MIS GLOBAL CONFERENCE 2018

Clinical Case Competition

At the 4th MIS Global Conference, Bahamas 2018

The following case studies were entries for the clinical case competition, displayed as posters at the 4th MIS Global Conference 2018. Out of the 50 cases submitted for review, the scientific committee, which included Professor Nardy Caspi, Professor Moshe Goldstein and Dr. Yuval Jacoby, chose the finalists, out of which these 3 winners were ultimately chosen.

First place winner, Dr. David Norre from Belgium, presented his case "When digital meets Biology", in which he presented a digital treatment workflow through implant planning using the MSOFT and MGUIDE systems.

The second place winner, Dr. Zev Schulhof from the USA, named his case "Sorry, you are not an implant candidate" - a challenging treatment plan, in which he presented the MIS MGUIDE system as the best solution.

Dr. Ran Asher from Israel was the third place winner, with his case ‘‘360˚ Implantology Modern Technologies & Techniques in Clinical Practice’’.

We would like to thank all the doctors who participated in the competition and we are proud to present you with the top 15 selected cases.

Click on the name to see the clinical case

- Dr. David Norre, Belgium
- Dr. Zev Schulhof, USA
- Dr. Ran Asher, Israel
- Dr. Carlo Arcara, Italy
- Dr. Oscar Arauco, Bolivia
- Dr. Umut Baysal, Germany
- Dr. Joan Tomas Bueno, Spain
- Dr. Alberto Mendez Delgadillo, Bolivia
- Dr. Cosmin Dima, Romania
- Dr. Pablo Ramírez Marrero, Spain
- Dr. Thomas De Peuter, Belgium
- Dr. Maria Ramos, Belgium
- Dr. Fabián Giovanny Rosero Salas, Ecuador
- Dr. Sofie Velghe, Belgium
- Dr. Christian Wehner, Austria

When Digital Meets Biology. Molar Concept: an Evidence Based Approach.

Dr. David Norre

Department of Periodontology, KU Leuven University, Belgium. Private Practice, Belgium

CASE REPORT

- Female patient, 41 years old
- No medical history
- Non-smoker
- ASA: 1
- Problems: Has lost teeth 36 & 37

02/04/2015

11/5/2016

Lost teeth 36-37

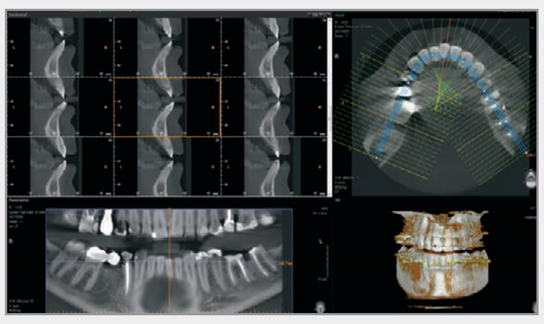
TREATMENT PLANNING

- Guided implant osteotomy through the roots[1]
- Extraction of teeth# 36-37
- Immediate implantation of V3 B+ implants
- Immediate wound closure with custom made healing abutment [1,2,4]
- Fabrication of 2 single crowns copy milled from healing

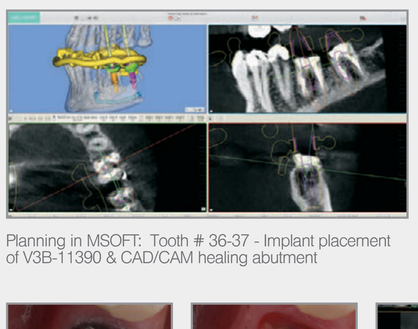
Examples of possible problems with delayed implant placement in molar region

TREATMENT WORKFLOW

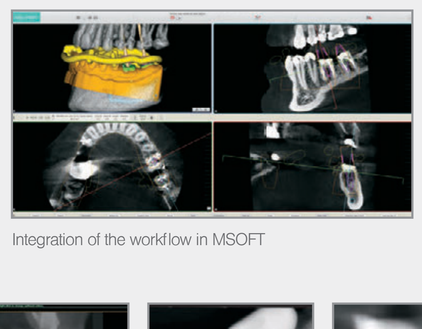
- Digitalized patient: Matching 3Shape scan & CBCT
- Implant planning on MSOFT & MGUIDE and healing abutment fabrication
- Extraction & immediate implant placement: V3 B+ implants Filling jumping distance with xenograft & L-PRF [3]
- After 3 months IOS (3Shape) on implant level and fabrication of 2 single implant crowns



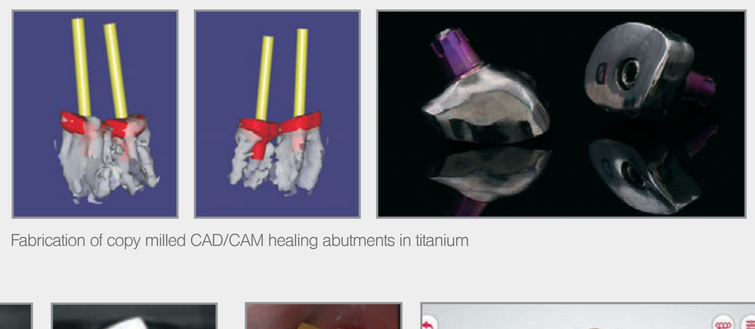
Workflow		
Dental Office	**M Center**	**Time**
3 Shape / impression & CBCT & work order : upload via cloud		20'
2 days	Put CBCT on stl into M soft Match STL & plan implant	
Skype with M center or change yourself in M soft & approve		1'-5'
2-5 days	Produce guide & ship guide	
Do surgery		20'



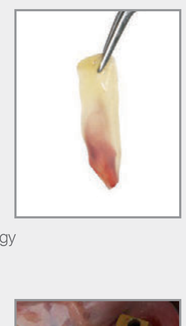
Planning in MSOFT: Tooth # 36-37 - Implant placement of V3B-11390 & CAD/CAM healing abutment



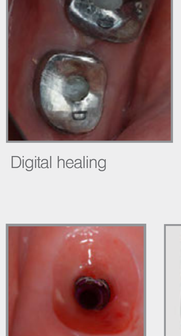
Integration of the workflow in MSOFT



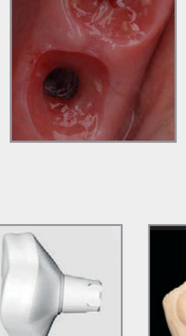
Fabrication of copy milled CAD/CAM healing abutments in titanium

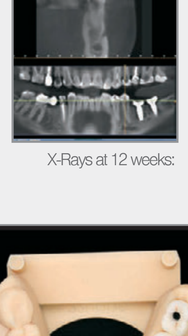


When digital meets biology

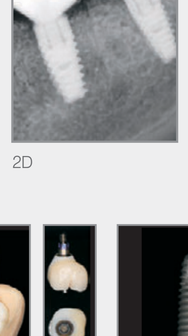


Digital healing

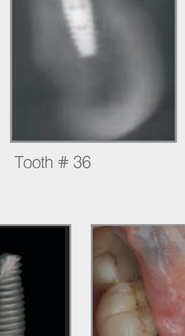




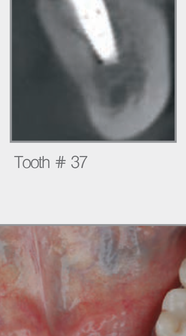
X-Rays at 12 weeks:



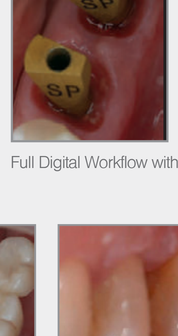
2D

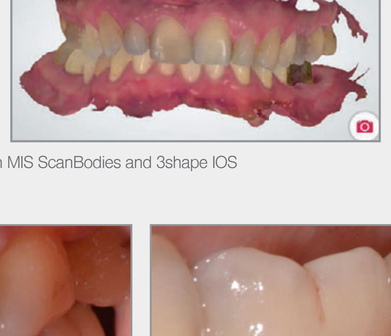


Tooth # 36

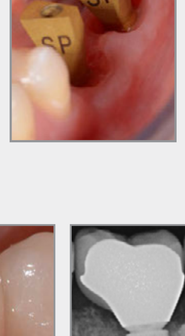


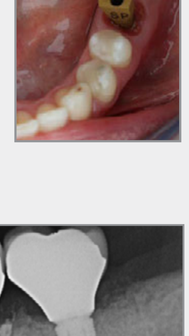
Tooth # 37





Full Digital Workflow with MIS ScanBodies and 3shape IOS





CAD/CAM. Design of the crowns: STL of the healing abutment

Enhanced biology

Day of insertion

10 weeks after placement of the crowns

X-ray at 5 months

REFERENCES

1▪ Rebele SF, Zuhr O, Hürzeler MB. Pre-extractive interradicular implant bed preparation: case presentations of a novel approach to immediate implant placement at multirooted molar sites. Int J Periodontics Restorative Dent. 2013 Jan-Feb;33(1):89-96
2▪ Passoni BB, Marques de Castro DS2, de Araújo MA2, de Araújo CD2, Piatelli A3, Benfatti CA4. Influence of immediate/delayed implant placement and implant platform on the peri-implant bone formation. Clin Oral Implants Res. 2016 Nov;27(11):1376-1383
3▪ Temmerman A. The use of leucocyte and platelet-rich fibrin in socket management and ridge preservation: a split-mouth, randomized, controlled clinical trial. J Clin Periodontol. 2016 Nov;43(11):990-999
4▪ Finelle G, Lee SJ. Guided Immediate Implant Placement with Wound Closure by Computer-Aided Design/Computer-Assisted Manufacture Sealing Socket Abutment: Case Report. Int J Oral Maxillofac Implants. 2017 Mar/Apr
5▪ Linkevicius T. The Novel Design of Zirconium Oxide-Based Screw-Retained Restorations, Maximizing Exposure of Zirconia to Soft Peri-implant Tissues: Clinical Report After 3 Years of Follow-up. Int J Periodontics Restorative Dent. 2017 Jan/Feb;37(1):41-47
6▪ Canullo L1, Micarelli C, Lembo-Fazio L, Iannello G, Clementini M. Microscopical and microbiologic characterization of customized titanium abutments after different cleaning procedures. Clin Oral Implants Res. 2014 Mar;25(3):328-36

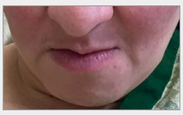
Sorry, You are not an Implant Candidate

Zev Schulhof DMD, MD

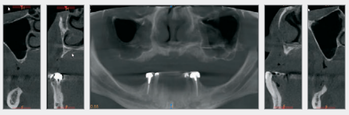
Diplomate, American Board of Oral & Maxillofacial Surgery

HISTORY

- R.S. is a 34 year old woman that presented to our office for an implant consultation. Mrs. S was edentulated in her maxilla and posterior mandible at a young age, as her parents could not afford proper dental care.
- Mrs. S has been wearing a full maxillary denture and mandibular partial denture for over 15 years. She denies any medical problems, current medication or allergies. She has been recently married and her husband has never seen her without her dentures in place.
- Mrs. S tells us that her upper denture no longer has any retention even with copious amounts of adhesive and she is desperate for a fixed prosthesis. She is happy with her lower partial denture.
- She tells us that she has been to 3 dental surgeons and 2 dental schools and she has been told "We are very sorry, but you are not an implant candidate"



Extraoral exam revealed a flat midface with loss of anterior maxillary projection, leading to a misconception that the patient was much older than her age...



ASSESSMENT

· Poor maxillary projection and a "collapsed midface" · No native alveolar bone remaining · Total sinus pneumatization · Extremely poor gingival architecture with scant remaining attached gingiva

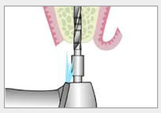
TREATMENT PLAN

A 3 step process (each 4 months apart)

Step 1. Lefort I Osteotomy with interpositional Graft: Due to the amount of bone required we would obtain the bone from the Anterior Iliac Crest

Iliac crest bone graft

Fixation of the iliac crest bone graft with bone plates and screws



Step 2. Hardware removal and implant placement: Potentially, a second large and involved procedure

Step 3. Final Restoration with Fixed full-arch Prosthesis: Either screwdown or cement retained

GREATEST CHALLENGE

- During the phase I Lefort osteotomy, the patient's down fractured maxilla is extremely thin.
- It is extraordinarily difficult to affix the iliac crest graft to the downfractured maxilla and in turn, affix the downfractured maxilla back to the basal maxilla and zygoma.
- This requires a large amount of hardware ie. plates and screws.
- These plates and screws ultimately poses a great challenge when it comes time to place the dental implants during phase II surgery.

PROBLEM

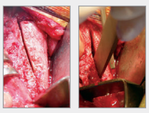
- A large second surgery under general anesthesia is usually required to remove these plates and screws to make room for implant placement.
- During the plates and screws removal, portions of the bone graft can be displaced or break off.
- Reflecting the supporting tissue leads to decreased blood flow to the grafted area and possible future resorbtion of portions of the graft.
- Some of the hardware becomes buried by bone and becomes inaccessible, thereby necessitating ostectomy to access the screws.

SOLUTION

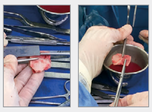
MIS MGUIDE

With the advent of MIS MGUIDE we would be able to avoid all of these issues and concerns, and avoid a large second stage surgery.

TREATMENT WORKFLOW

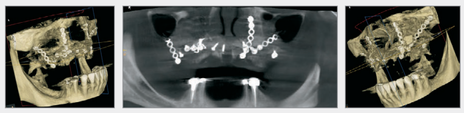


Harvesting of the anterior iliac crest



Harvesting of the anterior iliac crest

Lefort I downfracture of the maxilla, and beginning of the bone grafting process. You can see 2 blocks of bone already placed in the anterior maxilla / nasal area, fixated with 3 screws (one on the right and 2 on the left)



Post operative CT Scan showing extraordinary amount of plate and screw fixation required for multiple corticocancellous block fixation. The maxilla was also fixated in an anterior position to give the patient more lip support. You can now appreciate the extreme challenge of putting implants into these areas.

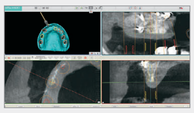
Post–op day 9, patient goes to prosthodontist for insertion of her transitional denture on her new ridge

Second stage surgery MGUIDE planning

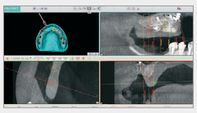
Together with Ismael Pedraza (of MIS USA), we carefully treatment planned placement of MIS SEVEN implants into areas, surrounding and avoiding any of the existing hardware.

Most of the implants would be placed utilizing a flapless procedure.

In only one area, did we decide to remove a screw to facilitate implant placement and this was easily achieved thru a normal crestal incision.



Placing implants precisely in between the hardware

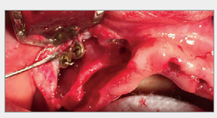


Using a longer drill guide and placing a shorter implant where the surgical site is deep

Of note, in this unique situation Ismael and I treatment planned some novel approaches to the guide placement. In some areas we prepped with longer drill guides and placed shorter implants, and in some areas we prepped with a drill guide and used hand placement. We also created a few alternate drill guide holes in case they became necessary intraoperatively.

New maxillary ridge after four months of healing, now ready for implant placement

Placement of MIS MGUIDE



The one area intraoperatively where a screw removal was required. Note the other areas of flapless surgery. The surgery was completed in-office, under local anesthesia in about 30 minutes.

Post–op Panorex

Four months later. Milled titanium framework try-in

Framework with teeth on model (occlusal view)

Finished prosthesis in mouth (front view)

Finished prosthesis in mouth after Zoom whitening of lower teeth

360° Implantology: Modern Technologies & Techniques in Clinical Practice

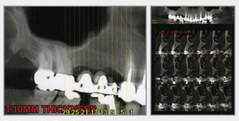
Dr. Ran Asher

Dept. of Periodontology, Faculty of Dental Medicine Hadassah – Hebrew University Medical Center Jerusalem, Israel

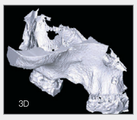
CASE REPORT

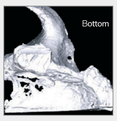
- Male patient, 45 years old
- No medical history
- Non smoker
- Problems: can't eat, especially solid food

Clinical Examination: Extensive horizontal bone resorption



Radiographic Examination

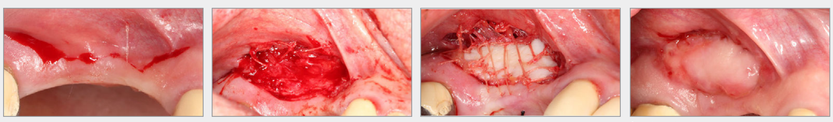




Case Difficulty: - Extensive horizontal bone resorption. - Insufficient amount of keratinized tissue. - Patient desire for fixed dentures.

TREATMENT PLAN

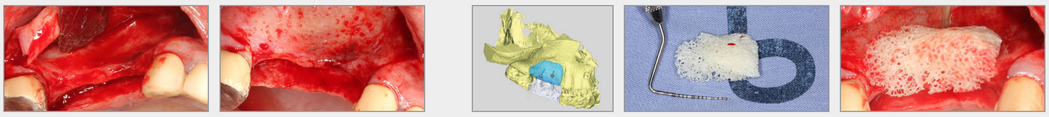
1. Soft tissue augmentation surgery - enhancing the width of keratinized tissue.



Harvesting a free gingival graft from the palate and secure it to the underlying periosteum

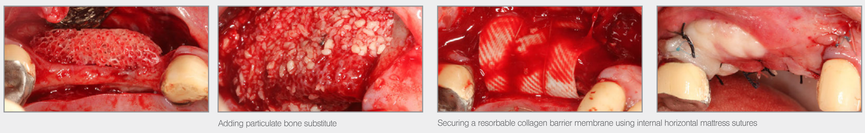
2 weeks post-op

2. Guided bone regeneration via customized allogenic bone block.



GBR using Customized Allogenic Bone Block

Based on CBCT scans of the patient, the bone block is virtually designed using 3D CAD/CAM technology

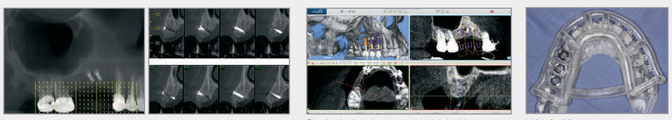


Adding particulate bone substitute

Securing a resorbable collagen barrier membrane using internal horizontal mattress sutures

6 weeks post-op

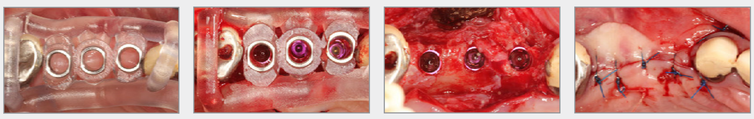
3. Implant placement using digitally guided surgery



Radiographic evaluation 6 months after GBR

Planning implant placement using digital guided surgery

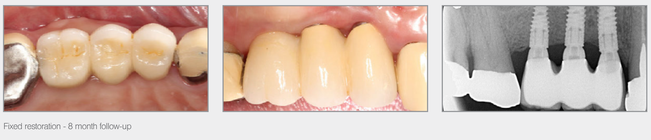
MIS MGUIDE template



Implant placement (V3 implants Ø3.9x13mm, Ø3.9x11.5mm, Ø3.9x8mm)

2nd stage implant surgery- 6 months after implant placement

RESTORATION



Fixed restoration - 8 month follow-up

Treatment of a Fistula in Keratinized Mucosa and Presence of Tooth Discoloration

Dr. Carlo Arcara

Private practice in Sicily, Italy

CASE REPORT

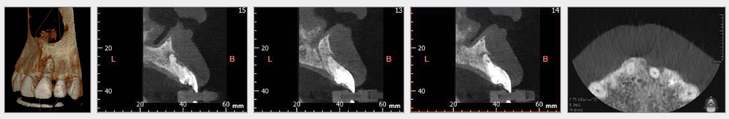
Patient: Rita L.
Gender: Female
Age: 45

Remote pathological anamnesis: the patient had tooth 21devitalized following a trauma two years ago. A canal retreatment was performed after a new episode of swelling and pain 2 years later.

Future pathological anamnesis: the patient came to my studio with pain and the presence of a fistula on the vestibular mucosa of the tooth 21.

Clinical image from the patient visit. There is presence of a fistula in keratinized mucosa and tooth discoloration.

Radiographic evaluation: An incomplete endodontic therapy is evident, with the presence of a radiotransperent area in the apex. The rarefaction area brings me to conduct a second radiographic evaluation with CBCT.



CBCT evaluation: The CBCT scan highlights root resorption and the lack of vestibular bone due to the presence of infection.

DIAGNOSIS AND THERAPY

Following radiographic evaluation, tooth 21 is hopeless. For this reason I decide to do an extraction with the use of PRGF for a primary closure of the site and with the use of a removable denture. After a healing period of 6 months, an implant will be inserted in site 21.

TREATMENT WORKFLOW

Phase of atraumatic extraction. The lack of buccal bone is evident as well as tooth resorption.

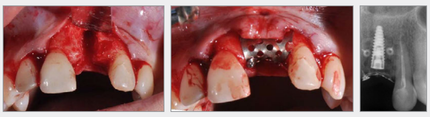
After debridement of the fresh socket, I placed calcium phospate with PRGF inside. I also used membrane of PRGF and a 6-0 PGA suture for primary closure and healing.

Healing of the site after two weeks.

Healing of the site after 1 month.

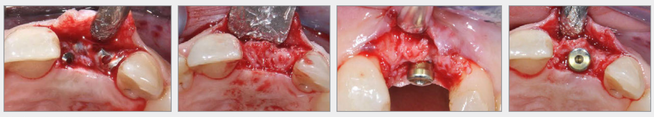
Healing of the site after 6 months.

Radiographic evaluation after six months of healing. It is evident that the biomaterial hasn't completely integrated in the site. I prepare my second stage of surgery with the probability to find the lack of bone for the placement of an implant.

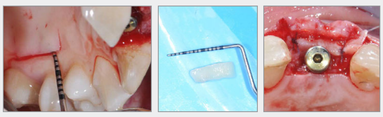


When I opened the flap, I found non-integrated calcium phosphate. I then inserted a C1, Ø3.75mm x 11.5mm, conical connection implant and used a titanium mesh for the regenerative procedure without any use of bone. I fixed the mesh with a titanium pin.

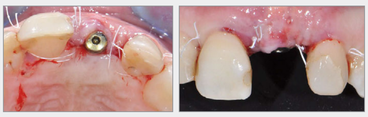
4 months of healing.



After 6 months of healing, I proceed with removing titanium mesh to insert a healing cup.



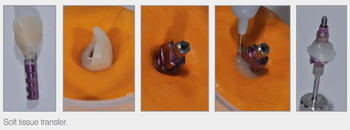
To increase the volume of soft tissue, a connective tissue graft from the palate is made and sutured with pga 7- 0.



Primary closure with goretex 5-0.

Healing after 2 weeks.

After 2 weeks, a provisional screw is inserted and conditions the tissues while we wait for the maturation of the connective tissue graft.



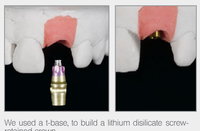
Soft tissue transfer.

Impression with personalized transfer, to reproduce soft tissue volume and implant transmucosal patch.

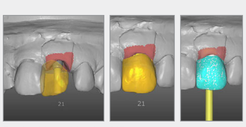
Difference in the volume of soft tissue, first after the extraction and then after the maturation of connective tissue graft.

Central incisor is triangular in shape, which is very rare. This shape usually shows interdental black triangles, so I decided to turn the shape of the two central incisors into square-rounded, and to report this data to the laboratory.

Creation of model work (Laboratory).



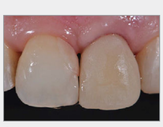
We used a t-base, to build a lithium disilicate screw-retained crown.



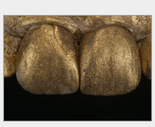
Transfer of the model work in CAD and virtual wax-up of crown #2. (Laboratory)

From digital wax-up to analogic wax (Laboratory).

Crown test (Laboratory).

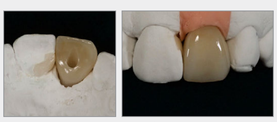


Clinical step.

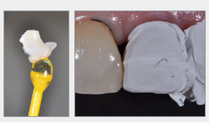


Laboratory procedure.

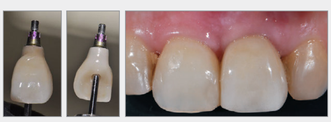
Laboratory procedure.



Work completed, with crown on implant #21 and additional micro veneer on tooth #11 (Laboratory).



Cementation of veneer on tooth #11 (Laboratory).



Insertion of implant crown (Clinic).

X-ray of implant with crown.

Soft tissue volume around implant and integration of restoration.

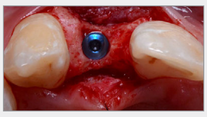
Surgical and Prosthetic Protocol for Unitary Implant in Healed Flange

Dr. Oscar Arauco Urzagaste

Private Practice, Cochabamba, Bolivia

ABSTRACT

This case presentation is about a 19 year old female patient. She reported that eight years ago, the upper right lateral incisor was detected radiographically retained in an unfavorable position. It was decided at the time to do the surgical extraction and orthodontic treatment. She has used a removable acrylic prosthesis ever since and now wishes to replace tooth12 with an integrated bone implant. This is a step by step description of the treatment.



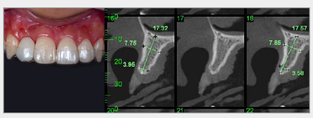
TREATMENT PLANNING & WORKFLOW

Initial photograph of smile showing the absence of tooth #12

Intraoral aspect revealing the scar of the surgical extraction and the horizontal bone-gingival defect.

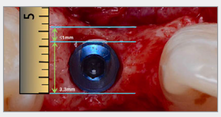
Diagnostic wax-up of the model by acryl dento gingival mock-up.

Photograph of the mock-up from an angle showing the material compensating the horizontal defect and proposing the ideal emergence profile according to the wax-up.

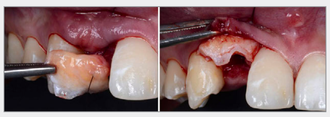


Bis-acryl tomographic guide with a medium radiopacity that permits the observance and planning of the position of the implant according to the prosthetic crown. This enables us to decide if the restoration will be screwed or cemented.

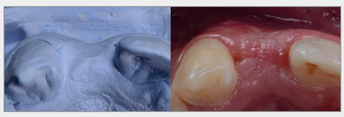
Flap elevation where the remodeling of the bone can be observed to achieve a correct distance from the clinical neck of the future prosthesis to the implant platform.

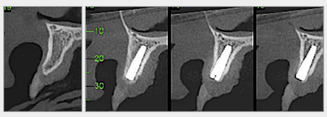


Implant placement surgery using an MIS V3 3.30x13 NP implant.



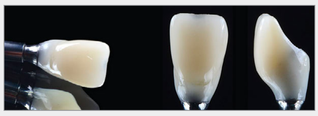
Connective tissue graft removed from the palate and placed in the recipient area to improve the thickness and appearance of the buccal soft tissue.





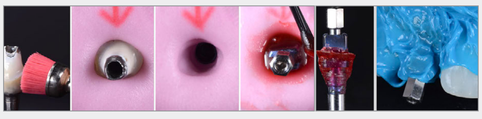
Incisal view of initial model and initial tomographic image. In both images the horizontal defect and collapse of tissues can be noticed. Incisal view and tomographic image four months after implant surgery and connective tissue graft where we can observe the increase of vestibular tissue thickness and the correct location of the implant for the cemented prosthesis.

Conditioning of the soft tissue by means of a removable splint with periodic increments of composite resin creating areas of slight compression. This technique provides an atraumatic and controlled access to the implant making the future installation of the fixed pillar much easier.

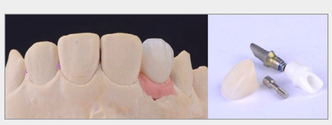


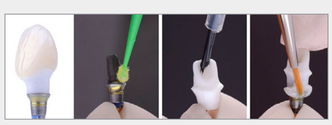
Modifications in the shape of the tooth making increases and wear of the provisional material, achieving a concave surface in the buccal face and straight or convex one in the interproximals, taking care of the polishing of the surface to achieve health and stability in the soft tissues.

Preparation of the provisional tooth in the same way as if it were a conventional preparation for a cemented crown on a natural tooth. This technique allows very accurately determining the shape and ideal size of the abutment to receive a cemented crown that also has the desired shape and the correct thickness of material without modifying soft tissues that have already been stabilized.



Once the ideal shape is obtained in the temporary abutment, a duplicate of the sub gingival part is made with laboratory silicone to customize the transfer with acrylic resin and obtain an accurate and personalized definitive impression. The coronal part of the provisional abutment can also be duplicated or scanned so that the final abutment has the same shape.





Extraoral cementation of the customized abutment, carefully removing and cleaning all excess cement before screwing the abutment.

Definitive cementation of the ceramic crown. Cemented crowns over implants are susceptible to be left with cement remains. However, the use of absolute isolation allows us to have control of the excess cement, visualizing with precision the lines of termination to remove and to clean residue carefully.

Case completed, showing the satisfactory appearance of the restoration and stability of soft tissues. The correct shape and size may be observed according to the contralateral tooth. (in the middle of the procedure dental bleaching was performed)

Natural Preservation of the Emergence Profile

Dr. Umut Baysal

Private practice focused on esthetic dentistry and implant dentistry in Cologne, Germany.

CONCEPT

Supplying single-tooth gaps with implants in the aesthetic zone is subject to strict evaluation. Objectively verifiable criteria like the “pink and white aesthetic score” were elaborated and scientific works focused mostly on the reconstruction of hard and soft tissue. However, these concepts are based on the principle of tissue reconstruction after tissue loss. The following case history pursues the approach of preventing resorption processes after tooth extraction.

CASE HISTORY AND TREATMENT

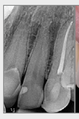


Fig. 1

Fig. 2

A 44-year-old patient visited our practice due to problems with tooth 23 for the first time in January 2016. The patient was healthy at the time of the consultation and suffered neither from acute nor chronic general diseases. The labial surface in the medium third of the root of tooth 23 was very sensitive to percussion. A dental X -ray scan of region 21–24 did not show any signs of resorptive processes (Fig. 1). The therapeutic goal was to restore the proper function of tooth 23 and to remediate the inflammatory processes. We suggested various therapeutic options and chose the implantological treatment.

Fig. 4

Fig. 3

Treating the alveolar bone and the surrounding tissue with care during the extraction may positively influence the formation of defects. After cutting all periodontal fibers to be reached from the intra-sulcular side using a micro scalpel blade, the tooth was removed from the alveolar bone axially using forceps. Figure 2 shows the situation before and figure 3 right after the extraction. The resorptive processes in the labial area which are barely perceptible in figure 3, are confirmed in figure 4, which shows the separated root and the internal resorption of the labial region.

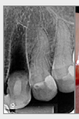


Fig. 5a

Fig. 5b

Crown and root were separated 2mm below the enamel cement junction. If there was no root canal filling available, the dental pulp areas would be cleaned and filled with composite filler. For replantation, a pre-manufactured palatinal silicone key was used to attach the crown to adjacent tooth 22 by means of acid etching (phosphoric acid, Adhese™ Universal, Ivoclar Vivadent) and composite filler (SDR™, Dentsply Sirona). Figures 5a and b show the situation right after replantation and fixing.

IMPLANT PLANNING & PROCEDURE

Fig. 10

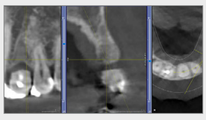


Fig. 9

The aesthetic result depends on the three-dimensional positioning of the implant. After replantation, volume loss was prevented and complete ossification of the alveolar extraction site was achieved. Figures 9 and 10 show the radiographical findings right before the implantation. In particular, the volume in orovestibular direction (Fig. 9, center) prevents the implant from being positioned too far into the palatinal direction with sufficient osseous volume of 2mm on the buccal side. The replanted crown makes it possible to plan the implant position allowing for the prosthetic component in terms of backward planning.

Fig. 11

Fig. 12

Fig. 13

Fig. 14

Fig. 15

Fig. 16

Fig. 17a

Fig. 17b

A template-guided implantation facilitates the incision-free technique and shorter treatment period, reduced patient morbidity, and better surface texture of the soft tissue. Figure 11 shows the situation after removal of the replanted crown and prior to the implantation. Using a micro scalpel blade, access to the bone was established (Fig. 12). Afterwards, a pilot hole was drilled using the MGUIDE template (Fig. 13) and further preparation performed with osteotomes (Fig. 14) after inspection of the buccal bone lamella. Despite the preventive measures, the purely subtractive preparation of the implant bed using drills was not indicated. We used a 3.3/11.5mm implant with a special triangular design of the crest, which increases the bone deposit in the critical zone (V3, MIS, Figs. 15 and 16). After implantation, the crown was replanted. Figures 16 and 17a show the status of the soft tissue right after the implantation. The atraumatic status and the complete preservation of the emergence profile are remarkable. A single-tooth radiograph was prepared to check the implantation (Fig. 17b).

Fig. 18

The implant was re-exposed three months after the initial implantation. The atraumatic exposure and removal of the replanted crown and the subsequent exposure of the implant using a micro scalpel blade cannot be compared to the typical exposure technique. The dental impressions were taken in an analog procedure using a closed tray via a transfer cap (Fig. 18). The next step was the manufacturing of an individual hybrid abutment (titanium adhesive bonding, zircon abutment) in the laboratory. The dental crown was replanted again after the impression was taken.

Fig. 19

Fig. 20

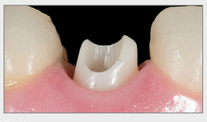


Fig. 21

In the next session, the definite abutment (Fig. 19) and a synthetic crown were tried on for aesthetic analysis. We removed the composite residues from the adjacent teeth and fixed the abutment tightly using a new screw according to the manufacturer’s instructions (Fig. 20). A new silicone impression was made in filament technique. This impression serves to manufacture the crown with the newly defined contact points to the adjacent teeth. Previously, the laboratory had manufactured an analog to the abutment of super-hard plaster to ensure the exact preparation of the crown margin. Figure 21 shows the abutment after removal of the composite residues from the adjacent teeth.

Fig. 22

Additional optimization by applying and removing provisional masses to form the emergence is not necessary anymore in most cases. This shortens the treatment duration considerably. Figure 22 shows the definite crown right after its placement.

Mimicking Nature by Means of Digital Protocols

Dr. Joan Tomas Bueno

Professor at the Master of Implantology and Periodontics Department, Catholic University of San Antonio de Murcia, Spain

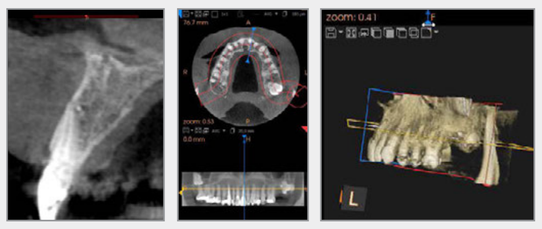
CASE REPORT

- Name: V.B.S
- Age: 57
- Gender: Male
- No relevant medical conditions
- Tooth number 21 had a deep vertical fracture making it impossible to restore. Patient´s desire was to replace hopeless tooth with an implant.

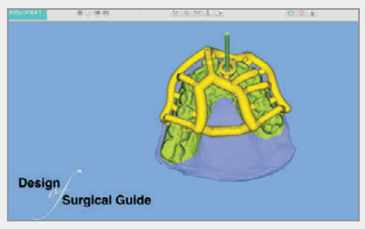
ABSTRACT

- The goal in this case was to use the CBCT information to plan, the implant placement through a surgical guide with maximum precision.
- The anatomy of the hopeless tooth was rendered from the CBCT and used to fabricate the final zirconia abutment (“1 abutment 1 time concept”) that copied the exact sub gingival contour of the extracted tooth. A PMMA provisional crown was milled before surgery.
- For matching the shade, the new protocol from eLABor_aid® by Sasha Hein was used to match a very challenging situation.

TREATMENT WORKFLOW



Pre-Op CBCT



Design of surgical guide

Design of final zirconium abutment

Initial situation

Surgical guide, final zirconia abutment + PMMA provisional ready before surgery

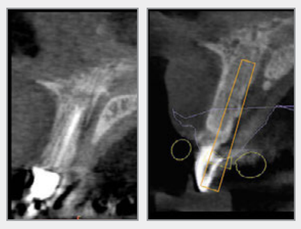
Super passive fit. Dual scan CBCT+ optical scanner

Using the new B+ surface by MIS for enhancing bone formation

Bone grafting the “Bone Zone” gap

Soft tissue grafting. Envelope preparation for #22

Soft tissue grafting. CTG harvested



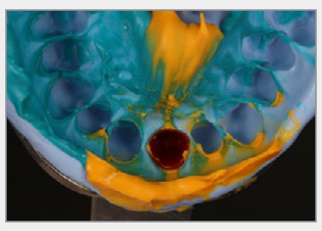
Final position vs. planning

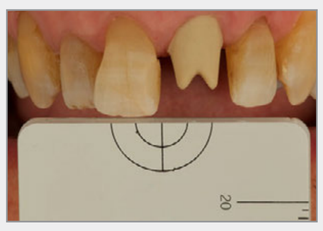
Suture removal: 15 days post-op

Post-op: 3 months - Relapse of recession #2. Too much tension

Post-op: a second round of grafting was performed in #22

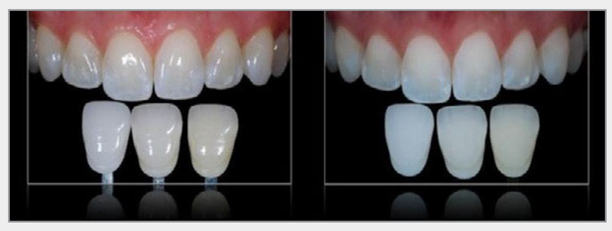
Buccal contour 5 months post-op



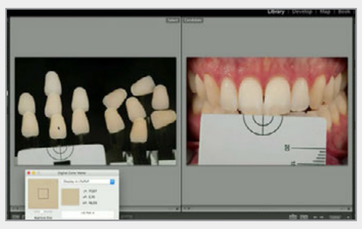


Impression with pattern resin coping + eLABor_aid® protocol for shade matching by Sasha Hein

Polar eyes



Exposure balancing + white balancing



Digital color meter

Final result

SUMMARY

Take home tips. Guided implant surgery: Improved treatment plan - Implants placed accurately and precisely - Prosthetically driven treatment plan - Easier to restore - Higher succes rate - Immediate implants/provisionals - INTRA-OP complications minimized - Less invasive - Faster.

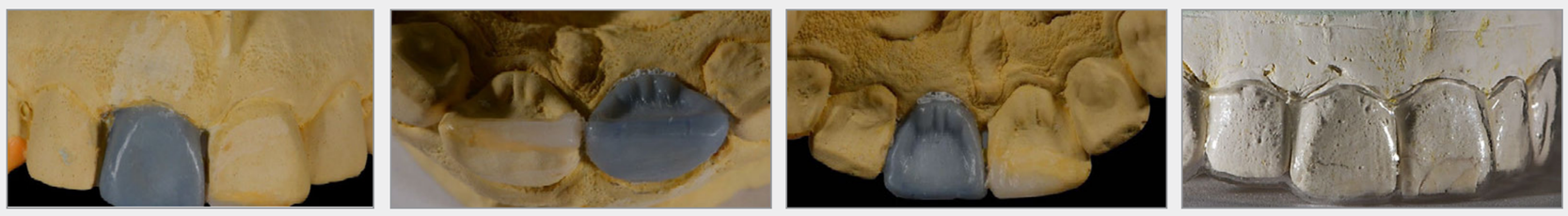
Immediate Implant Placement in Post-Extraction Site

C.D. Alberto Méndez

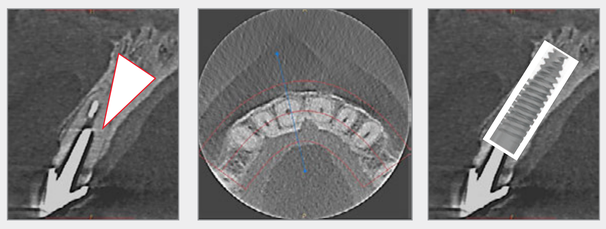
G.P.O Bolivia. Deontological perfection group.

ABSTRACT

Female patient, 35 years of age, systemically healthy. Came to the clinic for radicular fracture in tooth # 8. Subsequent planning for the immediate placement, post-extraction, of an MIS M4, 3.3 x 13mm implant. A protocol for anterosuperior sector with a bone graft and connective tissue graft obtained from the palatine area, including immediate provisionalization, is followed.

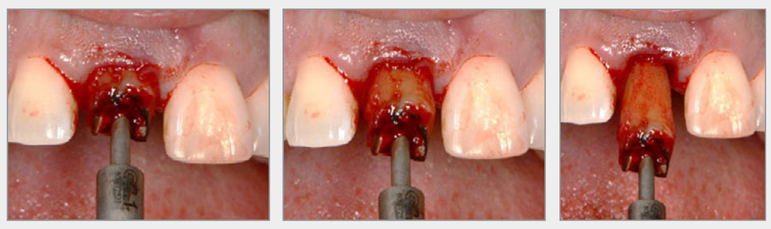


Prosthetically guided planning, to replace the upper right central incisor. Obtaining a surgical guide made of an acetate sheet.

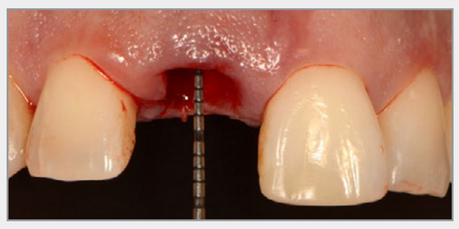


Evaluation of computerized axial tomography, where we found optimal residual palatal bone in which to place the implant.

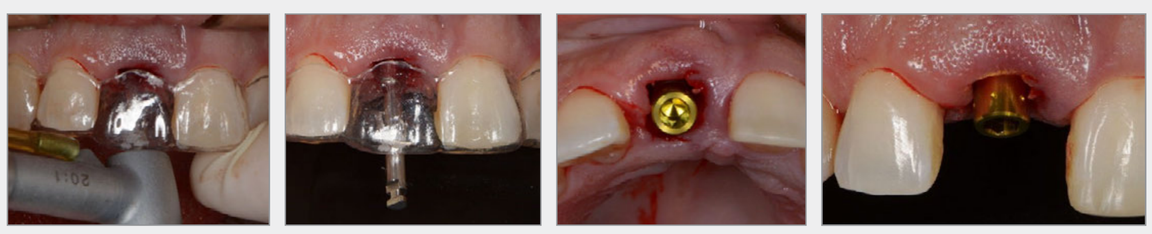
Minimally traumatic exodontia using a vertical extractor.



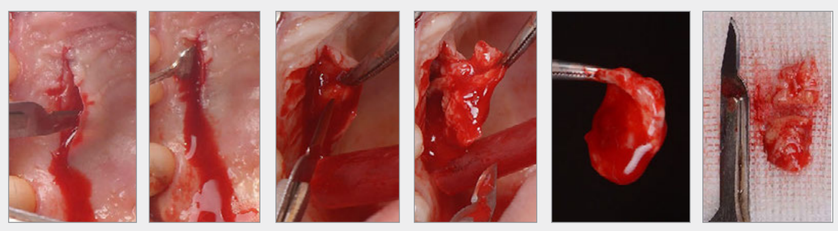
With the vertical extractor, we were able to remove the tooth without damaging the bucal and proximal bone.



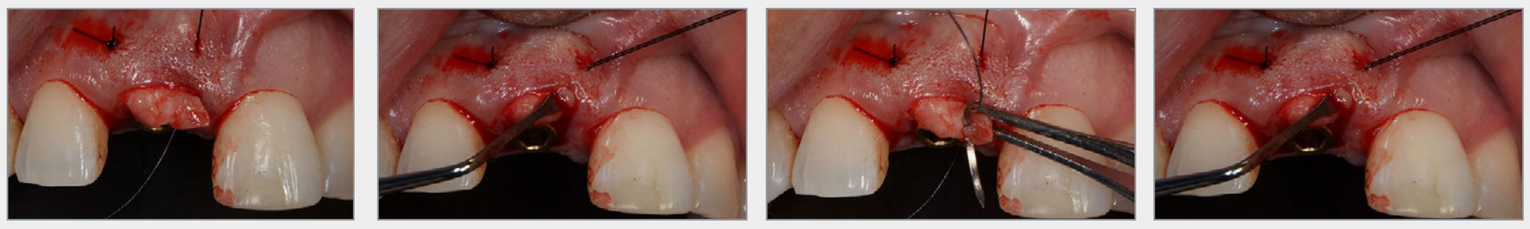
Preserving the integrity of the soft tissue.



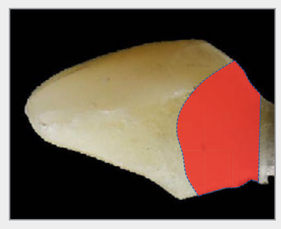
Palatinized final position of a narrow platform implant MIS M4 3.3 x 13mm.



Obtaining connective tissue graft of a safe area of the keratinized palatine mucosa.



Placement of the connective graft by vestibular to compensate the alveolar remodeling post exodontia.

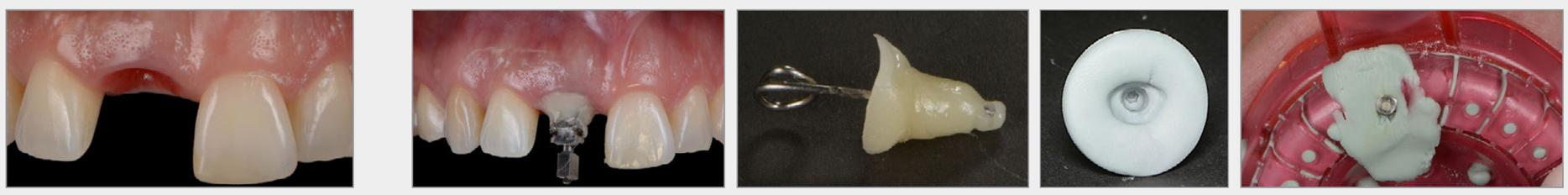


Correct handling of the emergence profile helps sustain the gingival architecture.

Immediate temporary prosthesis without functional load.

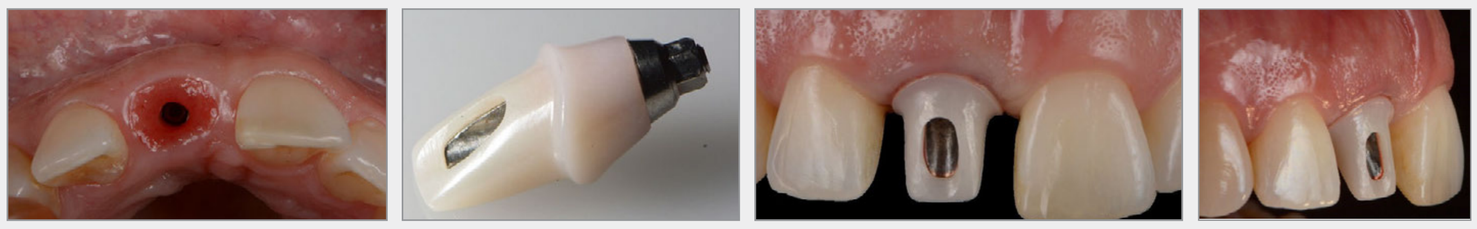
Stable soft tissue after 120 days of healing.

Maintains a vestibular contour.



Health and harmony.

Customized transfer.



Customized abutment produced from zirconium with a metallic base and metal free crown in lithium disilicate.

Macrotexture and microtexture that mimic the nature of a tooth.

Stability of the gingival zenith and interproximal tissue.

Tridimensional Reconstruction of the Bone and Soft Tissue Improvement in Challenging Cases of the Esthetic Zone

Dr. Dima Cosmin

Dental Progress - Private Dental Clinic, Bucharest, Romania

INTRODUCTION AND BACKGROUND

47 years old female patient presented at our practice in September 2015 with a shocking case of dental trauma caused historically in various dental practices. The case study revealed both functional and esthetic issues given by multiple extractions which have caused, during the years, major bone loss and huge gingival recession defects. She accepted the proposed treatment consisting of 8 implants (12, 13, 23, 25, 35, 37, 44, 47), bone augmentation, soft tissue preservation and development (CTG and Roll Flap), which are paramount to long term success in achieving the best natural esthetic and functional outcome, both vital to patient satisfaction. The patient did not go in for a dental check-up in 5 years and she no longer had confidence in dentists due to past experience with dental practices.

TREATMENT GOALS

- Functional and esthetic rehabilitation, bone augmentation, soft tissue management, preservation and development, surgical strategy in implant placement and long term stability.
- Explore different possibilities of functional and esthetic rehabilitation in conditions of bone resorption and high gingival recessions.

SURGICAL TREATMENT

The exposed root surface of tooth 23 was scaled. No vertical incisions were made. The gingiva was elevated on both sides of the recession using MB69 micro-blade and tunneling instruments followed by mucosal detaching. The second step was to harvest a sub-epithelial connective tissue graft from the palatal mucosa. The area extended from the mesial aspect of the left first premolar to the mesial aspect of the left first molar. The single-incision technique was used to remove the graft and the palatal site was stitched with single sutures. The graft was positioned under the flap and over the exposed root surface of tooth 23 and secured with 6 /0 PTFE sutures.

The next stage of the treatment included the insertion of MIS SEVEN implants in the positions of 12 and 13, bone augmentation and soft tissue management covered by two layers of collagen membrane. The healing process was uneventful on both left and right sides. Immediate esthetic results were observed, full coverage of the recession, a gain of keratinized tissue and horizontal and vertical bone volume on the right side (Fig.17, Fig.19).

After 3 months, the root of tooth 23 was extracted and the patient received an MIS conical connection C1 implant, covered by a collagen sponge and an MIS SEVEN implant in the position of 25, followed by a roll flap to increase the esthetic outcome in the right lateral incisor and canine. The final impression for 17 dental crowns and 8 implant crowns, was taken with Impregum soft polyether material in an open tray using 8 MIS copings. Implant restorations in the frontal maxillary area, offer a challenge in terms of both functionality and esthetic outcome. The essential goal of the treatment was achieving a final functional result, as esthetically as possible for this patient.

CONCLUSION

Even in situations with bone loss and high gingival recessions, esthetic and functional outcomes can be achieved using well designed implants if bone regeneration and soft tissue management are handled properly and the materials used are suitable to the clinical situation.


Fig. 1

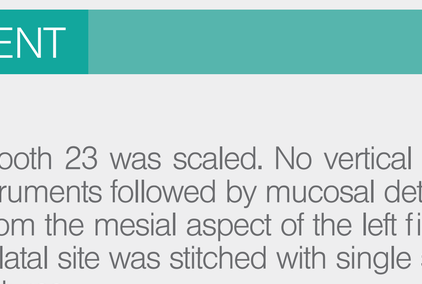


Fig. 2

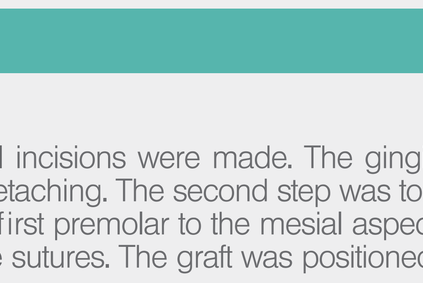


Fig. 3

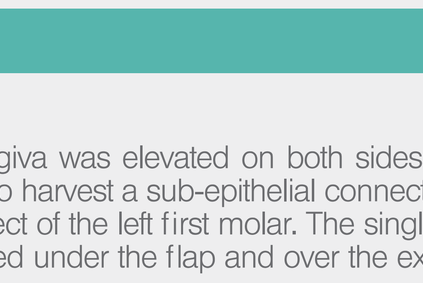


Fig. 4

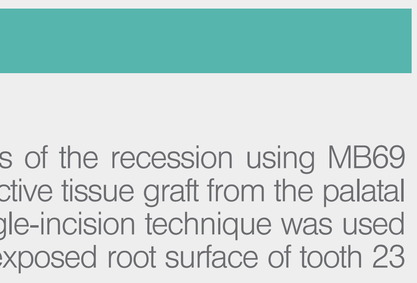


Fig. 5


Fig. 6


Fig. 7

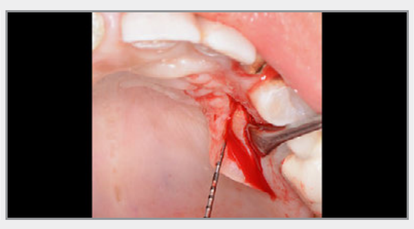


Fig. 8


Fig. 9

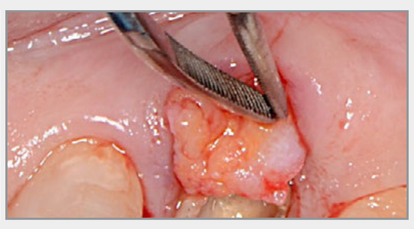


Fig. 10

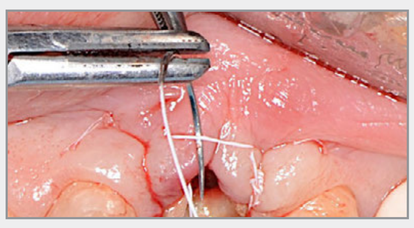


Fig. 11


Fig. 12


Fig. 13

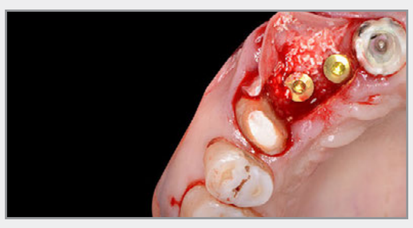


Fig. 14


Fig. 15


Fig. 16


Fig. 17


Fig. 18


Fig. 19


Fig. 20

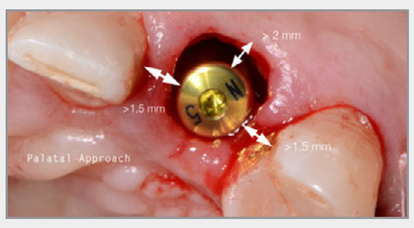


Fig. 21


Fig. 22


Fig. 23


Fig. 24


Fig. 25


Fig. 26


Fig. 27


Fig. 28


Fig. 29


Fig. 30

Digital Workflow in Implant Dentistry. Treatment Plan, Guided Surgery and 3D printing for an Esthetic Anterior Case

Dr. Pablo Ramírez Marrero, DDS

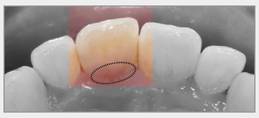
Faculty at Implant Program, European University of Madrid, Spain

CASE REPORT

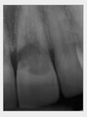
A 39-year-old patient presented at the clinic with slight discomfort in the area of teeth 11 and 21. In the initial clinical examination, the presence of caries or gingival inflammation is not observed.

After the radiographic and photographic analysis, the presence of radiolucent images in the cervical third of both pieces is verified, with greater impact in 21 together with a reddening of the palatal area at the gingival level. Therefore, this makes us suspect of possible external resorption of both pieces.

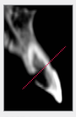
To complete and confirm our initial suspicions, a CBCT is performed, as well as vitality tests in both parts and cross-consultation with the endodontic specialist. Our initial diagnosis is confirmed where due to the extension of the lesions below the cervical margin, the teeth must be extracted.



Diagnosis and plan of TTo



RX



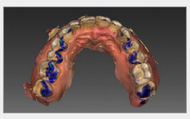
CBCT # 11

CBCT # 21

Invasive Cervical Resorption.

TREATMENT WORKFLOW

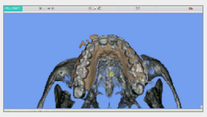
Digital flow: Scanning with Cerec Omnican



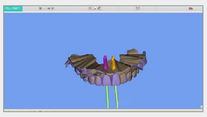
STL Cerec InLab 15

Formlabs 2 SLA

Implant transfer- Acrylic

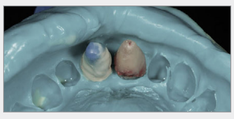


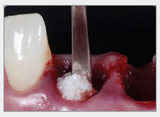
Surgical Phase - Guided Surgery: .STL & .DICOM



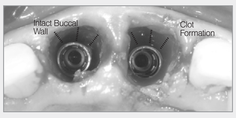
Guide design

MIS V3, 3.9 x 13 mm





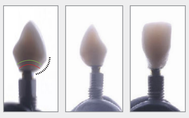
Interproximal Adaptation



Biologic Principles

Provisional Retainer

Prosthetic Phase



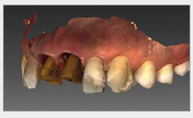
Acrylic Provisionals

Adjustment Without Disconnecting

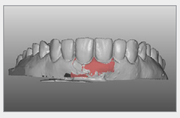
After 5 Days

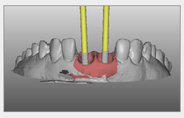
Starting final restoration after 5 months

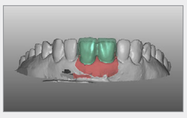
Analog Impression



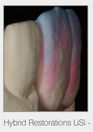
Digital Impression - InLab 15

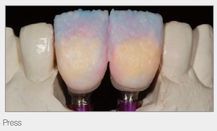




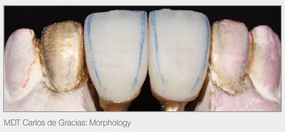


Preparing Final Restoration

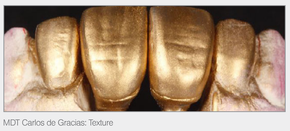




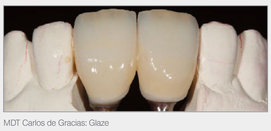
Hybrid Restorations LiSi - Press



MDT Carlos de Gracias: Morphology



MDT Carlos de Gracias: Texture



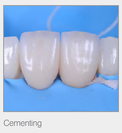
MDT Carlos de Gracias: Glaze

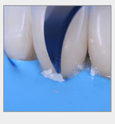
Abutment Veneer

Soft Tissue Adaptation

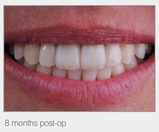
3D Model SLA - Emergence

3D Model. SLA Replica

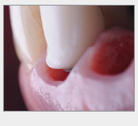




Cementing



8 months post-op



8 months post-op

Customized Healing in the Molar Region

Dr. Thomas De Peuter, DDS

Kwadrant Tandartsen, Antwerp, Belgium

THE CONCEPT

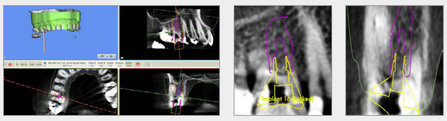
A conventional way of restoring missing molars with implants takes roughly 6 months and we end up with a very difficult last step of creating the right emergence profile which resembles that of a natural tooth, due to the fact that normally a cylindrical healing abutment is used. With this concept I try to maintain, as much as possible, the gingival architecture as it was with the natural tooth. With prosthetic driven planning before extraction and guided surgery, it is possible to maintain the structures in a completely digital workflow. There is only one paradigm shift needed: the sub gingival anatomy of the permanent abutment is designed before the tooth is removed. Throughout the whole procedure the use of biocompatible materials is a key factor in not harming the biological width.

PRE-OP SITUATION

- Male, 44 years old
- No medical history
- Non-smoker
- ASA: 1
- Pre-op situation:
  Tooth 16 is lost due to a deep fracture with root involvement

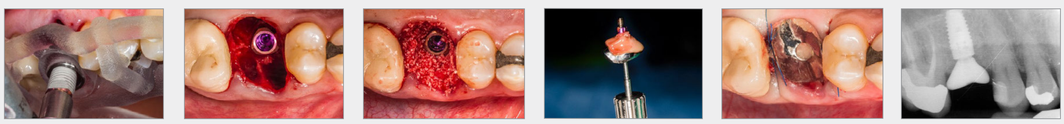
PLANNING

Once the implant is placed, a custom healing abutment can be designed with the same soft tissue support as the natural tooth. This concept can only be achieved when there is a sufficient amount of bone to obtain primary stability.



SURGERY

An atraumatic extraction is established after which the implant is inserted in a guided procedure. The remaining extraction alveoli are filled with a mixture of L prf and a biomaterial. After filling the alveoli, the custom healing abutment is installed with an intermediate L prf membrane, to have more protection of the biomaterial.

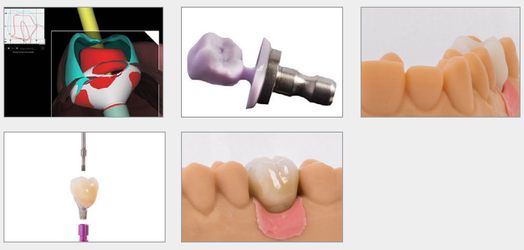


AFTER INTEGRATION

Intra-oral situation after healing period of 3 months. Digital impression is made of custom healing abutment in situ, without and with scan post. Almost no collapse is seen of the buccal structures.

LAB WORK

In the lab the original STL file of the healing is matched with the intra-oral situation after which the lab technician only has to design a retentive form over which the monolithic crown can be cemented in the lab in order to have a screw retained restoration.



FINAL PROSTHETIC

A Digital Approach to Achieving Esthetics and Function in Full Mouth Implant-Supported Rehabilitations

Dr. Maria Ramos

PhD Int. Interntional Doctor in Dentistry. UCAM UNIVERSITY, Murcia, Spain

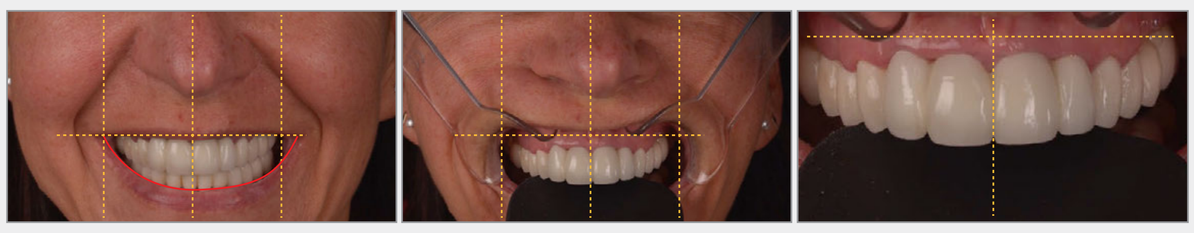
CASE REPORT

In 2015, a 49 year-old female patient was referred to the clinic for full mouth rehabilitation.

TREATMENT WORKFLOW

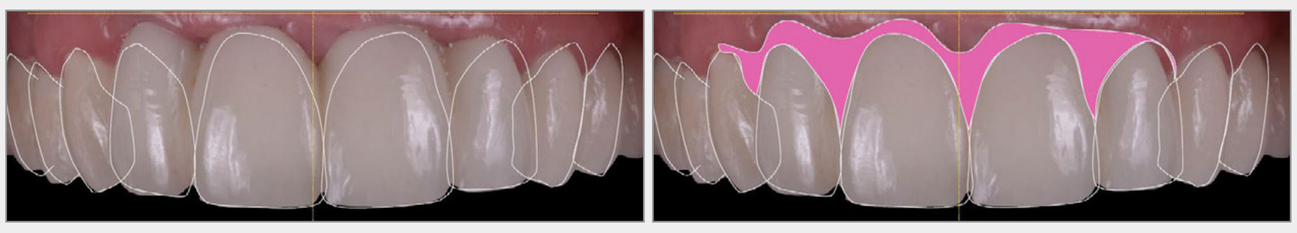
A digital approach to achieving esthetics and function in full mouth implant-supported rehabilitation.

Complete-mouth implant-supported rehabilitations are challenging because of the multiple surgical and prosthetic steps involved in clinical evaluations to assure passive prosthesis fit and optimal esthetic and functional outcomes. Successful implant treatment involves osseointegration of implants that are placed in ideal positions for fabrication of a dental prosthesis. Preoperative implant and prosthetic planning is the key to a successful treatment outcome. The guided surgery approach optimizes implant position, angulation and depth. The following case presentation demonstrates in detail, how the use of a digital workflow can help to provide long-term results.



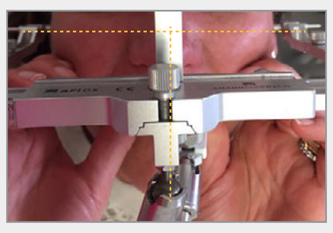
Pre-operative photoanalysis of the smile. The patient has a medium lipline, convex incised curve and a wide buccal corridor.

Pre-operative intra-oral analysis. This patient presents full mouth Zirconia rehabilitation. Periodontal health Status: Chronic periodontitis



Smile design based on esthetic parameters. Guidlines for wax-up are visualized for the dental technician.

Immediate denture. After careful examination of the patient and the prognosis of the remaining teeth, the definitive treatment plan dictated removal of the remaining teeth.



Defining a new occlusion. The TENS unit was applied for 1h to the patient's cranial nerves (V,V II and XI) to relax the paracervical muscles and deprogram the muscles of mastication.

Immediate denture. Esthetic analysis and correction of middle line and upper left quadrant

Final denture. Extra-oral facial analysis.

Digital planning and guided surgery. The CBCT scan was taken according to the protocol. The use of the MGUIDE system offers high accuracy in planning and execution of surgical procedures which is important in securing a high success rate without causing iatrogenic damage. This can be achieved by 3D implant planning software, and computer-aided surgery, such as MSOFT.

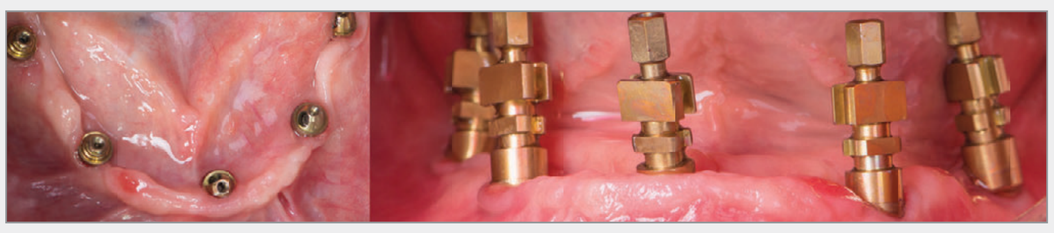
Upper and lower MGUIDE surgical template. 4 months after the extractions, implant treatment was planned using guide protocol. Mucosa-supported guides were used.

Guided surgery

Im mediate prothesis: Provisionals are ready for immediate loading. These were fabricated from a final immediate denture. The technician used a guided model surgery, where multiunit replicas were placed and cemented to the immediate prothesis.

Post-operative radiologic analysis OPG after implant placement.

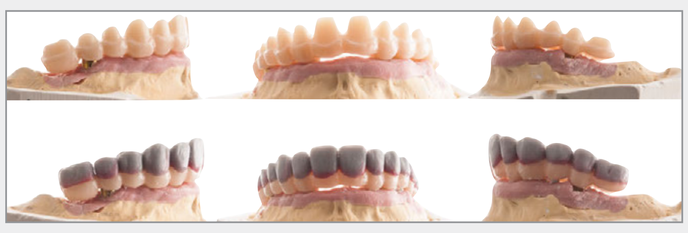
Guided surgery - 'Screenshots' from video. Full-mouth prefabricated immediate loaded fixed provisional prothesis was seated. Maxillary and mandibular fixed provisional restorations improve esthetics and function and will be used as a blueprint for final restorations.



Impressions 4 months after osseointegration of the implants, the final analog impressions were done on Multiunit level using an individual tray.

Plaster key confirmation. The implant position was confirmed by means of a plaster key.

2nd Appointment: The bite with provisional was checked using scan5 K7 (Myotronics) and was transferred to the dental laboratory by using Luxabite (DMG America) and the provisionals. This way, the individual casts could be put in the articulator.



Final prothesis: Laboratory fabrication of zirconia framework design: preparation sequence of the full-arch zirconia framework. Maxillary full-arch zirconia framework.

Maxillary final restoration. Pink composite is added to the lithium disilicate single crowns.

Intra-oral and extra-oral final. Final restoration showing fully integrated esthetics of teeth and gingiva.

Immediate Placement with Immediate Loading Following Extraction of Natural Anterior Tooth Using CEREC System in One Single Session (chairside)

Dr. Fabián Rosero Salas

Private practice, Dental Solutions clinic, Quito, Ecuador

CASE REPORT

- Patient: Female
- Age: 35 years old
- No systemic diseases

TREATMENT WORKFLOW

Presented tooth 12 with pain and mobility grade 2

Balanced occlusion without alterations

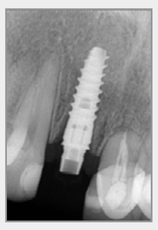
Diagnostic Clinic and X-Ray #12
- Short-root anomaly (SRA)
- Chronical Periapical lesion

Atraumatic Dental Extraction

Flapless Implant Surgery

MIS SEVEN Implant
- 4.2 x13mm
- Torque: 80 Ncm

Placement of MIS Ti-Base Standard



X-Ray Check

Sirona Scanbody

Digital Impressions

Cerec Digital Wax-up and Design

Occlusion Control

Milling Oxide Zirconium Abutment and Feldspathic Crown

Adaptation Control

Cerec SpeedFire

Cerec SpeedFire Stain and Glaze

Ti-Base Cementation

Abutment Placement

Temporary Cementation

X-Ray After 3 Months

X-Ray After 7 Months

Soft Tissue Stability After 7 Months

Actual State

Modern Technologies & Techniques in Clinical Practice

Dr. Sofie Velghe

PhD student at Ghent university Periodontology dept., Belgium

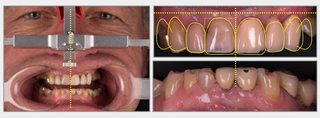
TREATMENT WORKFLOW

ROOTDONOR concept / Digital protocol of individualizing the soft tissue support using original root fragments. Rehabilitation of a patient with severly worn and compromised dentition.

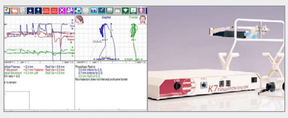
Esthetic and functional full-mouth rehabilitation with implant supported restorations is challenging. The key to succes of this treatment is a well designed treatment plan according to functional and esthetic parameters along with the use of CAD/CAM technology, artistic skills of the technician and a great amount of teamwork to create an excellent outcome. This case report describes a workflow that adresses both function and esthetics. In 2016, a male, 60 year old patient, ASA 1, was referred to the clinic for full mouth rehabilitation.

Pre-operative photoanalysis of the smile. Our patient has a flat smile and low lipline. There is a possibility to lengthen the teeth, if desired, according to the lower lip.

Pre-operative intra-oral analysis. There is attrition on the natural teeth and failing restorations due to the lack of a well balanced occlusion and the lack of dorsal support. There are soft tissue and bone defects in the edentulous zones of the 1st and 2nd quadrant. A combined deep bite, steep curve of spee and dentoalveolair compensation indicate the patient might benefit from a bite elevation. There was no periodontal disease or other problems.

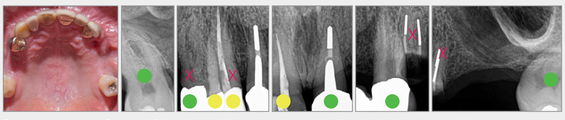


Smile design based on esthetic parameters, guidlines for wax-up are visualized for the dental technician.

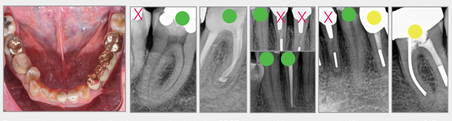


Defining a new occlusion. The TENS unit (transcutaneus electrical nerve stimulation) was applied for 1h to the patient's cranial nerves (V, VII and XI) to relax the perioercical muscles and deprogram the muscles of mastication. The new physiological occlusion (new PO) was recorded vertically, anteroposteriorly and transversally with a Myotronics K7evaluation system. Bite registration was performed using polydimethyl vinyl siloxane (silicone bite).

Diagnostic analogue wax-up. Cast models made from the PVS impressions served as a base for the creation of the maxillary and mandibular wax-up, integrating esthetics (incisal edge) and function (palatal and occlusal surfaces). Soft tissue and underlying bone defects are visualised using pink wax. A putty key was used on the wax-up to produce a template for intraoral mock-up.



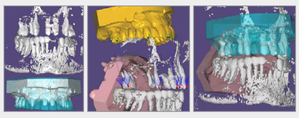
Treatment plan in the maxilla. Both 1st and 2nd quadrant needed bone augmentation and sinus lifting prior to implant placement. Initially we planned to save teeth 12 and 14, but during exploration it was decided that those teeth were lost due to decay. The patient preferred to have single restorations in the front, instead of bridges on natural teeth. This was a good option due to the compromised status of teeth 13, 11 and 21. His wish was to keep his own teeth as long as possible. All of the remaining teeth still have a good prognosis after retreatments. If necessary in the future, we can make a bridge on existing implants.



Treatment plan in the mandibula. After examination, including CBCT, it was decided to retreat tooth 46 and extract tooth 48. Both incisors 32-31 were lost. It was decided not to place implants in the 3rd quadrant but replace the old bridge with a new one. If teeth 37 and 34 (medium prognose) get lost in the future we can distribute our implants better.

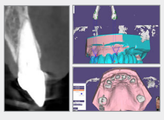
Intra-oral evaluation of the mock-up . The composite resin mock-up (Luxatemp) was fabricated directly in the patient's mouth and remained for occlusion testing for 1 month. Before placing the mock-up, spot etching was performed. No preparation or bonding on the teeth was done. Another 1h TENS session was done to deprogram the muscles into their proper position supported by the mock-up. Occlusal equilibration was carefully performed so precise contacts and guidance were created for the patient. Additionally, the position of the incisal edges were inspected. Video and photos were taken, and the patient was consulted to be satisfied with the outcome.

Digital planning and guided surgery. Six months prior to implant surgery sinus lifts and augmentations were performed. A new scan was taken to evaluate the bone and to do implant planning with MSOFT. The use of MGUIDE achieves higher precision and accuracy in implant shoulder, apex, and angulation, which is much more suitable for complicated procedures and conditions such as the flapless method, immediate loading, aesthetic restoration, and insufficient bone height. Zhao J, Fan L, Qu H, Xu W, Wang Y, Zhang S, Kim YJ. Evaluation of computer-designed surgical guide template in oral implantology. J Craniomaxillofac Surg. 2015 Oct 24. pii: S1010-5182(15)00365-0.

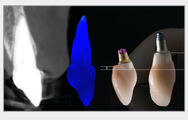


The most frequent soft tissue complication following implant treatment seems to be the lack of buccal convexity (Cosyn et al. 2011, 2012). This so-called "alveolar process deficiency" (Fur- hauser et al. 2005) is the result of buccal bone remodelling and/or soft tissue loss following tooth extraction (Araujo & Lindhe 2005). In order to compensate for the volume loss , GBR and soft tissue grafts are used. In addition Huan et al. stated that overcouring the facial subcritical contour, within a physiologically acceptable range, provides support for the soft tissue without altering the gingival margin position. So copying both the critical and subcritical contour from the natural tooth can optimize the clinical outcome by creating a better soft tissue profile. Before we already did this in an analogue way, by using the extracted root. Nowadays it is possible to do this digitally by matching the STLs of the waxup, the study models and the DICOMS from the CBCT.

ROOT DONOR concept - Before extraction of the root we can use the profile to be copied in our individual abutment. This is, for example, what we did with tooth 14. A more difficult situation is when the roots are missing in edentulous zones. There are two options: we can use a contra-lateral root and copy/paste or even mirror it. This procedure was done for teeth 16, 26 and 24.



ROOT DONOR concept. When there are no usefull roots available, we can digitally extract one from another patient and copy it into our case. Here for example we used the nice roots of the laterals from a previous case and used it for this one. It seems likely that in the future there will also be libraries with natural roots as there are for crowns.

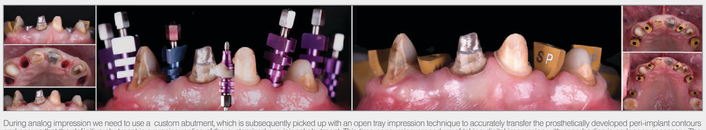


ROOT DONOR concept: limitations and considerations. The distance between our implant neck and the gingival margin, the so called running room, determines how much we can play with the subcritical contour and the influence of it on our soft tissue profile. The amount of running room is influenced by the height of the Ti-Base and the level of the bone. In cases were we have vertical bone loss with good amount of soft tissue, the influence of the subgingival profile of the restoration can be of greater importance and compensate for the limitations we encounter with augmentations.

Customized titanium individualized healing abutments (MCENTER, MIS). In cases like this, where we prefer to let the implants osseointegrate without loading, we can better use customized healing abutments with the objective to preserve the vestibular volume and shape the gingiva from the start of healing. To make our healing and work as biocompatible as possible, we prefer to have our healing abutments in titanium instead of making them ourselves with composite.

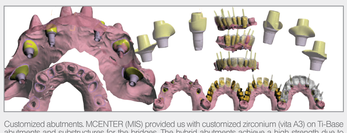
Guided implant surgery six months after extractions, sinus lifts and GBR (Bio-oss/Bio-guide, Geistlich) Implants were placed according to our digital planning. MGUIDE was used in the lower as well as in the upper jaw to facilitate implant placement, be less invasive, reduce surgery time and be more precise. M8 C1 implants were placed in the lowers (locus 32-3,3x 11,5mm) and the posteriors (loci 26/16: 3,75 x 8mm, locus 14-3,75 x 13mm, locus 24: 3,75 x 11,5mm). M8 V3 implants were chosen in the front to replace the laterals (locus 12: 3,75 x 13mm en locus 22: 3,3 x 13mm).

Control of the emergence profile was achieved by the combined use of digital planning software, MGUIDE and custom healing copings. In this way, we succeeded in contouring our soft tissue into the desired morphology right from the start of healing and without the need of additional intervention. This straight-forward digital protocol makes it possible to eliminate the need of several appointments to adapt the contour with composite, a procedure that was less favourable for healing and very time-consuming.

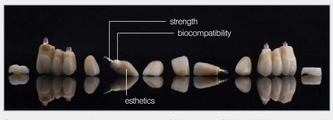


During analog impression we need to use a custom abutment, which is subsequently picked up with an open tray impression technique to accurately transfer the prosthetically developed peri-implant contours and ensure that the definitive abutment is a precise replica of the customized provisional abutment. This time consuming procedure of taking digital impression with scan bodies is no longer necessary. The only info we need at this point is the exact position of the implants. The emergence profile can be copy/pasted from our original design in the software. Alternatively, the provisional restoration optical scanning can be used to transfer the prosthetic contour to be duplicated into the definitive restoration.

Four months after implant placement, an impression was taken with an intraoral digital scanner (3Shape Trios, Copenhagen, Denmark).



Customized abutments. MCENTER (MIS) provided us with customized zirconium (vita A3) on Ti-Base abutments and substructures for the bridges. The hybrid abutments achieve a high strength due to the metal-metal internal connection into the implant and the metal / titanium base internally supporting the abutment.



Root donor concept. All of our restorations were fabricated out of lithium disilicate glass-ceramic (Ivoclar Vivadent, Liechtenstein). For our implant supported restorations the hybrid abutments consisting of zirconium on Ti-Base (MIS), were layered and covered with Emax because of the nice fluorescence at the cervical restoration margins.

Bonding protocol. A standardized procedure for bonding was followed according the manufacturer's prescription. After try-in, single tooth isolation(Optradam, Ivoclar Vivadent) was performed and the teeth were sand-blasted with silica to reactivate the IDS layer (CojetDM ESPE). Selective enamel etching (phosphoric acid) was performed and then a thorough rinse in water. Silane was applied (Monobond, Ivoclar Vivadent) and heated by light curing. We used all-in-one adhesive system (Adhese universal, Ivoclar Vivadent) with a minimal film thickness that needs to be light- cured before bonding the restoration with composite resin cement (Variolink esthetic DC, Ivoclar Vivadent). To ensure proper photopolymerisation light curing was finalized using glycerine gel (Ivoclar Vivadent). The lithium disilicate restorations were pretreated with Monobond Etch & Prime. Excess cement was carefully removed with a blade 12 and polished with silicone rubbers at low speed to prevent overheating.

Hybrid pink-white ceramic implant supported restorations. The residual ridge deformity in the lower front was covered by a prosthetic gingiva. A titanium substructure was covered with a zirconium framework cemented with veneers, similar as on the neighboring teeth.

X-ray status

Final outcome

MIS V3 B+ Implant in a Fully Digital Workflow: the One-Piece Individual Abutment

Dr. med. dent. Christian Wehner

Division of Conservative Dentistry and Periodontology, School of Dentistry, Medical University of Vienna, Austria

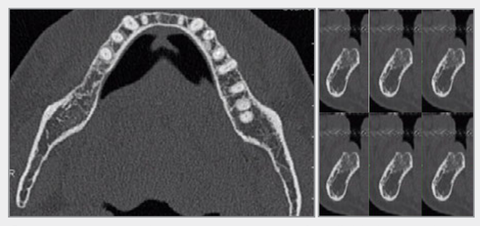
CASE REPORT

- Female patient, 46 years old
- Problems: Loss of tooth 46 due to generalized severe chronic periodontitis

Dental treatment history:

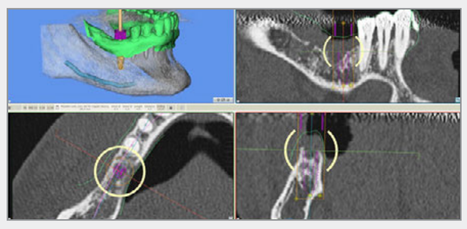
- Nonsurgical phase of periodontal treatment
- Evaluation (no residual PPD >4mm)
- Maintenance phase

Radiographic diagnosis: Free-end gap position 46, insufficient root canal treatment (15, 16) and generalized horizontal bone loss.



Computer tomography scan: assessment of available bone volume

TREATMENT PLANNING & WORKFLOW



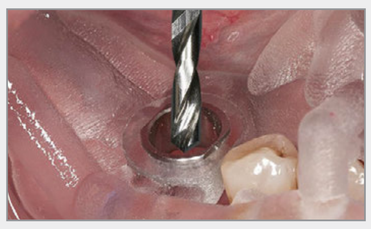
3D-planning for patient-specific surgical template.

MGUIDE digital guided surgery template. Initial try-in to confirm correct seating and stability.

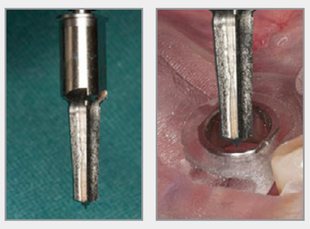
Region 46 before implant placement. Teeth 46 and 47 were extracted 6 months before surgery due to severe bone loss and increased mobility

Sulcular incision at tooth 45 and distal extension to maintain keratinized gingiva.

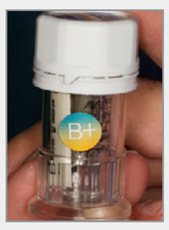
Preparation of buccal and lingual full-thickness flaps.



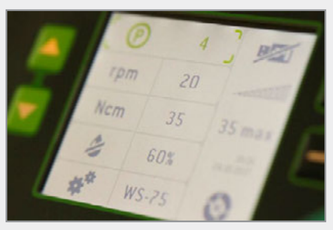
Bone mill with built-in stopper was used at the beginning of the surgical protocol.



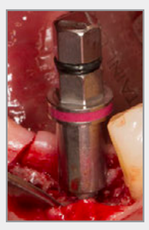
Proceeding of surgical protocol until final drill.



MIS V3 Ø4,3mm x 11,5mm, B+ surface, Standard Platform.

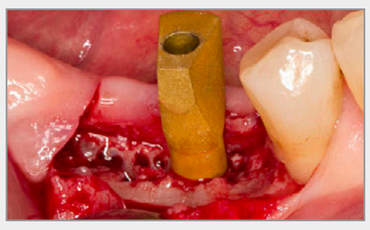


Insertion of V3 implant. 35 Ncm primary stability was obtained.



Final adjustments of V3 implant orientation. Flat side of V3 implant shoulder is aligned at buccal side.

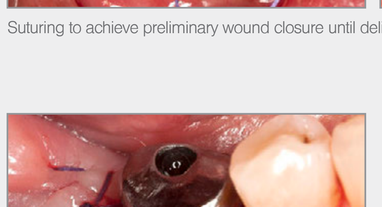
Final V3 implant position has been reached.



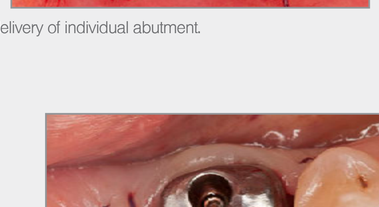
Installation of scan body (MIS, Israel) to enable intraoral scanning.

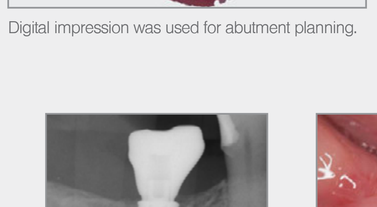
Digital impression taking was performed (TRIOS®, 3Shape, Denmark) in the lower jaw preoperatively. Therefore, only position 46 was scanned after surgery.

Teamwork in the operating theatre.

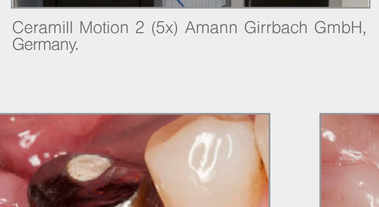


Suturing to achieve preliminary wound closure until delivery of individual abutment.

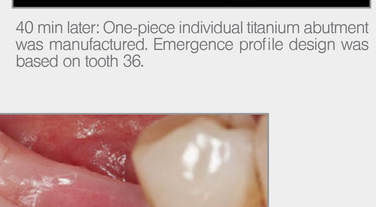




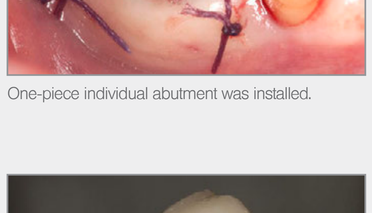
Digital impression was used for abutment planning.



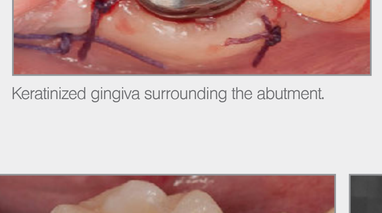
Ceramill Motion 2 (5x) Amann Girrbach GmbH, Germany.



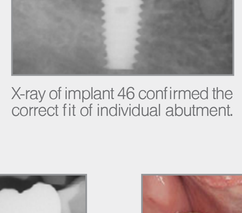
40 min later: One-piece individual titanium abutment was manufactured. Emergence profile design was based on tooth 36.



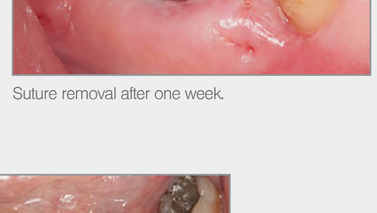
One-piece individual abutment was installed.



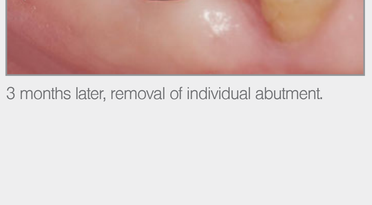
Keratinized gingiva surrounding the abutment.



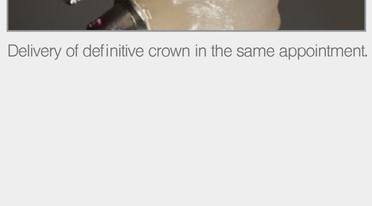
X-ray of implant 46 confirmed the correct fit of individual abutment.



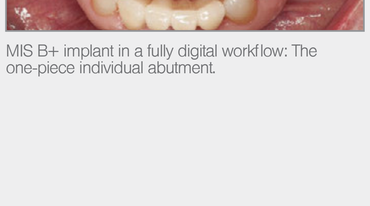
Suture removal after one week.



3 months later, removal of individual abutment.



Delivery of definitive crown in the same appointment.



MIS B+ implant in a fully digital workflow: The one-piece individual abutment.