

Case study 30

Bone stability around implants in full mouth fixed reconstruction: 7 years follow up

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Dr. Lucian Toma Ciocan received his Dental Diploma from Carol Davila University of Medicine and Pharmacy, Bucharest (2002), graduating with a specialty in Oral Surgery (2005). After receiving his DMD, Dr. Ciocan received an MSc in Biomaterials, Bucharest Polytechnic University (2004) and a PhD (Thesis: "Interface Studies on Endoseous Implant Biointegration"), University of Medicine and Pharmacy, Bucharest (2011), and is a graduate of the Linhart Continuing Educational Program: Current Concepts in American Dentistry-Aesthetics and Oral Rehabilitation, Faculty of Dentistry, NYU (2012). Since 2002, Dr. Ciocan has been actively involved in the Department of Prosthetic Technology and Dental Materials of Bucharest, Carol Davila University of Medicine and Pharmacy and practices full mouth prosthodontics rehabilitation at the Nicolescu-Agatstein Dental Clinic, Bucharest.



Dr. Ion Nicolescu

Dr. Ion Nicolescu holds a Bachelor degree in Dentistry (1991), a degree in General Medicine (1999), and is a specialist in Oro-maxillo-facial Surgery (1995), from the Carol Davila University of Medicine and Pharmacy, Bucharest, where he also received a Specialist in Dentistry (2000) and a PhD in Medical Science (2001), and from 1992-2008, Dr. Nicolescu was held the post of University Professor. From 2008, he has been the Chief of the Maxillo-facial Surgery Department at the Saint Mary Hospital, Bucharest. Dr. Nicolescu's specialties include oral surgery, implantology, reconstructive dento-alveolar surgery, maxillo-facial surgery, deformations and facial malformations surgery (orthognatic surgery).



MTDArnon Kiperman

Arnon Kiperman holds a Master degree (Dental Technician) and is a graduate of the Ort Yad Shapira College (Israel), 1985. He continued his postgraduate education in Germany and in the United States. Since 1993, he has held the position of CEO at Levy Kiperman Dental Services, Ltd., a multi-disciplinary center that specializes in providing integrated solutions in complex reconstruction for the global dental industry. In 2007, together with his partners, he founded MS Systems Company specializing in 3D dental and medical industries, where he currently holds the position of Director, R&D.





This case study presents a 7-year follow-up bone stability deploying 17 ATID Alpha-Bio Tec implants inserted in a 44 year old patient, full mouth rehabilitation with porcelain fused to metal restorations. The long term stability of the clinical outcome was evaluated on clinical check-ups, periodontal charting and panoramic x-rays.

Introduction

Implant placement in aggressive periodontitis has been a questionable issue of debate. Although there are still some clinicians who consider periodontal disease an absolute contraindication for dental implants, randomized clinical studies show that there is no statistically significant difference in implant survival rates in patients with implants replacing teeth lost due to chronic periodontitis (90.5%). This is compared to patients with implants replacing teeth lost due to reasons other than periodontitis (96.5%) during a 10-year maintenance period and in particular, those who give up smoking and improved their oral hygiene routine [1].

Case Description

A 44 year old female patient presented in our clinic in March 2006, with the major complaint of gradually increasing teeth mobility, bleeding when brushing and recently spontaneous loss of tooth 1.2. (U.S. system #7). She denied any alteration of the systemic conditions, being at that time a heavy smoker (more than 20 cigarettes p/day). Anamnesis revealed nocturne bruxism parafunctional activity.

Clinical Examination

• Facial examination

showed a rounded symmetric face (Fig. 1) with the face midline perpendicular to the bipupilary line, light alteration (1-2mm) of the VDO (Vertical Dimension of Occlusion). Class 1 (low) lip line. Mouth opening 40mm, normal TMJ movement and well developed masticatory muscles.

Oral examination

(Fig. 2) revealed a labio-genial mucosa of normal aspect, as well as the one of tongue, palate and floor of the mouth, normal tongue mobility, normal saliva secretion in both quality and quantity, presence of scanty calculus with moderate to severe gingival inflammation and poor oral hygiene and Kenedy class III edentulous maxillae and mandible restored by four fixed partial PFM dentures with poor fit: grade 1 mobility for the one from the 4^{th} quadrant teeth/dentures and grade 2 mobility for the ones from quadrants 1^{st} , 2^{nd} and 3^{rd} . The remaining anterior non-covered teeth presented attrition grade 2. BOP and deep probing depth of all remaining teeth (Figs. 4-5).

• Panoramic x-ray examination

Orthopantomography (Fig. 3) shows vertical bone loss in relation to all teeth present on the both arches (1.8., 1.7., 1.3., 1.1., 2.1., 2.2., 2.3., 2.8., 3.7., 3.5., 3.4., 3.3., 3.2., 3.1., 4.1., 4.3., 4.4., 4.5., 4.7.).

Diagnosis

Severe deep generalized periodontitis without indication of conservatory treatment of the remaining teeth.

Restoration Type

Cement implant supported PFM fixed full dentures.

Materials

ATID Alpha-Bio Tec implants, Xenograft and Collagen Membrane.

Treatment Plan and Goals

In this case, the treatment options were presented to the patient using Dental Master software [2]: full upper and lower denture, maxillary and mandibulary implants supported overdentures and maxillary and mandibulary porcelain fused to metal fixed implants supported full bridges (Fig. 6). Patient selected the full PFM bridges.

Step I

24-05-2006: During the first treatment visit, we proceeded with the extractions (Fig. 7), the curettage of alveolar pockets and the appliance of immediate full upper and lower dentures (Figs. 7-10).

Step II

20-07-2006 (2 months following Step I): Early placement with soft tissue healing implant insertion according to SAC classification in Implant Dentistry [3] in the position of 1.7. (ATI 4.2/10mm); 1.6. (ATI 4.2/11,5mm); 1.4. (ATI 3.75/11,5mm); 1.3. (ATI 3.75/11,5mm); 1.2. (ATI 3.75/10mm); 2.2. (ATI 3.75/10mm); 2.4. (ATI 3.75/11.5mm); 2.6. (ATI 3.75/11.5mm); 2.7. (ATI 4.2/10mm); 3.7. (ATI 4.2/11.5mm); 3.6. (ATI 3.75/11.5mm); 3.4. (ATI 3.75/16mm), 3.2. (ATI 3.75/16mm); 4.2. (ATI 3.75/16mm); 4.4. (ATI 3.75/16mm); 4.6. (ATI 3.75/11.5mm); 4.7. (ATI 4.2/11.5mm), bilaterally closed sinus lifting at the levels of 1.7. and 2.7., GBR with Xenograft and Collagen Membrane at the level of implants 3.7. and 4.7. were realized by Dr. Ion Nicolescu. Dentures soft tissue relining using GC Tissue Conditioner with Nistatin in concentration below 1.000.000U [4] (Figs. 11-14).

Step II

26-09-2006 (2 months following Step II): The removable dentures were anchored to the 1.4., 2.4., 4.4. and 3.4. implants using ball attachments to reduce overpressure on the facial bone over the implants and to ensure patient comfort for the remaining 5 months by uncovering the upper denture's palatal area (Figs. 15-20).

Step IV

February-March 2007: After 7 months of osseontegration of the implants at the level of the sinus augmentation, all the implants were uncovered and all the necessary steps for completing the porcelain fused to metal full arches reconstruction were fulfilled. The provisional overdentures where used as a template for the primary computerized smile design [5] (Fig. 21). Selection of the tooth size was performed using Dr. Levin's Golden Proportion Mean Gauge [6] (Fig. 22), with the size of the central incisor calculated at 8.5mm wide. In a one day appointment, we took the master impressions, overdenture impressions, bite registrations for cross-mounting technique [7] and measurements for incisal point lab transfer using AlmaGauge (Fig. 23) [8]. Level and direction of occlusal plane was determined and registered by use of PhisioLogic Articulation Facial Headline [9] (Fig. 24). Facial and oral examinations of the set-up are noted in Figures 25-27.

After electing TLASP and TLA 15oB abutments and parallelized milling them, MTD Arnon Kiperman elaborated the fixed provisional as well as metal try-in of the final restorations (Figs. 28-32). The type and torque values for the prosthetic abutments are noted in Table 1. After two weeks of wearing the temporary fixed provisional, the bite on provisionals and the accuracy of the occlusion registrations was again examined. The metal frameworks were over-impressioned and impressions of the provisional were taken (Figs. 33-35). On the bisque porcelain, the occlusion was adjusted according to the functional balanced occlusion principles [10] (Figs. 36-44). On 31-03-2007, the final segments were cemented using silicon cement. The seating and the control of cement removal can be seen on the panoramic X-rays (Figs. 45-55).

Abutment Type	Torque	Diameter	Length	Implant Type	Location
TLA 15 ^o B	30N/cm	4.2mm	10mm	ATID	1.7.
TLA 15 ^o B	30N/cm	4.2mm	11.5mm	ATID	1.6.
TLASP2	30N/cm	3.75mm	11.5mm	ATID	1.4.
TLA 15 ⁰ B	30N/cm	3.75mm	11.5mm	ATID	1.3.
TLA 15 ⁰ B	30N/cm	3.75mm	10mm	ATID	1.2.
TLA 15 ⁰ B	30N/cm	3.75mm	10mm	ATID	2.2.
TLA 15 ⁰ B	30N/cm	3.75mm	11.5mm	ATID	2.4.
TLA 15 ⁰ B	30N/cm	4.2mm	11.5mm	ATID	2.6.
TLASP2	30N/cm	4.2mm	10mm	ATID	2.7.
TLASP2	30N/cm	4.2mm	11.5mm	ATID	3.7.
TLASP2	30N/cm	3.75mm	11.5mm	ATID	3.6.
TLASP2	30N/cm	3.75mm	16mm	ATID	3.4.
TLASP2	30N/cm	3.75mm	16mm	ATID	3.2.
TLASP2	30N/cm	3.75mm	16mm	ATID	4.2.
TLASP2	30N/cm	3.75mm	16mm	ATID	4.4.
TLASP2	30N/cm	3.75mm	11.5mm	ATID	4.6.
TLASP2	30N/cm	4.2mm	11.5mm	ATID	4.7.

Table 1: Abutment Types and Corresponding Implant Parameters

Follow-Up

Patient returned for a check-up one day following cementation, when the bone sounding was performed (Figs. 56-57), then returned after 1 week, 1 month, 3 months and every 6 months for the first 5 years. Due to changing her place of residence, the patient had not been seen for 2 years until April 2014. At the oral clinical inspection, we saw a healthy attached gingiva around all implants, reduced quantity of plaque deposits and good maintenance of restorations, except for surface enamel chipping at the level of 1.1. and 2.4. The panoramic X-ray and bone sounding revealed good bone stability over the 7-year follow-up (Figs. 58-65).

Conclusions

There are multiple factors that could influence the long term prognosis of dental implants treatment. Some are patient related (i.e., bone quality and quantity, systemic diseases, irradiation, infections, oral lesions, age, gender, oral hygiene and oral habits), while others depend on the clinician (site selection, selection of implant design, implant numbers and distribution, surgical technique, time of loading, design and prosthesis materials) [11]. Although only one of these factors was not been fulfilled in this case (the patient did not wear the night guard even though she was diagnosed with nocturne bruxism), we encountered very good bone stability around maxillary and mandibular implants in the following 7 years.



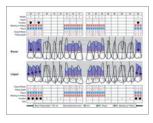
1 Clinical facial image at presentation



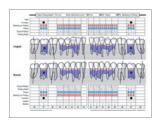
2 Clinical oral image at presentation



3 Panoramic x-ray at presentation



 Maxilary teeth periodontal chart



5 Mandibulary teeth periodontal chart



Treatment options simulated using DentalMaster software



Treatment options simulated using DentalMaster software



Treatment options simulated using DentalMaster software



Go Treatment options simulated using DentalMaster software



Treatment options simulated using DentalMaster software



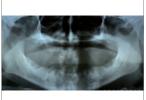
Treatment options simulated using DentalMaster software



Immediate full dentures preextractional prepared



Oral image of postextraction alveolar ridges



Panoramic x-ray after extraction



Oral image of immediate overdentures soft relined "in situ"



11 Oral image of maxillary ridge after implants insertions



Oral image of mandibular ridge after implants insertion



Panoramic x-ray after implant insertion (Surg. Ion Nicolescu)



Re-relined dentures after implant insertion



Oral image of maxilary ridge 2 month after implant insertion. Mounted TB4 straight ball attachment at the level of 1.4. and 2.4., 3,75/11,5 mm ATID implants



Oral image of mandible ridge 2 month after implant insertion. Mounted TB3 straight ball attachment at the level of 3.4. and 4.4., 3,75/16mm implants



Clinical oral image 2 month after implants insertion – good soft tissue healing arround healing abutments



Clinical oral image 2 monthafter implants insertion-removable upper denture relined, direct anchorated on ball attachments and palatal reductioned



Clinical oral image 2
month after implants
insertion – removable
lower denture relined and
direct anchorated on ball
attachments



Clinical oral image 2 month after implants insertion - removable dentures relined and direct anchorated on ball attachments



21 Computer face analysis for election the form, shape and position of the teeth



Golden mean gauge used for election the wideness of the upper frontal teeth related to intercomisural diameter



43 Alma-gauge used for transfering the position of incisal point and of the incisal margin of the two central incisors relatively to the retroincisive papilae - being possible in one step procedure to copy the provisional removable teeth position to the set-up and fixed provisional



Face-headlines instrument used to transfer level and direction of the oclusal plane in the lab



25 Frontal face appearance with setup



26 Lateral face appearance with set-up



Oral examination of the set-up



Lab work delivered after set-up check: TLA paralelised abutments, fixed composite provisionals and metal try-in (MTD Arnon Kiperman)



29 Abutments insertion fixed with 35 N/cm torque value



Metal try-in and bite registration check-up



31 Upper and lower composite fixed provisional



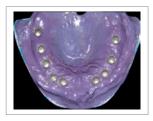
Upper and lower composite fixed provisional Fig



Provisional impresions and interprovisional bite registration



Metal bite registration and pick-up impressions using 3M-Espe Impregum



Upper metal substructure pickup



33 Upper and lower bisque bake phase PFM on models (MTD Arnon Kiperman)



Upper and lower bisque bake phase PFM on models (MTD Arnon Kiperman)



Upper and lower bisque bake phase PFM on models (MTD Arnon Kiperman)



Upper and lower bisque bake phase PFM on models (MTD Arnon Kiperman)



40 Clinical try-in of bisque bake phase PFM



41 Clinical try-in of bisque bake phase PFM



Oclussion check of bimaxilary PFM fixed retorations in bisque bake phase Fig



Bilateral balanced oclussion on bisque bake phase (maxilary arch)



Bilateral balanced oclussion on bisque bake phase (mandibular arch)



Final PFM full arch restorations on models (occlusal view) - MTD Arnon Kiperman



Final PFM full arch restorations on models (lateral right view) - MTD Arnon Kiperman



Final PFM full arch restorations on models (frontal view) - MTD Arnon Kiperman



48 Final PFM full arch restorations on models (lateral left view) - MTD Arnon Kiperman



Oral image of abutments before cementations Fig



50 PFM full arches restorations cemented on implants in oclusion (frontal view)



51 PFM maxilary arch restoration (oclusal view)



52 PFM full arches restorations cemented on implants in disclusion



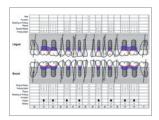
53 PFM mandibulary arch restoration (oclusal view)



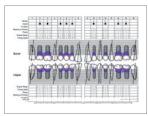
Panoramic x-ray at the day of insertion



Facial appearence in the day of delivery



Maxilary periodontal postinsertion



57 Mandibular periodontal postinsertion



Frontal view of PFM full arches restorations in oclusion 7 yrs after



PFM maxilary arch restoration (oclusal view) 7 yrs after



60 PFM full arches restorations in disclusion 7yrs after



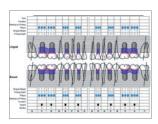
61 PFM mandibulary arch restoration (oclusal view)7 yrs after

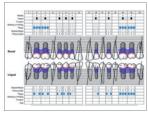


62 Panoramic x-ray 7 yrs after



63 Facial appearence 7 years after





Maxilary periodontal chart 7 years postinsertion

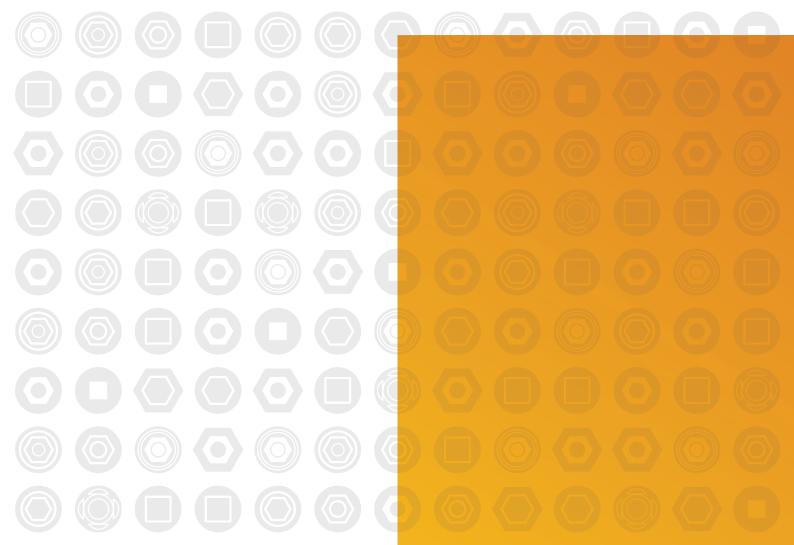
Mandibular periodontal chart 7 years postinsertion

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