- AFMP (Functional Masticatory Angle of Planas) & chewing table are symmetrical
- the occlusal plane is parallel to the plane of Kamper
- anterior teeth are without contact both in occlusion and in mastication
- Harmonic arches of similar length and with teeth only until the anterior half of the first molars.

Fig. 16a Prosthetic wotkpiece with inclined planes vestibule lingually.

Fig. 16b Basal areas of the prosthetic workpiece in contact with the mucosa polished to highest gloss.

Fig. 17 Prosthesis cemented at 72 hours.

It is important to design the prosthetic workpiece in a way that self-cleaning in possible (Fig. 16). The basal areas of the bridge (in contact with the mucosa must be polished to highest gloss) (Fig. 16a and 16b).

We then perform periodic monthly checks by adjusting the occlusion per the parameters discussed above during the first six months. And presented radiographic control at two years (Fig. 18), in which the perfect integration of the rehabilitated system is observed, without any bone loss, no peri-implant craters (as often seen in conventional dental implantology) nor signs of perimplantitis.

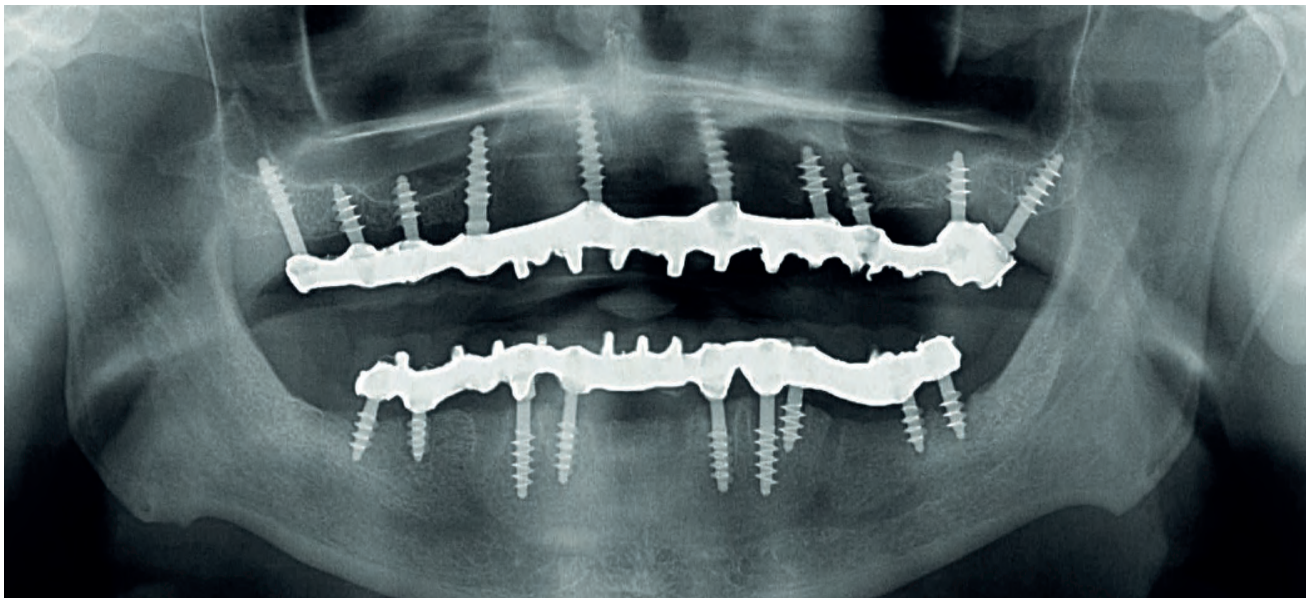

Fig. 18 Radiographic control of the patient at two years of evolution. Asymptomatic patient who continues his periodic occlusion and hygiene checks.

Discussion

The difficulty to rehabilitate patients with moderate or severe maxillary atrophy is evident. Following the conventional criteria in implantology, these rehabilitations require the alteration of the bone structure prior to the placement of implants. Without this step treatment is impossible to perform or at least the chances for success are low. Hence a vast amount of patients even today and world wide remains without treatment if the conventional approach is used. In medical statistics regarding dental implant treatment all these untreated cases should be counted as failure of the conventional method, because the "Intend to Treat Principle" (ITT) in medical statistics does not allow to disregard such patients (www.medicalforum.ch/docs/smf/archiv/de/2009/2009-25/2009-25-011.pdf). When we use the Strategic Implant® we are almost unlimited by lack of bone. With "Strategic Implantology" we can insert implants into the cortical bone structures or pillars such as tubero-pterygoid region, zygomatic region, naso-palatine buttress, nasal spine, the base of the vomer in the maxilla and below the mylohyoid line, as well as in the symphyseal and inter-foraminal region (with or without engagement in the basal/2nd cortical) in the anterior lower jaw.

Today we have for the Strategic Implant®, the diagnostic, surgical and prosthetic protocol available, which is necessary to perform rehabilitations with fixed prosthesis implant supported even in atrophic jaws.

When we can bend the necks of the implants, at the end of the surgical stage, and this way we make the work both for the laboratory and the prosthetic dentist quite easy. In very atrophic jaws, and to obtain an acceptable aesthetic, we chose hybrid cemented metal-resin or metal-composite prostheses. The great challenge for the professional is to obtain very satisfactory aesthetic results, with metal-ceramic structures. This is usually more feasible when we work on non-atrophic jaws, in cases where only the clinical crowns have to be replaced without too much soft and hard tissue.

The possibility of responding to patients expectations (with or without atrophic jaws), in relation to:

- the speed of the execution of the treatment
- with less aggressive surgery (using technique without flapless flap) thus creating less or no postoperative pain
- the immediate rehabilitation of the full masticatory function (immediate functional loading)
- the obtaining of very acceptable aesthetic results. All this generates the resolution of the expectations generated by our patients.

In the case of this article, the patient's expectations were satisfactorily fulfilled. Our patient had phobias to dental treatments, he is a smoker (hence he was never a candidate for any kind of augmentation) and he desired and received in shortest time a fixed restoration. For conventional dental implant concepts such patients are difficult to treat and in fact most treatment providers using conventional implantological approaches would reject this a case as "untreatable".

Summary

The protocol established for the Strategic Implant® increases the success and satisfaction of our patients. The philosophy and systematics for the work with the Strategic Implant® (as layed out in the textbooks of Ihde S. & Ihde A. , published by the International Implant Foundation IF, Munich/Germany), with unnumerable cases and research work, include large clinical experience and scientific knowledge, has offered a simple and effective technique for dental implantology.

Rehabilitation with fixed prostheses even in patients with atrophic jaws are now finally possible in the regular dental office. There is no need for waiting times (healing times), nor for all kinds of regeneration surgeries and grafts.

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