Clinical Case of Titanium Mesh for Bone Augmentation

—

Jade Chang, DDS 2023

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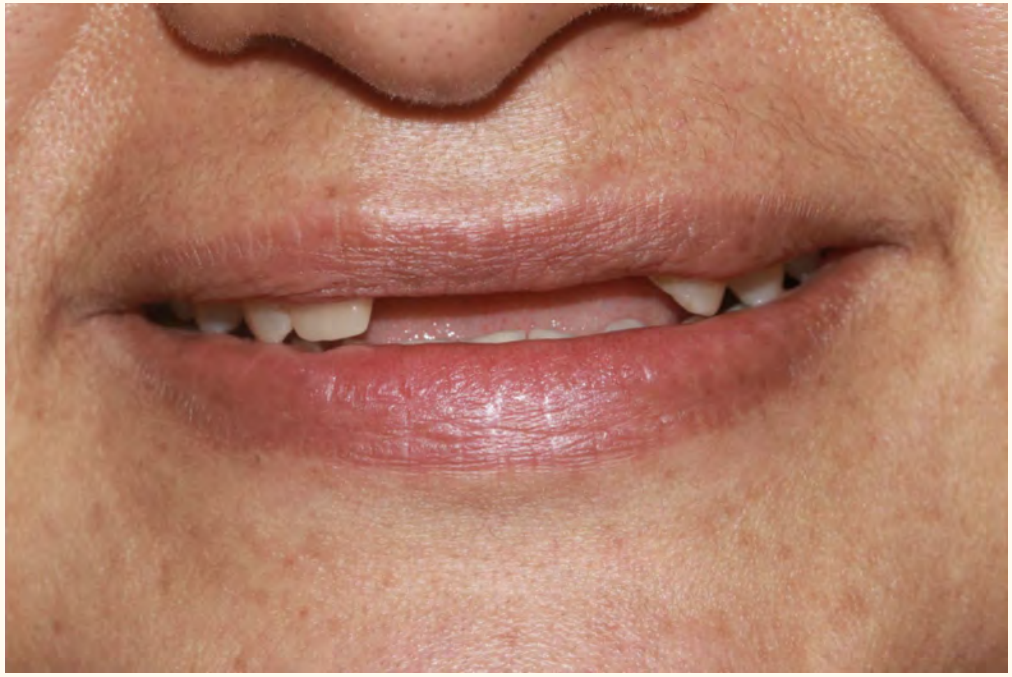
Patient Background

42yo Female

Chief Concern: "I want implants for my front teeth."

History of Chief Concern: Patient reports #8 & 9 were extracted roughly 10 years ago in her home country due to decay and has not had any tooth replacement since. #10 was extracted in 2021 due to extensive decay at UOP when patient first presented in our ER clinic.



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Medical, Dental, & Social History

Medical History: Non-contributory

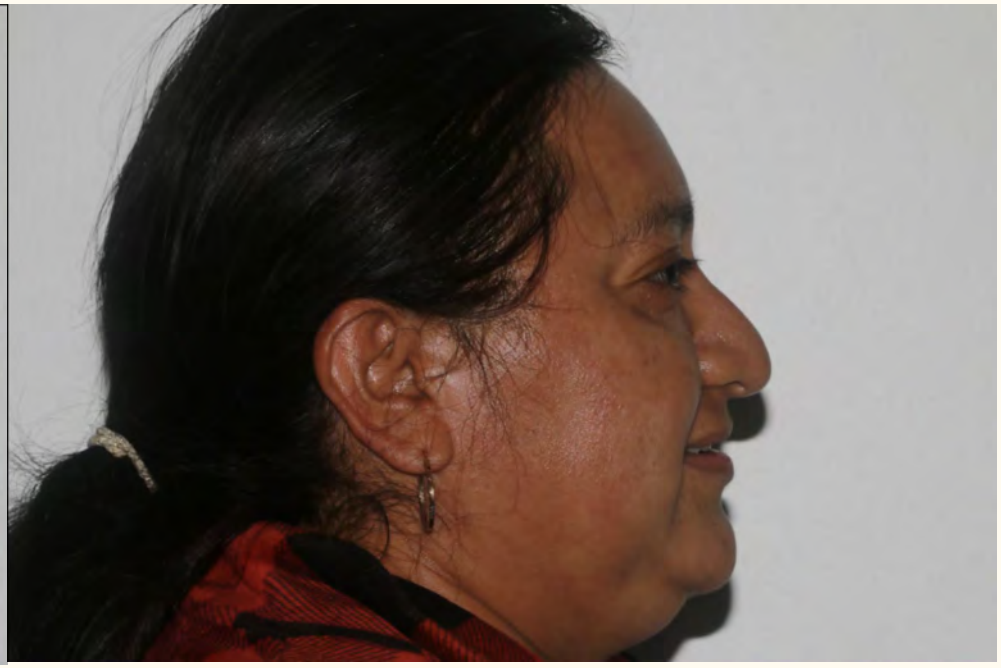
Dental History: Previous history of #8 & 9 extractions. Became a new patient at UOP in 2021 and had recent 4 quads scaling and root planing and periodontal re-evaluation, fillings, #7 crown.

Medications: Depo-provera (contraception)

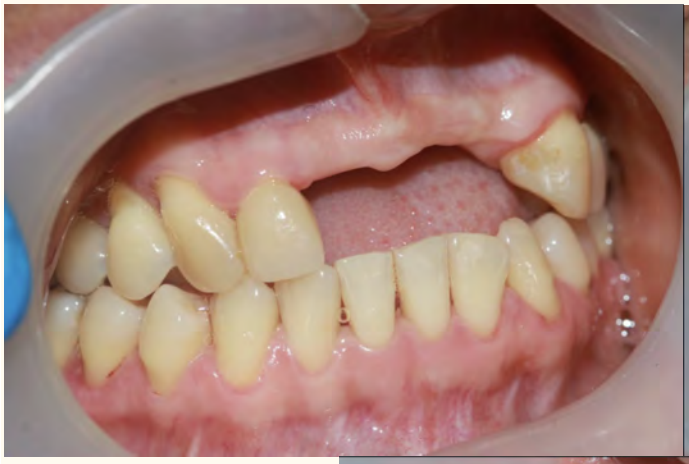
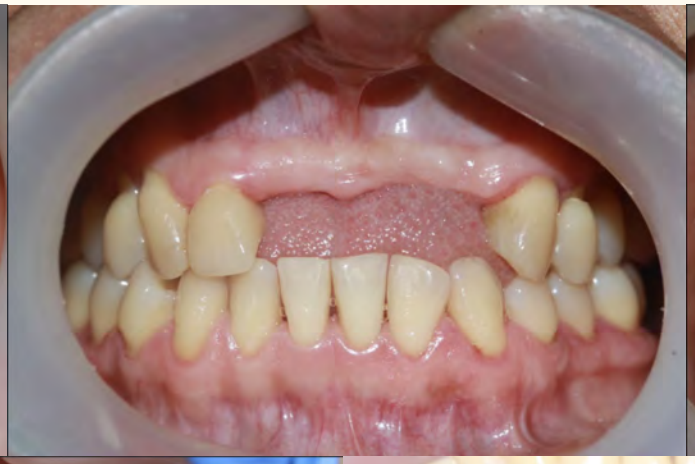
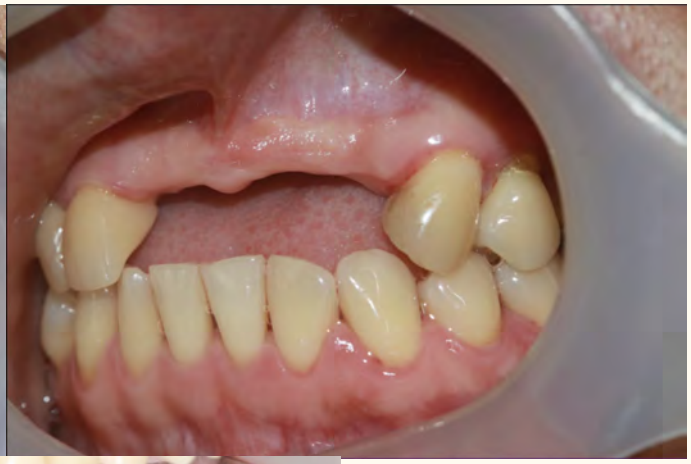
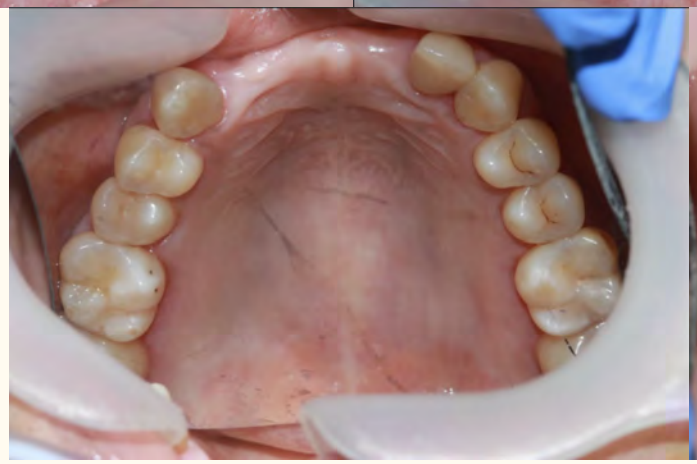
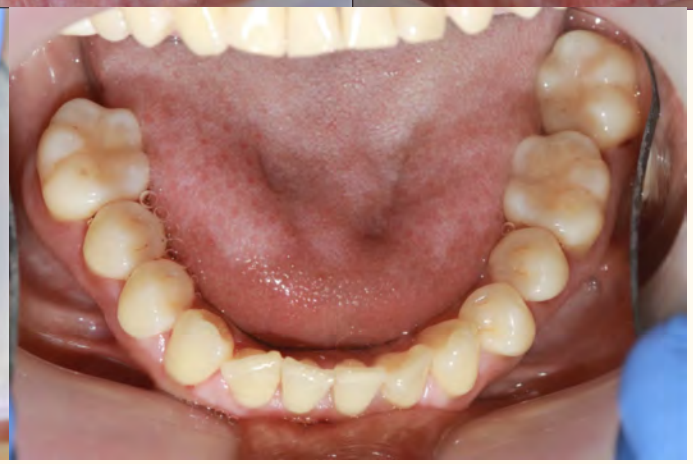
Allergies: NKDA

Social History: Patient works nearby in a restaurant and denies alcohol and tobacco use.

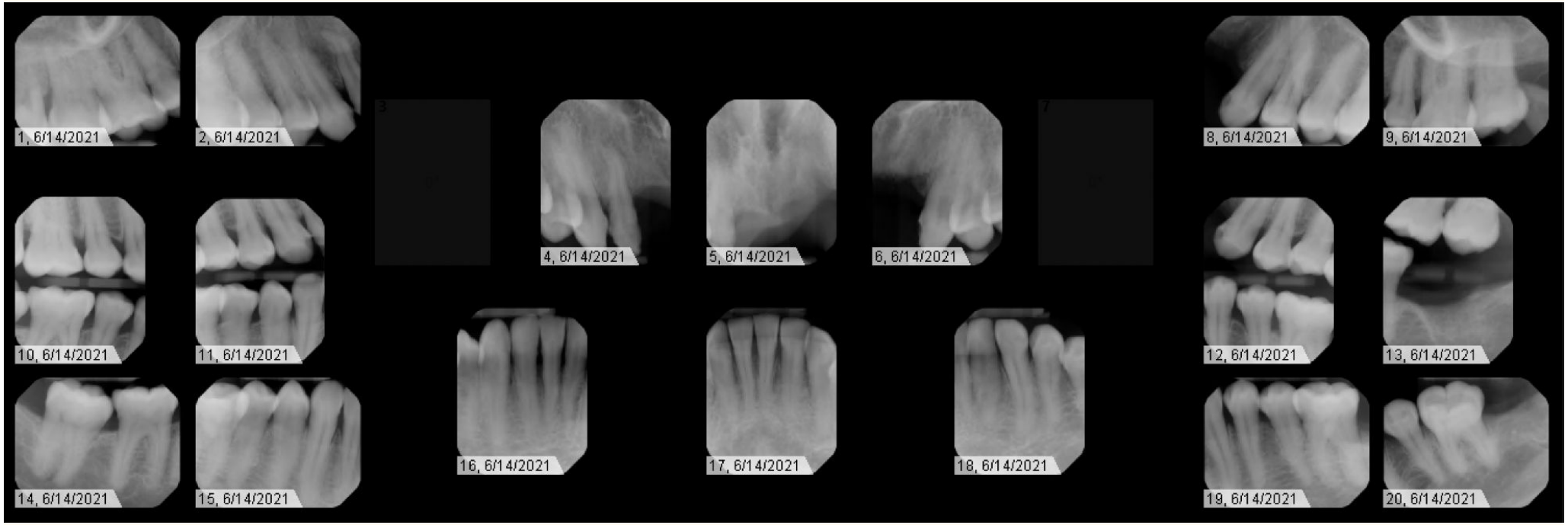
Extraoral Photos and Exam



Intraoral Photos and Exam

Radiographs - FMX 6.14.21



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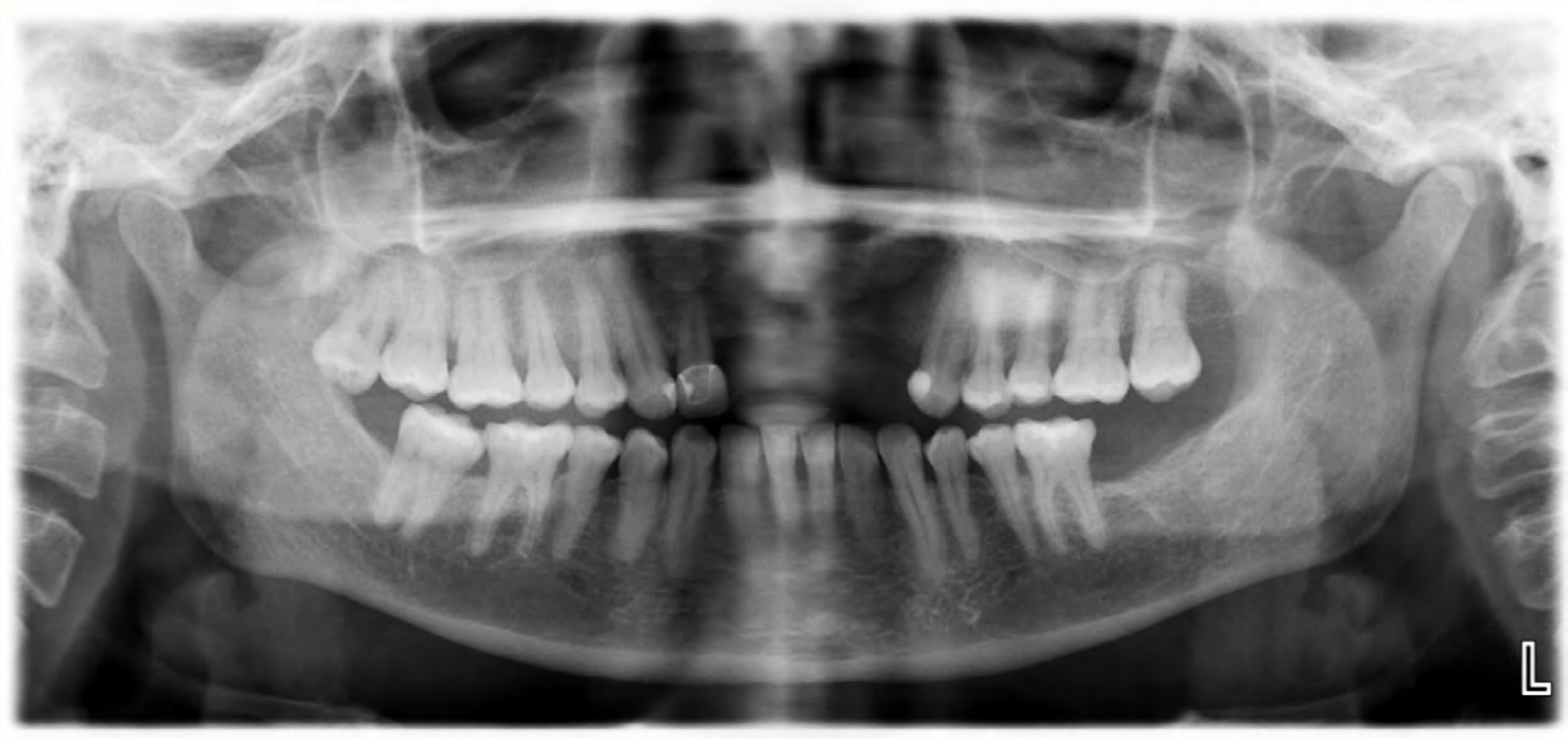
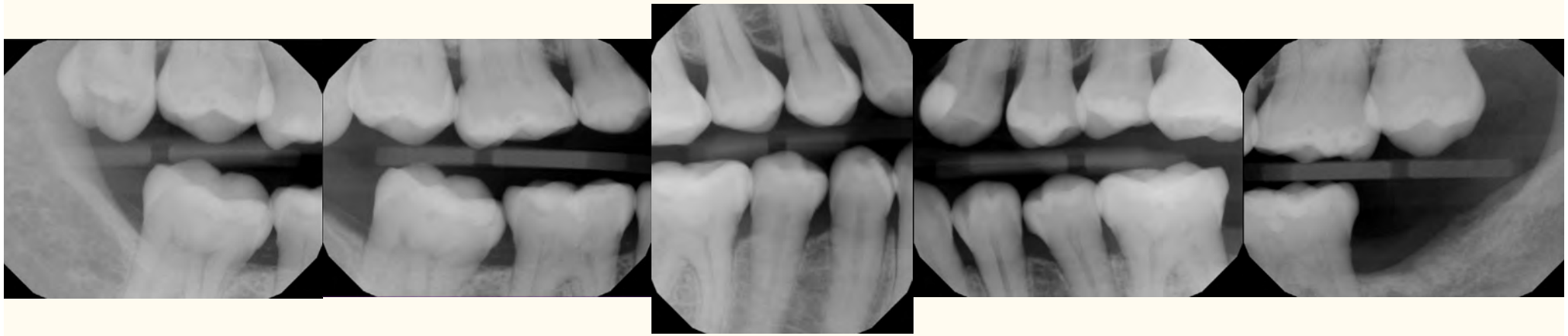
Radiographs - Panoramic taken 4.19.22



Radiographs - Bitewings 6.3.22



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Periodontal Assessment

Gingiva: healthy pink, glossy, generalized mild-moderate recession

Plaque Index: Poor (1.5)

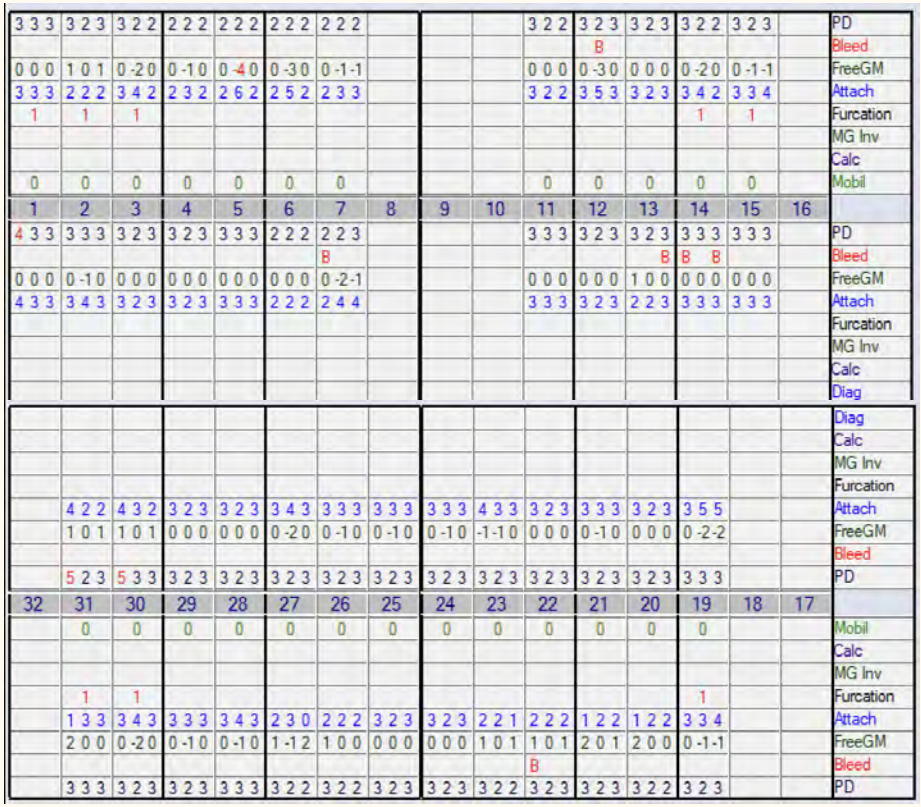
General 2-3mm pocket depths with 5mm pocket depths localized to #30, 31

Perio Dx: Localized moderate Stage I Grade A Periodontitis #30, 31

Prognosis: Good with improved OHI

Treatment: OHI, SPT

Recall Frequency: 3 months



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Hard Tissue Findings

#1 ICDAS 5 caries lesion

#8-10 missing, patient expressed interest in implants

#18 missing, patient not interested in implant

#5,12,28 NCCLs (non-cervical carious lesions), patient denies sensitivity

Caries Risk Assessment

Caries Disease Dx: High caries risk

Disease Indicators: Current active caries lesion and recent restorations in the past year

Risk Factors: Heavy plaque on teeth (PI=1.5), Low acidogenic bacterial load (ATP: 1378), Adequate saliva flow, Infrequent snacking

Protective Factors: Drinking fluoridated water, Fluoride toothpaste 2x/day

Assessment

Periodontal Assessment: Localized Stage I, Grade A slight periodontitis #30, 31 with generalized mild-moderate recession.

Hard Tissue Assessment: Moderately restored (several fillings and one crown) with missing #8-10 as well as #18.

Overall Assessment: ASA I patient with moderately restored dentition and is partially edentulous. Patient desires to replace her missing front teeth with implants.

Treatment Plan

Patient's goals, expectations, and desires:

- Patient would like her front teeth replaced with implants and understands her treatment options include doing nothing, implants, bridge, or removable prosthesis.
- She would like a fixed restoration rather than a removal prosthesis.
- Patient is not interested in a long-span bridge as it would require removal of additional tooth structure and be a longer span single-unit restoration rather than a shorter-span implant restoration. Additionally, any issues with the tooth-born bridge in the future would require replacing the entire bridge rather than the individual teeth or implant restoration.
- Patient understands that the ability to receive an implant will depend on the outcome of her CBCT and implant consultation.

Treatment Plan

Urgent:

- Essix retainer

Disease Control:

- OHI
- CTx4 Treatment Rinse
- High fluoride toothpaste
- #1 EXT
- Periodontal maintenance

Reconstruction:

- Implant consult, with possibility for need to re-evaluate treatment options (bridge, partial denture) based on consult outcome

Maintenance:

- Periodontal maintenance

Implant Consult

With Dr. Eduardo Gonzalez on 9.20.22

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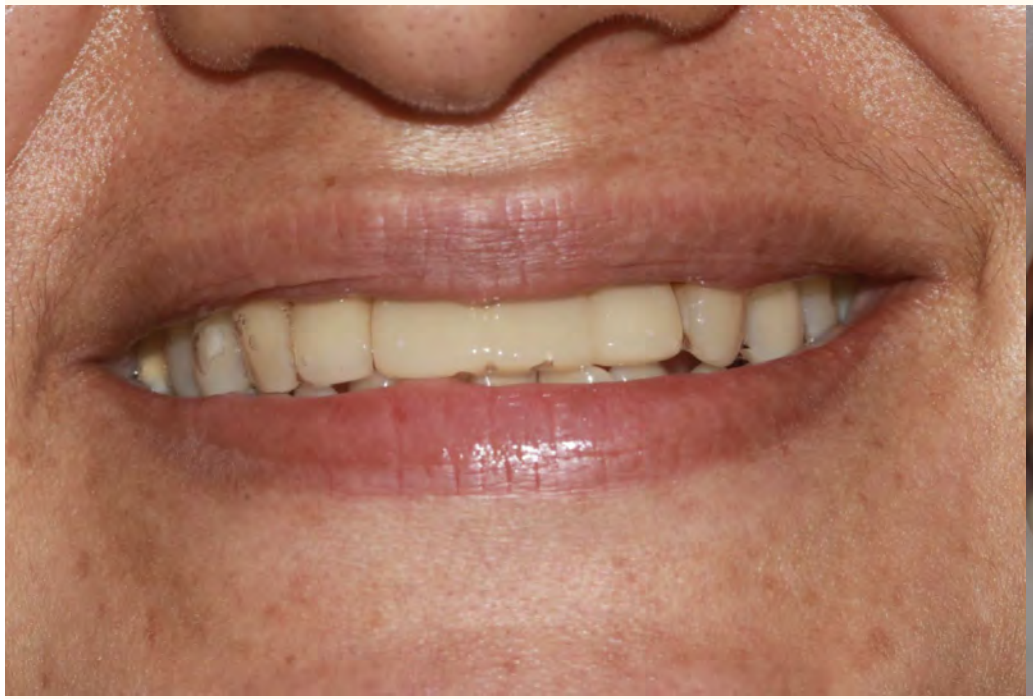
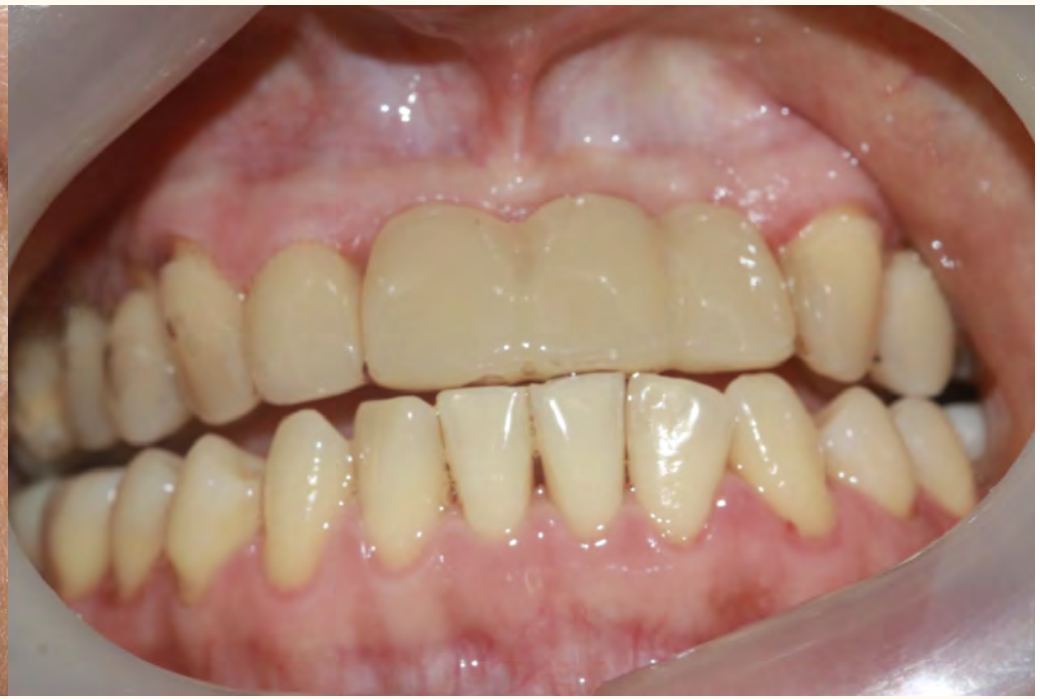
Smile Design

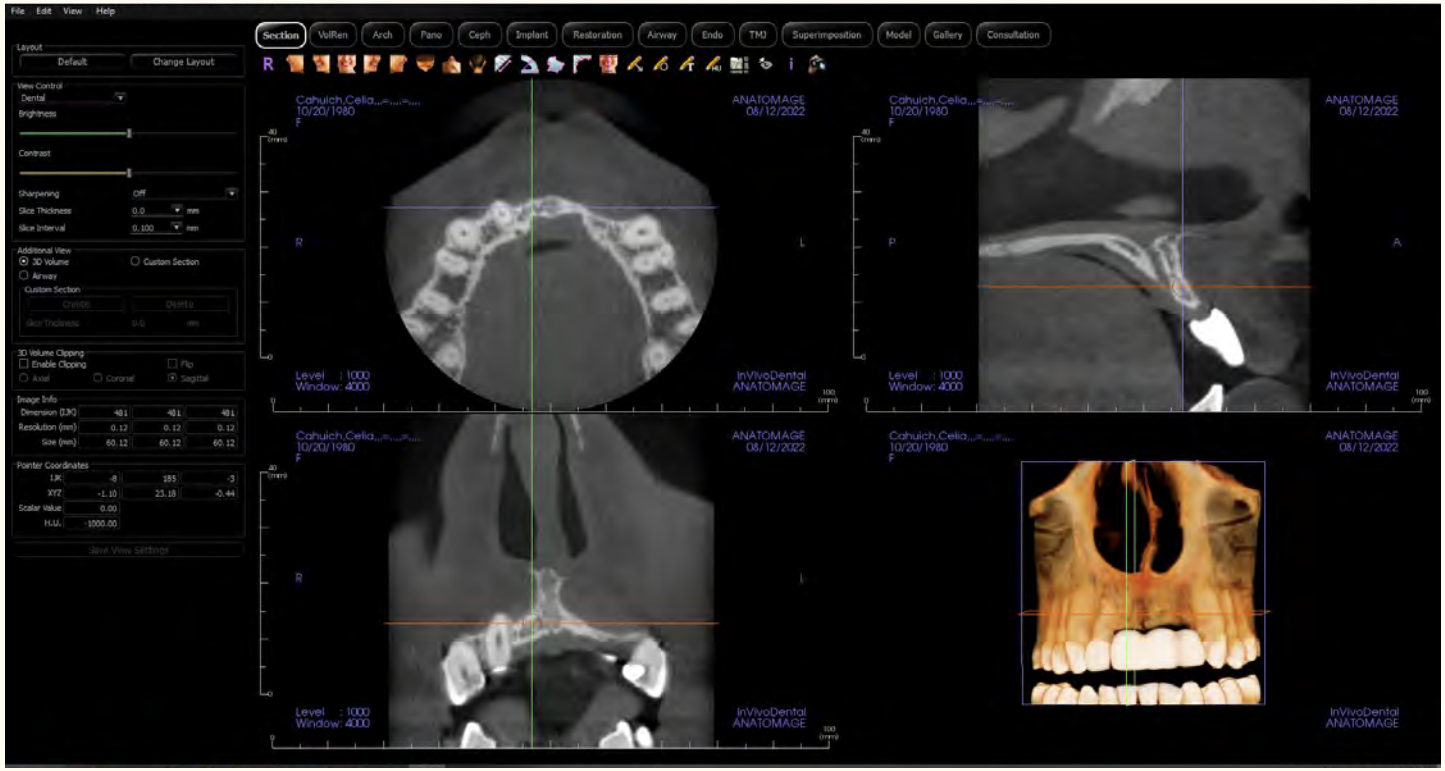




Smile Design

Pre-Op CBCT | 8.12.22

#8



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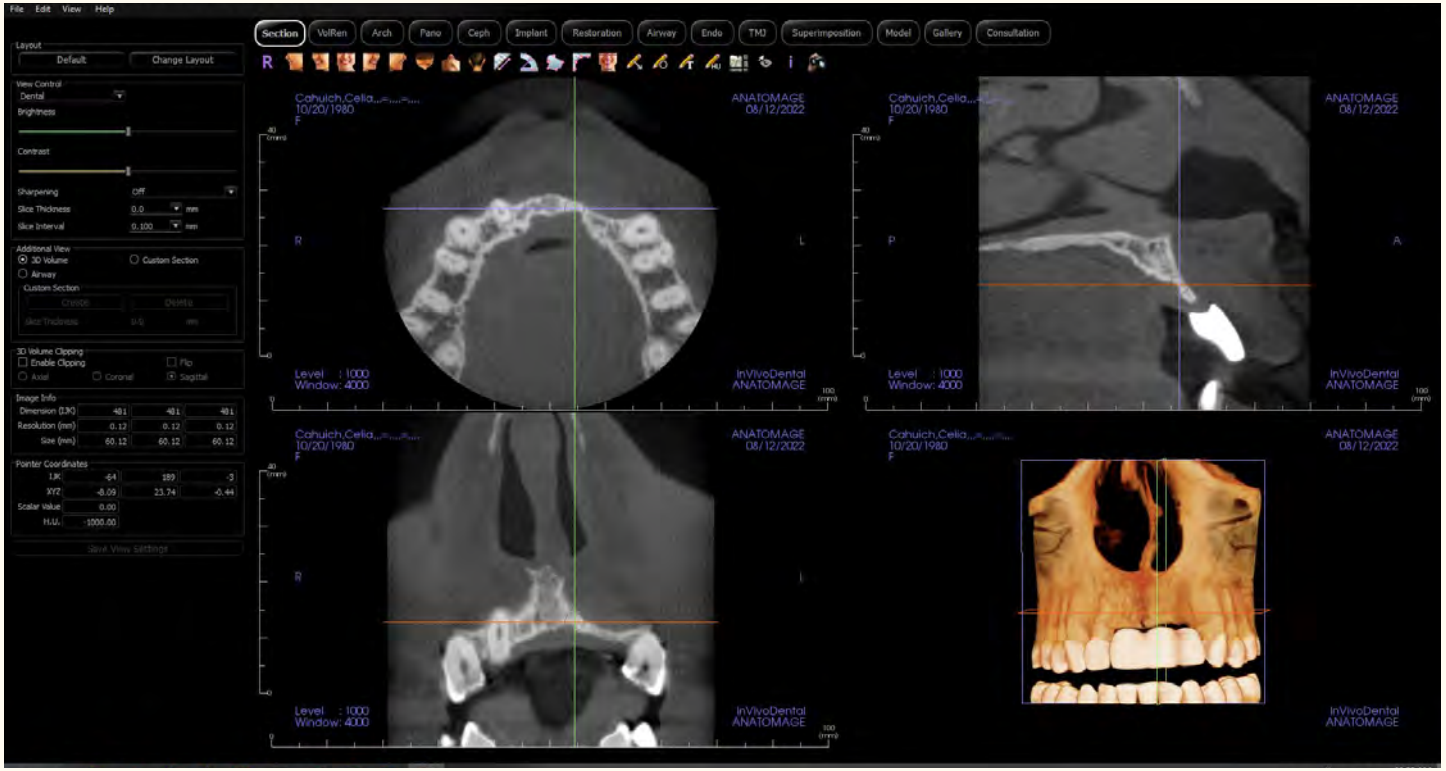
Pre-Op CBCT | 8.12.22

#9



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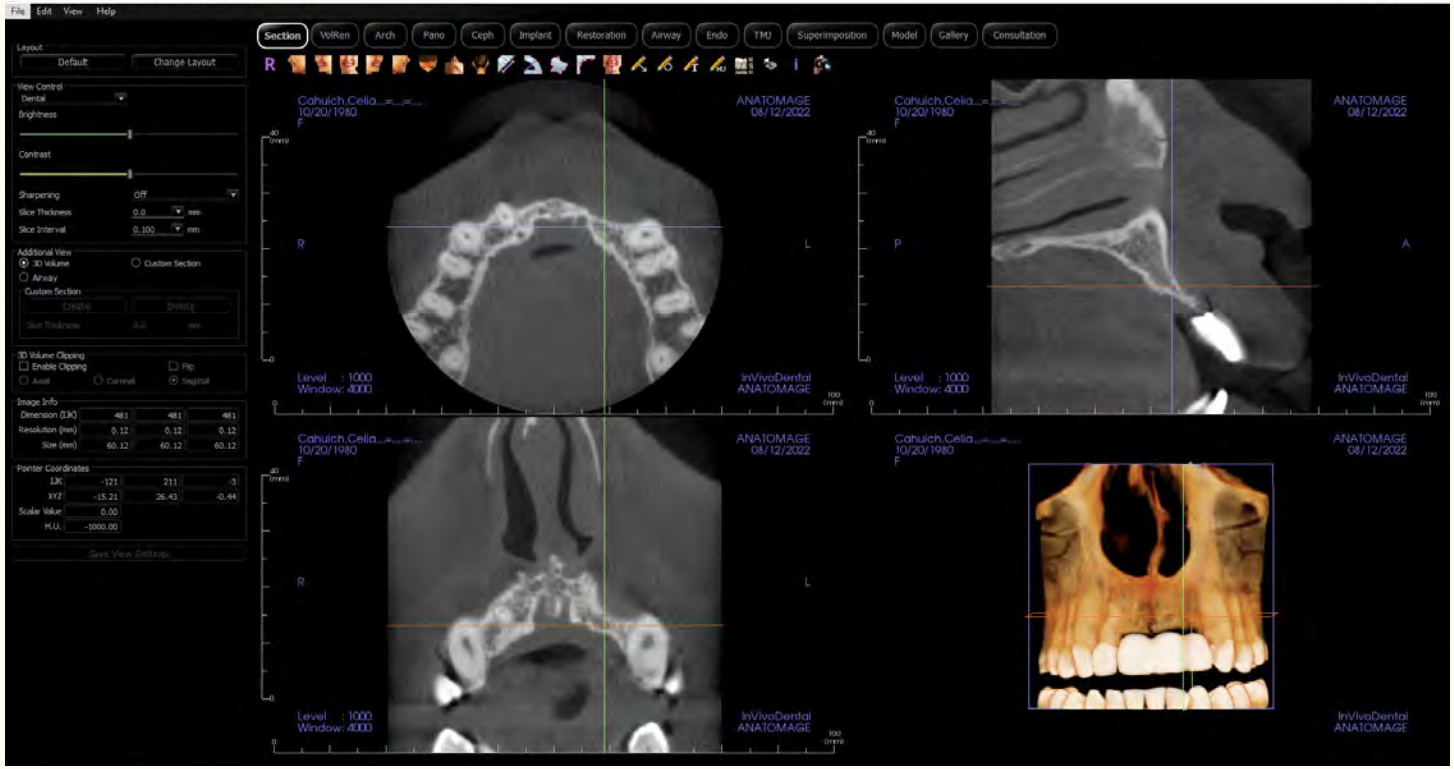
Pre-Op CBCT | 8.12.22

#10



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Observations and Proposed Plan

- Soft tissue intact
- Insufficient bone - horizontal bone deficiency requiring bone graft
- No osseous abnormalities, no bony lesions, no signs of radiolucency, no pathology
- High esthetic risk factors include 3 teeth replacement and thin facial bone-wall, however, this risk is minimized due to lack of gingival display when smiling and realistic esthetic expectations

Proposed implant restorative plan: Veneer bone graft and #8-10 implant bridge

Treatment plan sequence for implant restorative plan:

1. GBR Bone graft with PRF using titanium mesh requiring approximately 6 months for healing
2. Implant placement surgery
3. Allow approximately 4 months for osseointegration before final restoration

Reviewed risks and benefits of planned procedures and alternative treatment plans Discussed possibility that bone graft may not result in sufficient bone for implant placement, during which other restorative options may need to be revisited.
Patient desired to proceed with implant restorative plan.

EBD Article:

Review > Int J Oral Sci. 2020 Dec 30;12(1):37. doi: 10.1038/s41368-020-00107-z.

Titanium mesh for bone augmentation in oral implantology: current application and progress

Yu Xie [1], Songhang Li [1], Tianxu Zhang [1], Chao Wang [2 3], Xiaoxiao Cai [4]

Affiliations + expand

PMID: 33380722 PMCID: PMC7773733 DOI: 10.1038/s41368-020-00107-z

Abstract Go to:

Guided bone regeneration (GBR) is an effective and simple method for bone augmentation, which is often used to reconstruct the alveolar ridge when the bone defect occurs in the implant area. Titanium mesh has expanded the indications of GBR technology due to its excellent mechanical properties and biocompatibility, so that the GBR technology can be used to repair alveolar ridges with larger bone defects, and can obtain excellent and stable bone augmentation results. Currently, GBR with titanium mesh has various clinical applications, including different clinical procedures. Bone graft materials, titanium mesh covering methods, and titanium mesh fixing methods are also optional. Moreover, the research of GBR with titanium mesh has led to multifarious progresses in digitalization and material modification. This article reviews the properties of titanium mesh and the difference of titanium mesh with other barrier membranes; the current clinical application of titanium mesh in bone augmentation; common complications and management and prevention methods in the application of titanium mesh; and research progress of titanium mesh in digitization and material modification. Hoping to provide a reference for further improvement of titanium mesh in clinical application and related research of titanium mesh.

EBD Articles for Titanium Mesh in Bone Augmentation

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Introduction

Go to:

In oral implantology, the quality and volume of alveolar bone in the implant area affect implant position, primary stability and soft tissue shape recovery, and other critical factors related to satisfactory implantation restoration.[1] Generally, the alveolar bone will suffer secondary absorption and atrophy after tooth loss, the width and height of the alveolar ridge will decrease, and become insufficient for implantation over time.[2] Therefore, the reconstruction of alveolar bone in the implant area is a key point in oral implantology. There are many clinical methods for alveolar bone defect recovery, including guided bone regeneration technique (GBR), onlay bone grafting, bone extrusion technique, bone splitting technique, and distraction osteogenesis. Due to its simple operation, low technical sensitivity, osteogenic stability, and multidirectional osteogenesis ability, GBR is one of the most currently used technique to repair alveolar bone defects.[3]

The theory of GBR technology is to selectively prevent epithelial cells and connective tissue cells from bone defect area through barrier membrane based on different migration rate of various cells, allowing osteoblasts preferentially enter the bone defect area to complete bone induction and regeneration. Meanwhile, bone graft materials are placed in the bone defect area as scaffolds, and guiding osteoblasts and osteocyte to form new bone.[4] Previous studies have shown that, in the clinical application of GBR, the bone defect area's spatial support may play a more critical role than the cell-selective isolation.[5] If the bone grafts in the defect area lack support, it may be forced to shift by local stress, resulting in the collapse of bone-augmented area, which cannot achieve the expected effect. Therefore, for the barrier membranes in GBR technology, on the premise of good biocompatibility, it is ideal to have sufficient stiffness, supportability, and retention capacity. However, although traditional barrier membranes (such as absorbable collagen membrane, nonabsorbable expanded polytetrafluorethylene membrane (ePTFE), etc.) have the property of cell-selective isolation, they are relatively soft and difficult to provide adequate retention and protection for the bone regeneration areas.[6] Hence, when the traditional barrier membranes be applied to large bone defects, limited by its stiffness, it is difficult to maintain a suitable and stable bone regeneration space, and is easy to generate micromotion that affects blood supply.[7] When the alveolar bone has severe vertical or horizontal bone defects, many clinical studies suggest that titanium mesh shows superior mechanical properties and great osteogenic performance during application.[8–10] Therefore, this review intends to discuss the application and progress of titanium mesh in GBR.

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Indications for GBR with Titanium Mesh

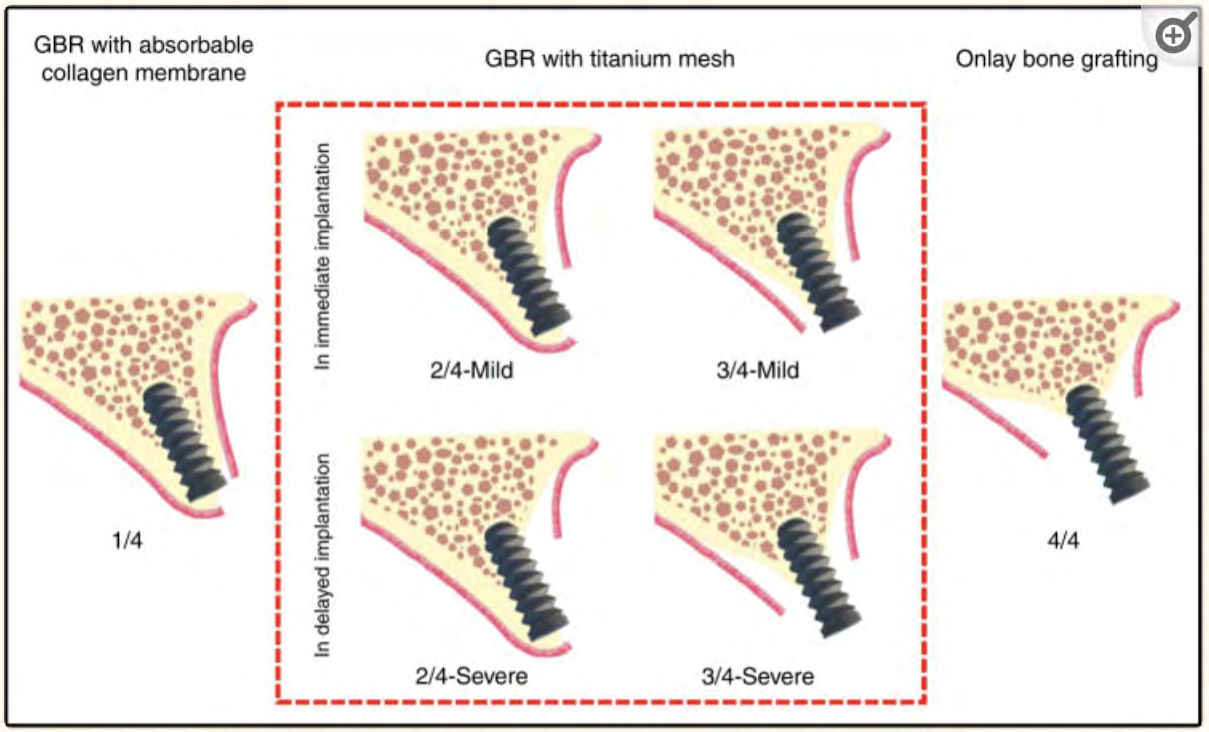

Fig. 1

Bone augmentation methods with different types of bone defect. The four types of 1/4, 2/4, 3/4, and 4/4, were classified according to the buccal and palatal relationship between the expected implant placement and the bone defect; the two subtypes of mild and severe were classified according to the severity of vertical absorption in the buccal and palatal wall

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Application of titanium mesh with delayed implantation

From the time titanium mesh was used as a barrier membrane for GBR, in most cases, the bone augmentation with titanium mesh was carried out in stages with implant placement. After the bone reconstruction at alveolar bone defect becomes stable, implants were placed in an appropriate position during secondary surgery. This method has certain guarantees for the osteogenic consequence, and even if the first bone augmentation surgery fails, the alveolar ridge reconstruction can still be performed at subsequent implant surgery without affecting the effects of implantation. Hence, many studies attempted to apply GBR with titanium mesh to atrophied edentulous alveolar ridge for bone augmentation. Poli et al. performed titanium mesh augmentation on patients with edentulous jaws, achieved ideal bone regeneration after a 6 months recovery period, and allowed the implant to be implanted in the ideal position. During the 88-month follow-up, the new bone obtained by the titanium mesh augmentation had very little resorption and did not affect the function of the implant.[34] Ciocca et al. also used GBR with titanium mesh to reconstruct extensive alveolar ridge defects, and a mean vertical bone of (3.89 ± 1.46) mm were gained after recovery period of 6–8 months, meet the implantation needs on the reconstruction sites.[24] It is worth noting that there is often a higher exposure rate and failure rate in extensive bone augmentation.[50] In Ciocca's report, the exposure rate of titanium mesh was as high as 66%. However, the exposure of titanium mesh in these cases did not lead to significant impact on the results of bone augmentation, which may also be an advantage in the application of titanium mesh.[24]

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Covering materials

The pores of titanium mesh are considered channels for connective tissue cells to form soft tissues under titanium mesh. Therefore, it is theoretically feasible to close the pores and avoid excessive soft tissue formation under titanium mesh by covering absorbable membrane upon titanium mesh. The biocompatibility of the absorbable collagen membrane can be utilized to promote mucosal healing. However, a retrospective cohort study found no statistical difference in the exposure rate of GBR with titanium mesh with/without covering absorbable collagen membrane. And even in cases that exposure did not occur, dense fibrous tissue was still found under the titanium mesh.[64] Hence, it can be considered that covering an absorbable collagen membrane upon the titanium mesh cannot increase the mucosal healing speed, and it is also difficult to reduce excessive soft tissue formation under titanium mesh.

EBD Article:

Medicina (Kaunas). 2021 Jan; 57(1): 60. PMCID: PMC7826518
Published online 2021 Jan 11. doi: 10.3390/medicina57010060 PMID: 33440889

Digital Customized Titanium Mesh for Bone Regeneration of Vertical, Horizontal and Combined Defects: A Case Series

Daniele De Santis,[1] Federico Gelpi,[1,*] Giuseppe Verlato,[2] Umberto Luciano,[1] Lorena Torroni,[2] Nadia Antonucci,[2] Fabio Bernardello,[3] Morris Zarantonello,[4] and Pier Francesco Nocini[1]

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Abstract Go to:

Background and Objective: Guided bone regeneration allows new bone formation in anatomical sites showing defects preventing implant rehabilitation. *Material and Methods:* The present case series reported the outcomes of five patients treated with customized titanium meshes manufactured with a digital workflow for achieving bone regeneration at future implant sites. A significant gain in both width and thickness was achieved for all patients. *Results*: From a radiographic point of view (CBTC), satisfactory results were reached both in horizontal and vertical defects. An average horizontal gain of 3.6 ± 0.8 mm and a vertical gain of 5.2 ± 1.1 mm. *Conclusions:* The findings from this study suggest that customized titanium meshes represent a valid method to pursue guided bone regeneration in horizontal, vertical or combined defects. Particular attention must be paid by the surgeon in the packaging of the flap according to a correct method called the "poncho" technique in order to reduce the most frequent complication that is the exposure of the mesh even if a partial exposure of one mesh does not compromise the final outcome of both the reconstruction and the healing of the implants.

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The realization of customized 3D meshes with CAD-CAM techniques after a careful virtual planned design can favor the treatment of very large defects and also reduce surgical times because the customized grid immediately and perfectly adapts to the site to be rebuilt without the necessity of intra-operative modeling [33,34]. Therefore, CBR avoids all those procedures of cutting, shaping and adapting the old titanium membranes (time-consuming operations), eliminating even the sharp edges created during the modeling of conventional grids that created an irritation of the mucosa, gingival dehiscence and early exposure of the meshes with the risk of failure of the regenerative procedure [35]. The most important factor that can affect the quantity and quality of the regeneration seems to be the exposure of the grid in terms of extension and the timing of appearance although this complication does not seem to compromise the final result [36]. The results of the present case series confirmed this hypothesis. Even though one patient showed a mesh exposure, premature mesh removal was not necessary as it showed no symptoms or signs of superinfection and it was easily recovered. The exposure of the mesh therefore did not affect the final outcome of the regeneration.

Titanium Mesh Design

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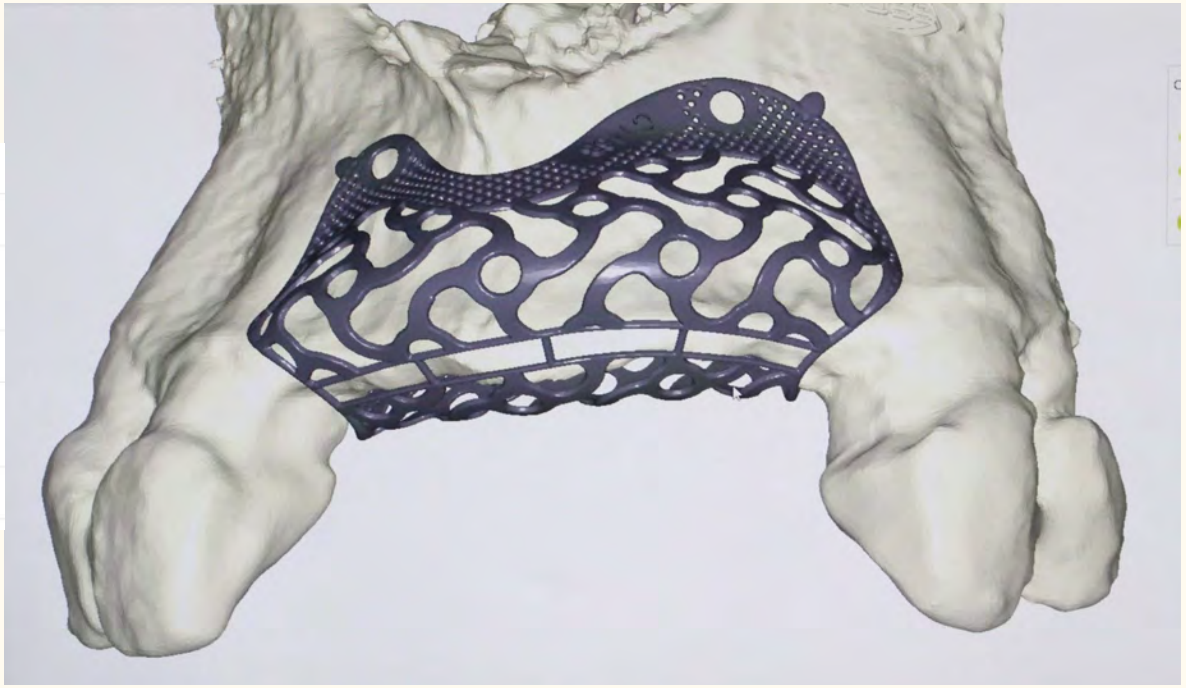
Digital Design of Titanium Mesh by ReOss

C146B Yxoss CBR®	
Volume augmentation [cc]:	0.70 cc
Dim. in mesiodistal direction [mm]:	20 mm
Predetermined breaking point:	Yes
Recommended cut:	- Crestal incision (after oral offset)
Lattice structure:	Yxoss CBR® protect



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Bone Augmentation Surgery

With Dr. Eduardo Gonzalez on 11.29.22

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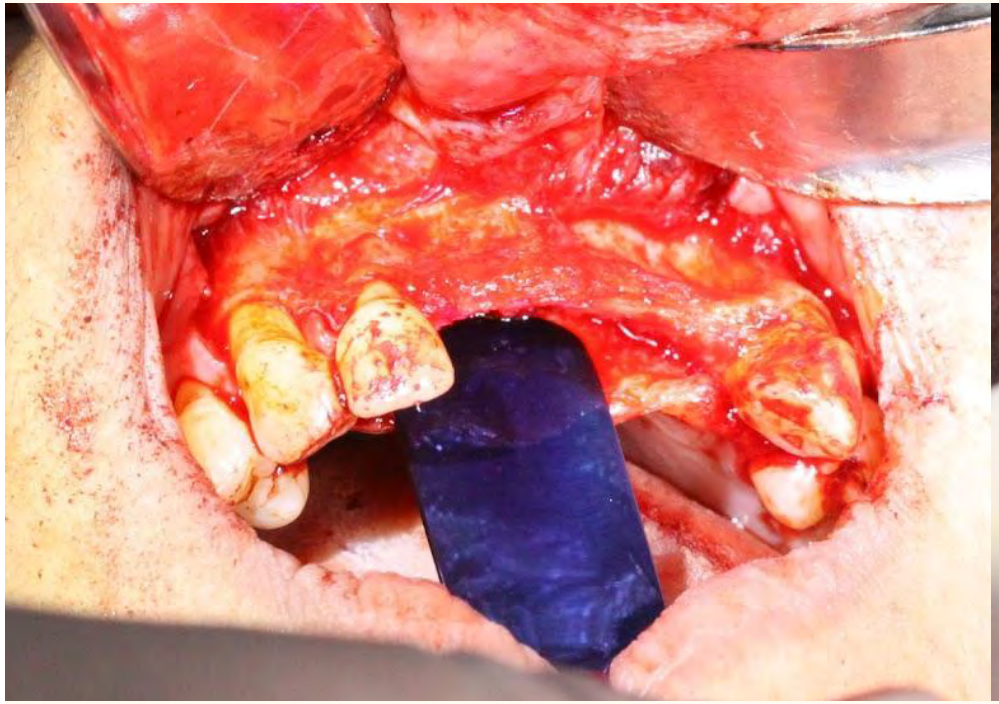
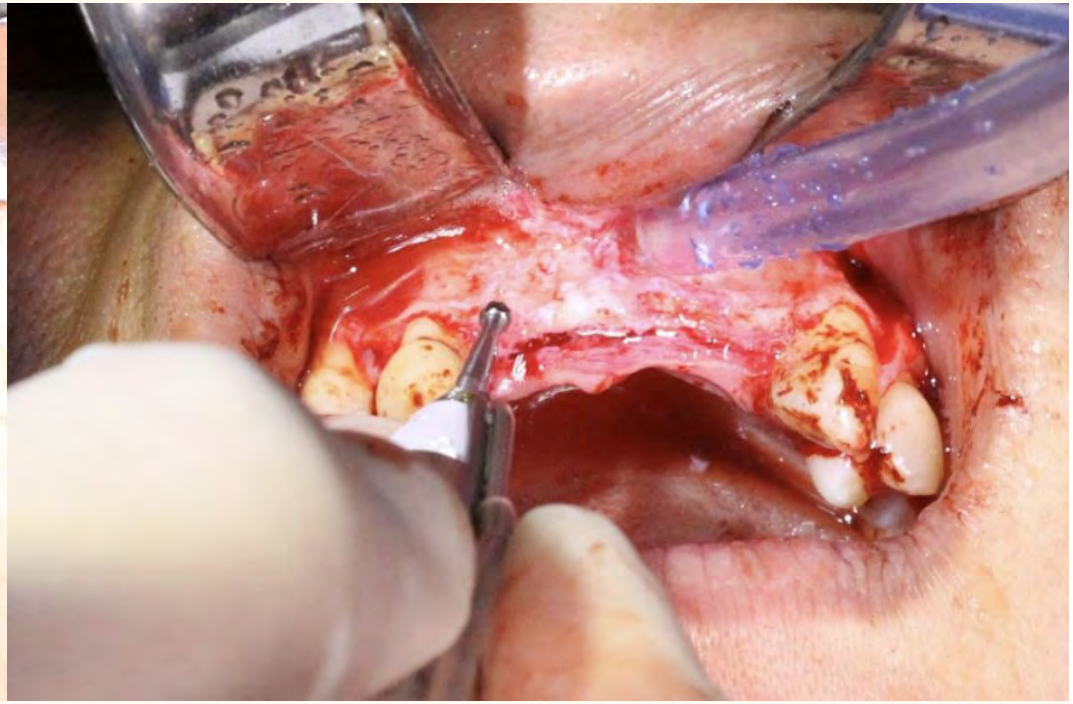
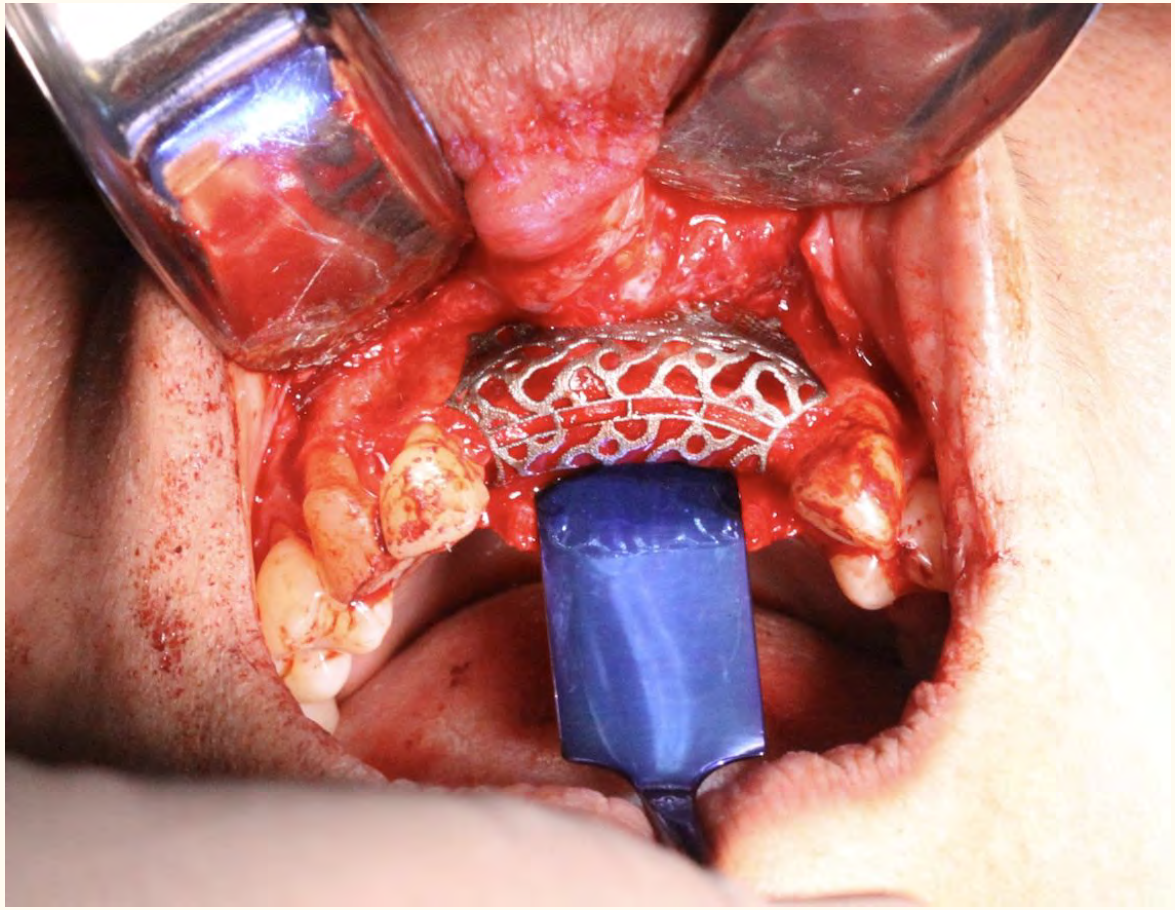
Full Thickness Flap #6-11

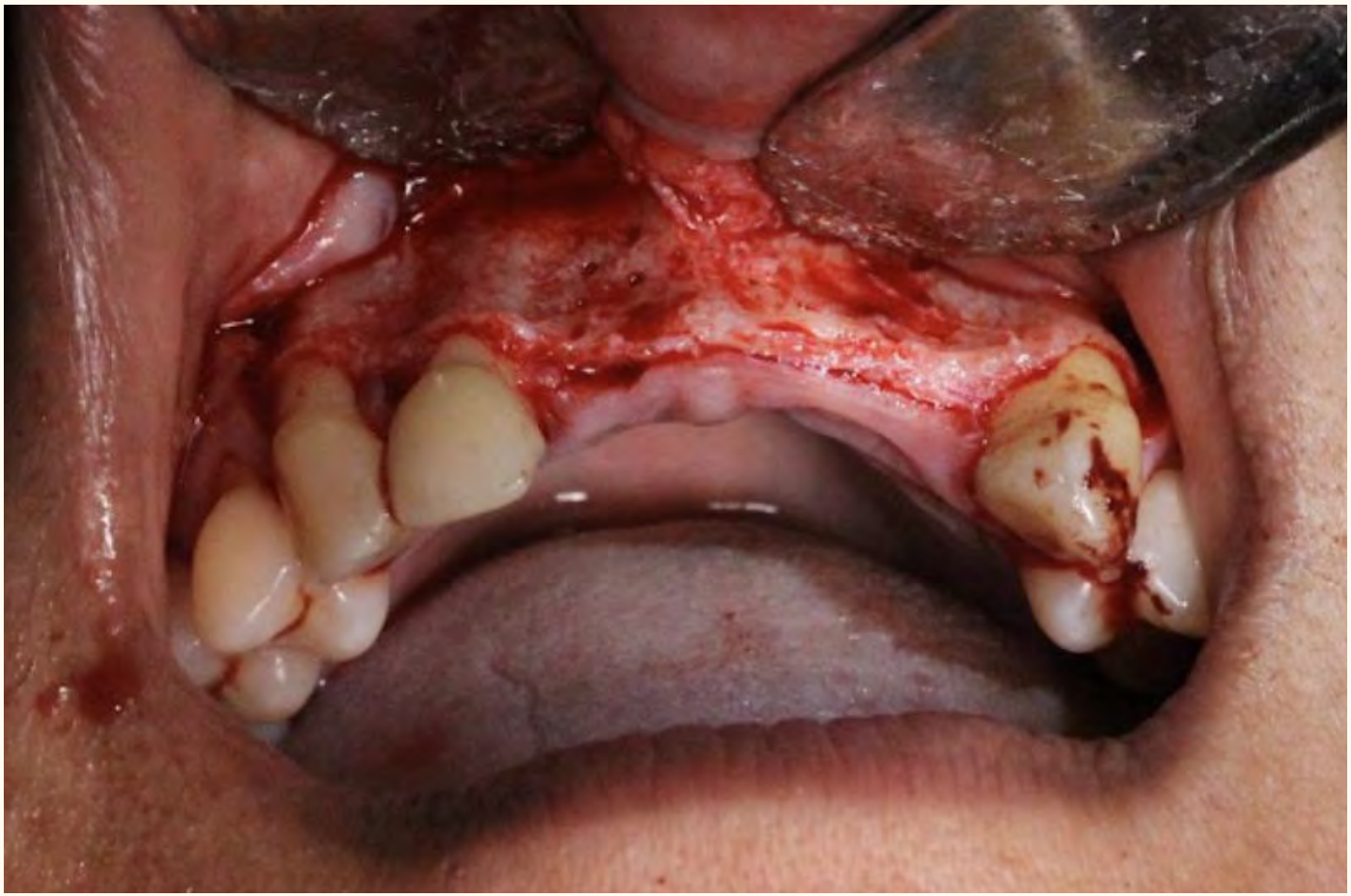




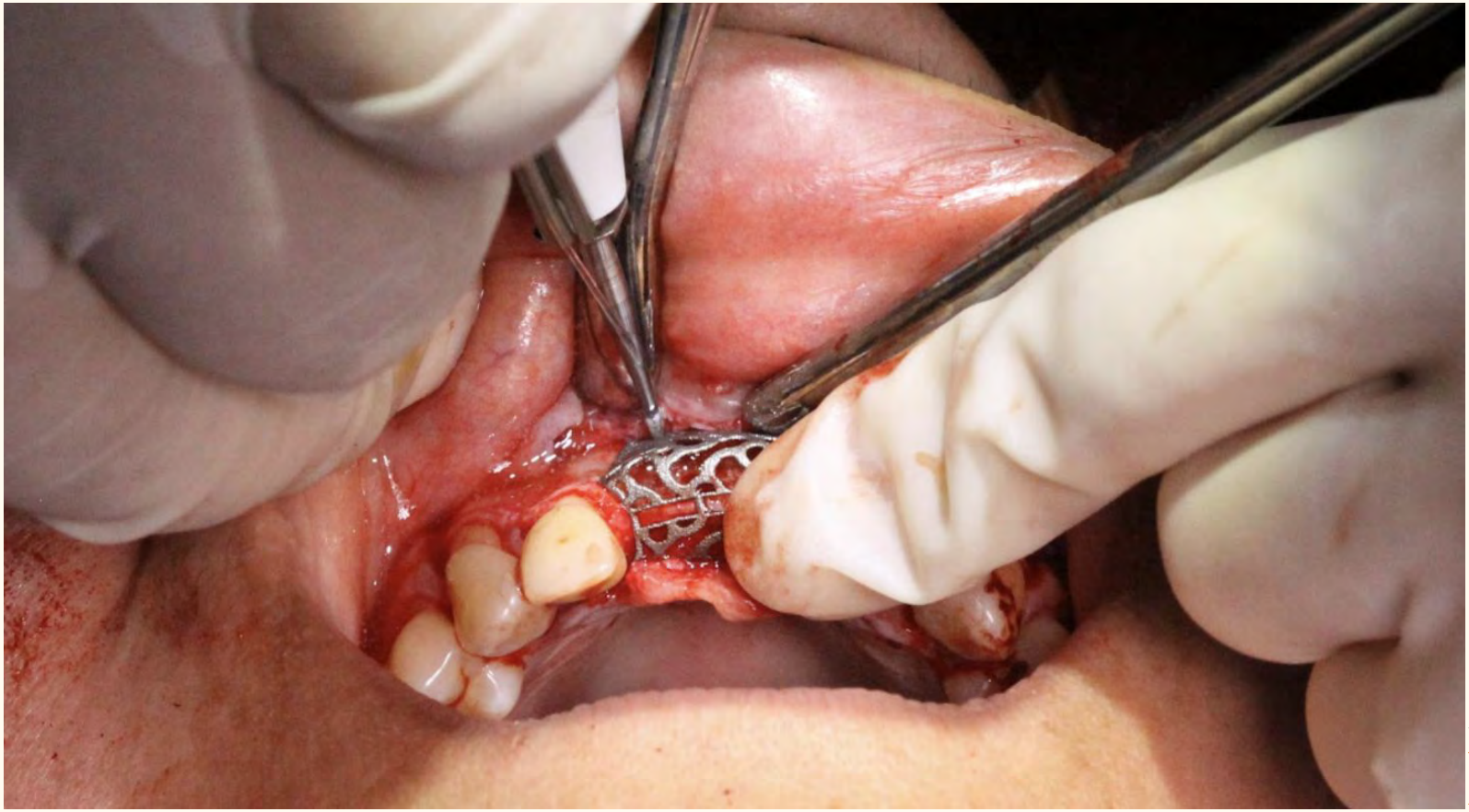
Try-in of Titanium Mesh



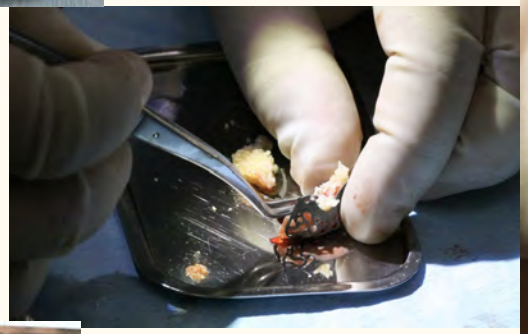
Buccal Plate Perforations

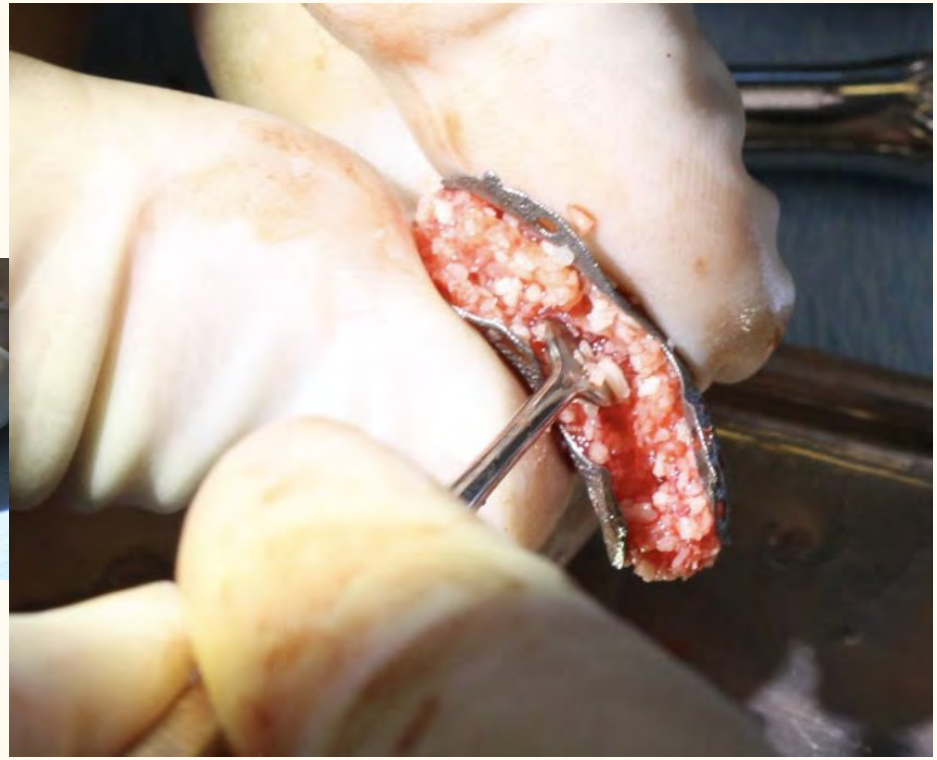


2 Pilot Holes for Screws on Buccal Plate



Loading the Bone Graft into the Titanium Mesh





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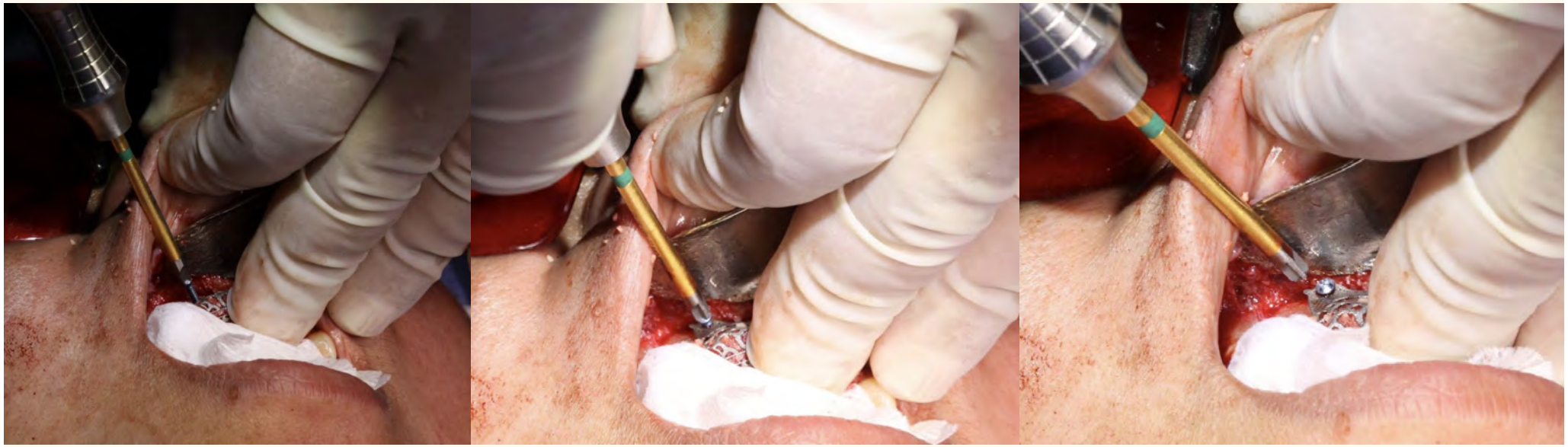
Securing Titanium Mesh



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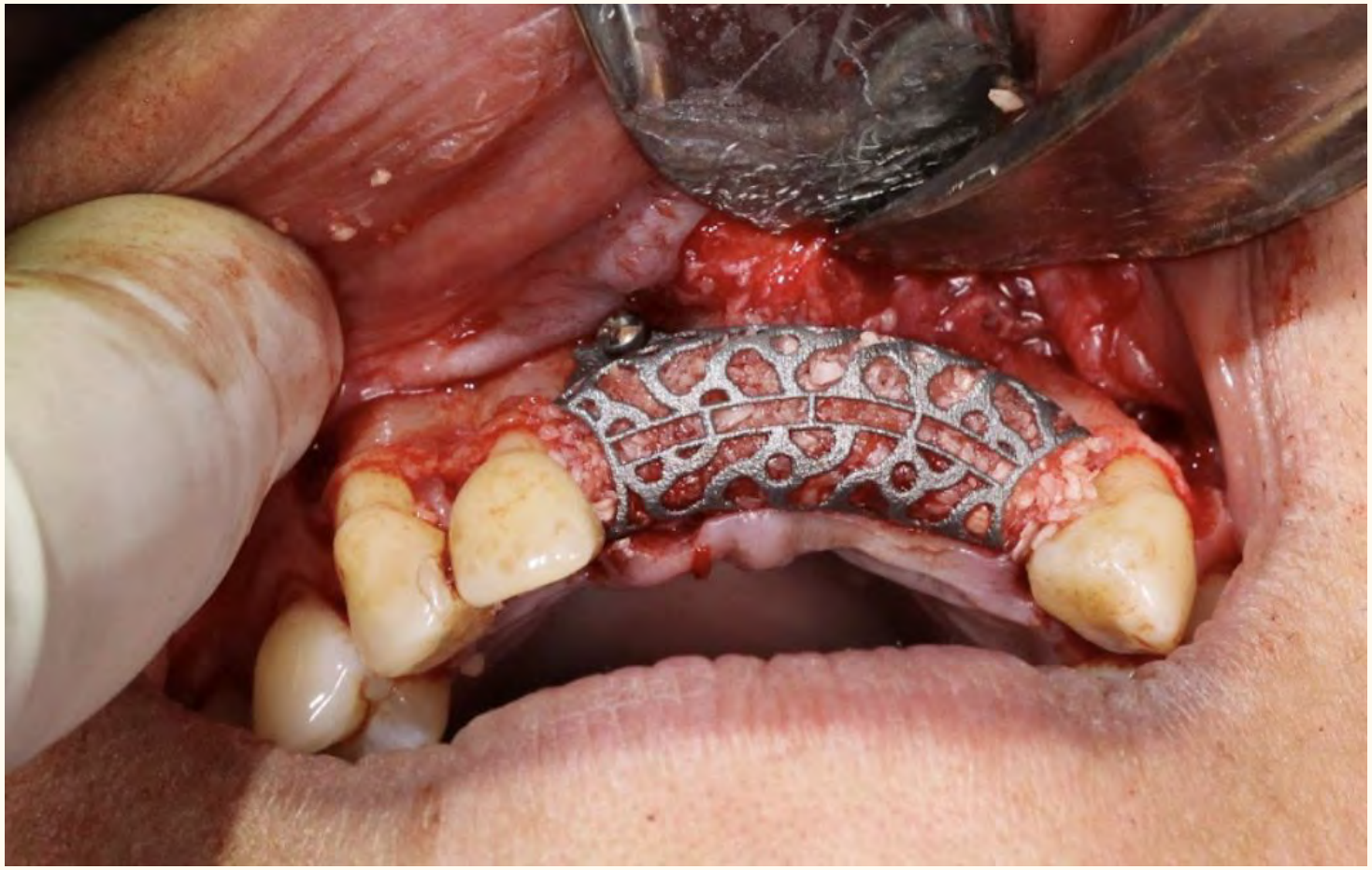
Final Placement



Collagen Membrane Placement (clinical photo not taken)

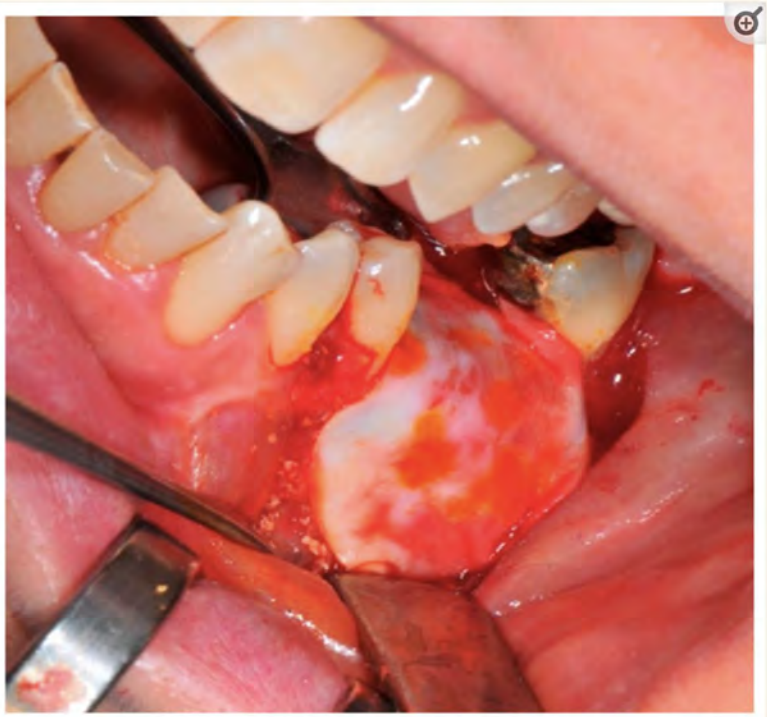


Figure 9

The resorbable membrane coverage above the titanium mesh.

Source: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7826518/

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Sutured Flap (clinical photo not taken)

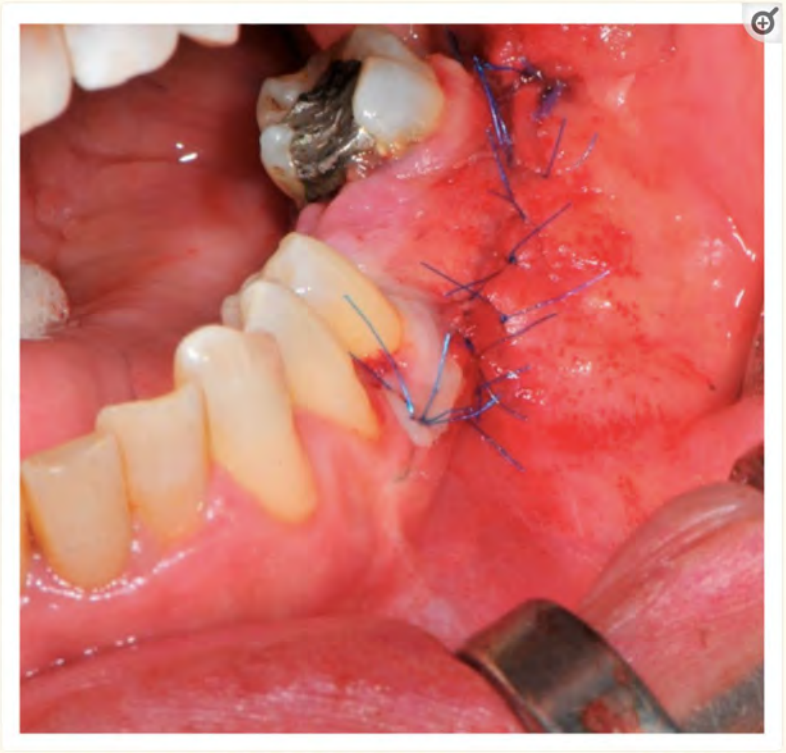

Figure 12

The buccal aspect of the sutured flap.

Source: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7826518/

No Surgical Complications

- Large resorbable collagen membrane placed over the titanium mesh to prevent ingrowth of soft tissue.
- 4cc Dexamethasone administered into the buccal vestibule (submucosal) to aid in postoperative pain and swelling.
- Primary closure obtained via mobilization of the mucoperiosteal flap by periosteal incision in the buccal vestibule area and coronal placement of the full thickness flaps.
- Mucoperiosteal flap positioned tightly but tension free.

Post-op Instructions:

- Informed patient to expect a lot of swelling and inflammation during initial healing stages and to plan for 1 week off from work.
- Avoid hot foods and stay away from heat (patient works in a restaurant) to minimize swelling
- Prescribed 500mg Amoxicillin TID 7 days
- Recommended 800mg ibuprofen TID 4 days for pain management

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Follow Up Visits

At 3 weeks and 2 months

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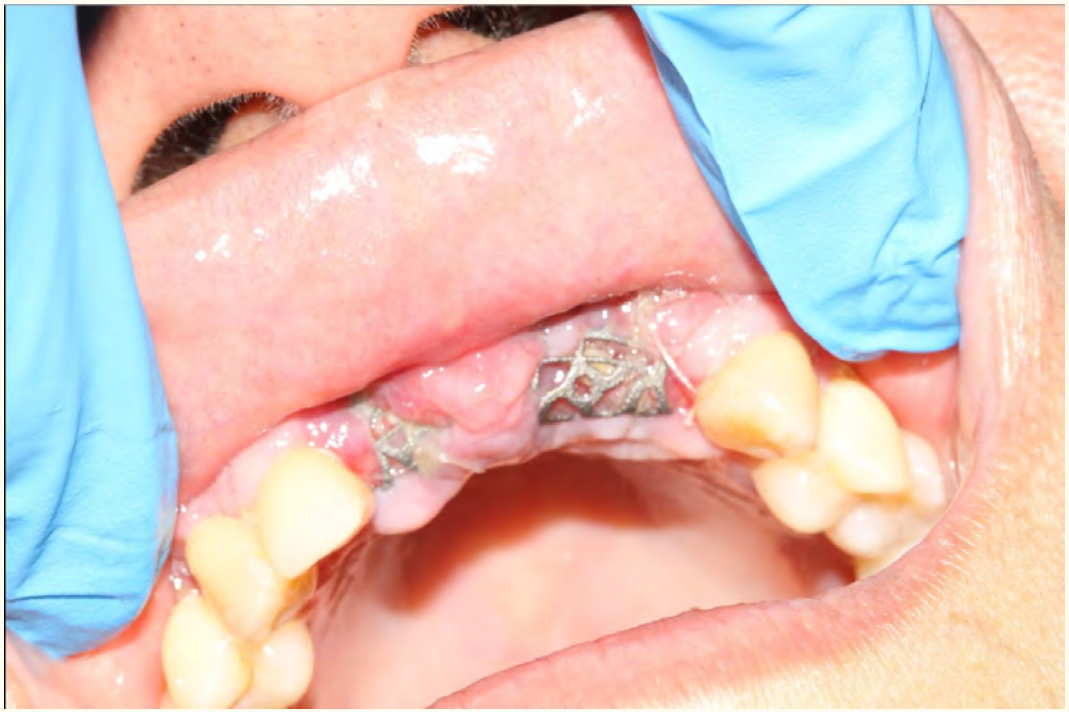
3 Week Post-Op | 12.19.22

CC: “I’m feeling well but the threads are a little pointy on my upper left (points to #11 area).”

Exposed mesh near sites #8 & #10. Visible plaque on mesh. Soft tissue otherwise healing well. Sutures still in place.

2 sutures cut and removed near #11 to address patient’s CC.

No other treatment warranted at this time. Follow up in 1 month



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EBD Articles about Titanium Mesh Exposure

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EBD Article:

Review > Int J Oral Sci. 2020 Dec 30;12(1):37. doi: 10.1038/s41368-020-00107-z.

Titanium mesh for bone augmentation in oral implantology: current application and progress

Yu Xie [1], Songhang Li [1], Tianxu Zhang [1], Chao Wang [2 3], Xiaoxiao Cai [4]

Affiliations + expand

PMID: 33380722 PMCID: PMC7773733 DOI: 10.1038/s41368-020-00107-z

Application of titanium mesh with delayed implantation

From the time titanium mesh was used as a barrier membrane for GBR, in most cases, the bone augmentation with titanium mesh was carried out in stages with implant placement. After the bone reconstruction at alveolar bone defect becomes stable, implants were placed in an appropriate position during secondary surgery. This method has certain guarantees for the osteogenic consequence, and even if the first bone augmentation surgery fails, the alveolar ridge reconstruction can still be performed at subsequent implant surgery without affecting the effects of implantation. Hence, many studies attempted to apply GBR with titanium mesh to atrophied edentulous alveolar ridge for bone augmentation. Poli et al. performed titanium mesh augmentation on patients with edentulous jaws, achieved ideal bone regeneration after a 6 months recovery period, and allowed the implant to be implanted in the ideal position. During the 88-month follow-up, the new bone obtained by the titanium mesh augmentation had very little resorption and did not affect the function of the implant.[34] Ciocca et al. also used GBR with titanium mesh to reconstruct extensive alveolar ridge defects, and a mean vertical bone of (3.89 ± 1.46) mm were gained after recovery period of 6–8 months, meet the implantation needs on the reconstruction sites.[24] It is worth noting that there is often a higher exposure rate and failure rate in extensive bone augmentation.[50] In Ciocca's report, the exposure rate of titanium mesh was as high as 66%. However, the exposure of titanium mesh in these cases did not lead to significant impact on the results of bone augmentation, which may also be an advantage in the application of titanium mesh.[24]

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EBD Article:

Research article | Open Access | Published: 03 February 2020

Minimizing risk of customized titanium mesh exposures – a retrospective analysis

Amely Hartmann & Marcus Seiler

BMC Oral Health **20**, Article number: 36 (2020) | Cite this article

4410 Accesses | **34** Citations | Metrics

Based on the principles of the GBR technique, individualized titanium meshes are proposed to overcome the problems of the conventional titanium meshes [13]. Literature [14,15,16] reveals the advantages of this technology such as a shortened and facilitated surgery time in sense of a modern digital work-flow. Although Sumida et al. evaluated less exposures, but not statistically significant, in patient-specific titanium meshes [17], soft tissue management remains one of the most challenging targets in customized bone regeneration [18].

Treatment opportunities like self-inflating soft tissue expanders [19] or free fat grafts (FFG) from the buccal fat pad [20] aiming to stabilize the soft tissue healing process increase comorbidity of the patient and need additional surgical skills. A promising solution may be the enhancement of soft tissue wound healing by Platelet-Rich Fibrin (PRF) as shown in literature [21,22,23].

So far, there is no clear recommendation in literature to reduce this exposure rate in customized bone regeneration.

The aim of this study was to describe a new surgical protocol in customized bone regeneration and to evaluate parameters that minimize the risk of customized titanium mesh exposures. The influence of various demographic, local and systematic factors were assessed.

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EBD Article:

Research article | Open Access | Published: 03 February 2020

Minimizing risk of customized titanium mesh exposures – a retrospective analysis

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In 25% of the cases (n = 17), exposures of the meshes were documented. Within this exposure rate, most of them were slight and only punctual (A = 16.2%, n = 11). Exposure like one tooth width (B = 1.5%, n = 1) and a complete (C = 7.4%, n = 5) occurred as well. Associated with these exposures, no loss of grafting material (86.8%, n = 59), partial (11.8%, n = 8) and complete in 1.5% (one case) was evaluated. A therapy according to the planned treatment protocol was possible in all the cases.

A®-PRF provided significantly less exposures of the titanium meshes (76.5% no exposure vs. 23.5% yes, p = 0.029) (Fig. 8). Other parameters like tobacco abuse (p = 0.669), diabetes (p = 0.568) or surgical parameters (mesh size, defect region, flap design p = 0.368) did not influence the exposure rate. Surgical splints were not found to reduce the exposure rate (p = 0.239). Gender (female) was significantly associated with less exposure rate (78,4% female vs. 21.6% male, p = 0.043, Fig. 9).

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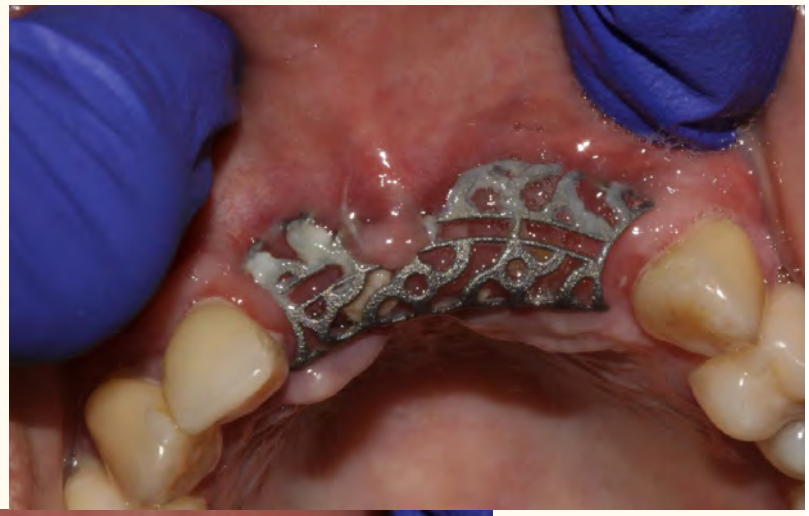
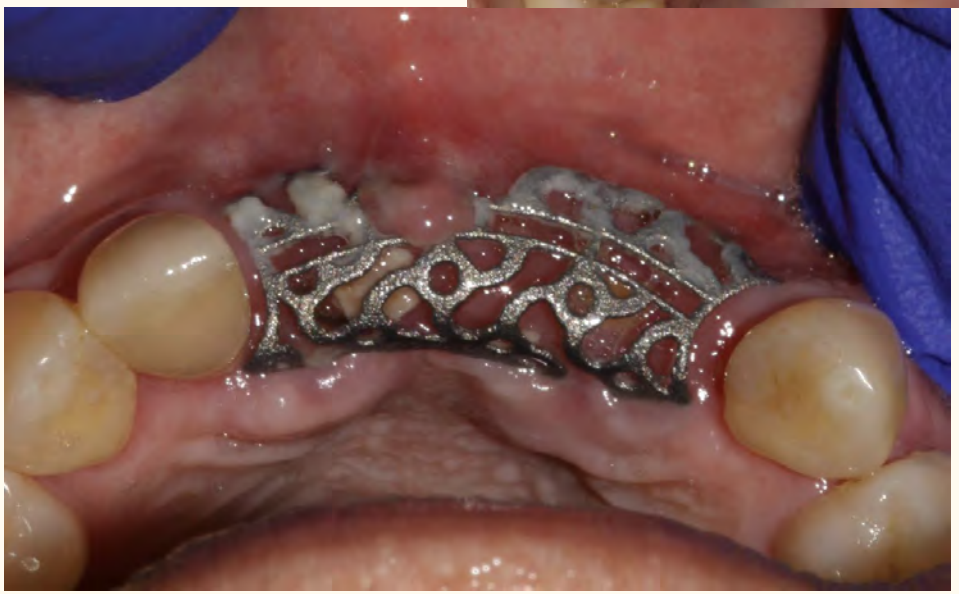
2 Month Post-Op | 2.3.23



CC: “Everything is feeling well”

Majority of coronal surface of mesh now exposed. Visible plaque on mesh.

No other treatment warranted at this time. Schedule mesh removal in late March (4 months after initial placement).



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Titanium Mesh Removal Surgery at 4 months

With Dr. Hussein Al-Wakeel on 3.10.23

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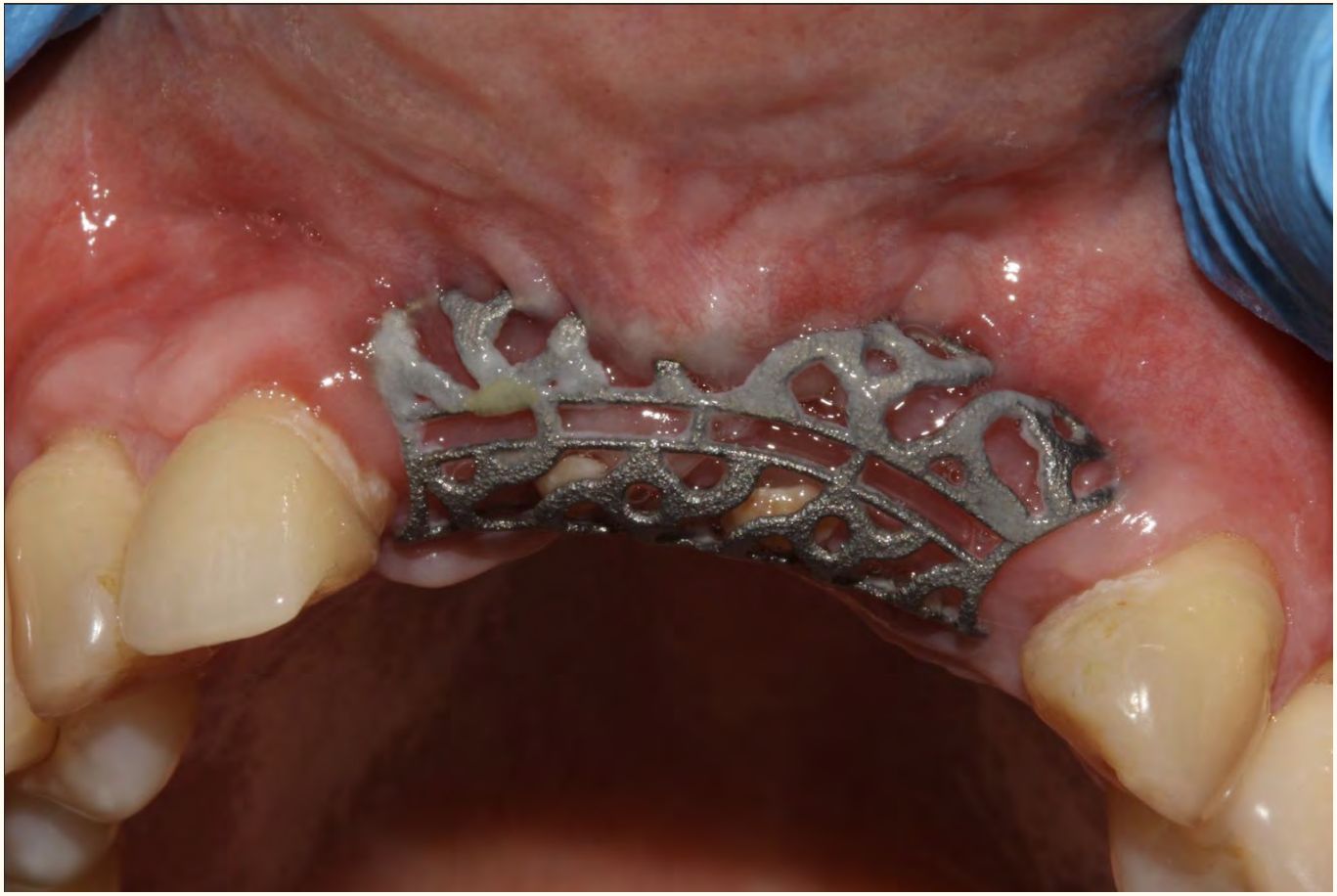
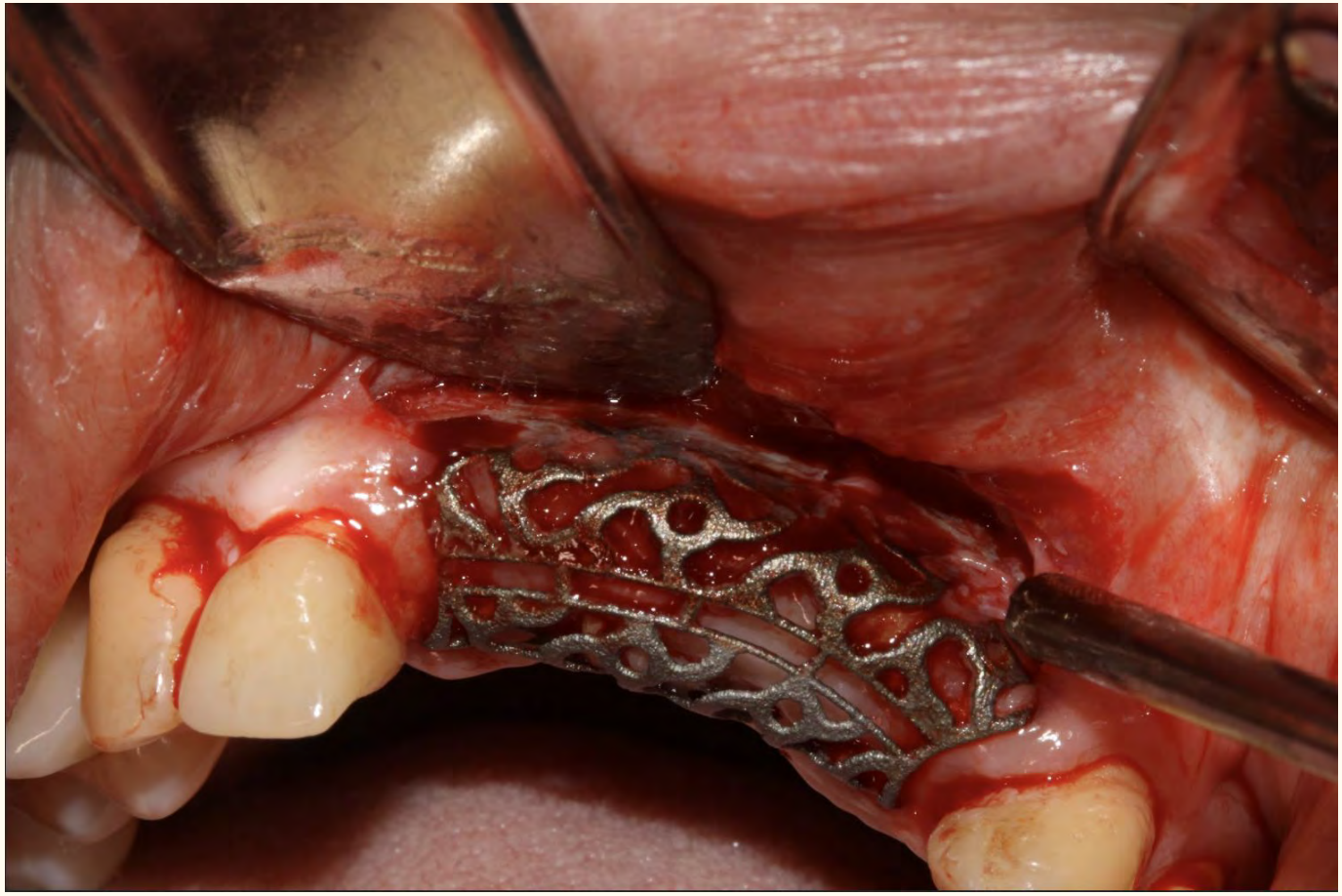
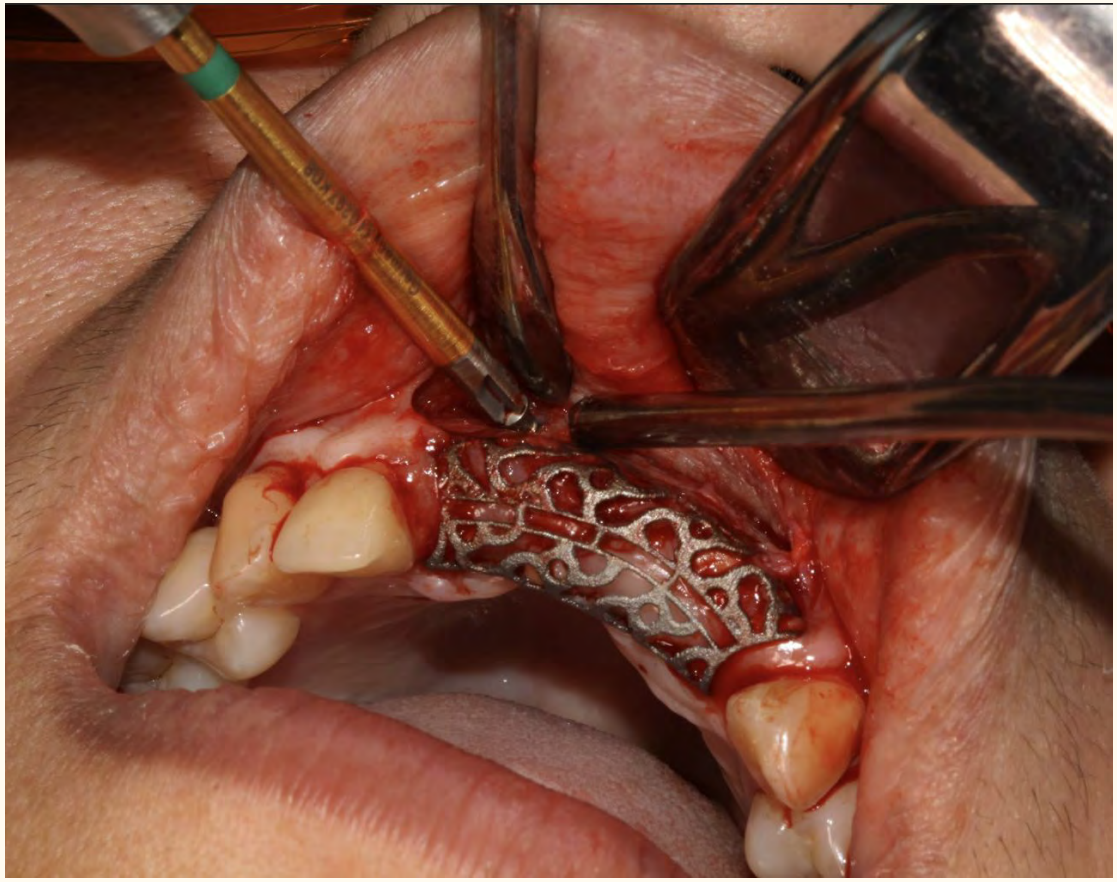
Pre-op



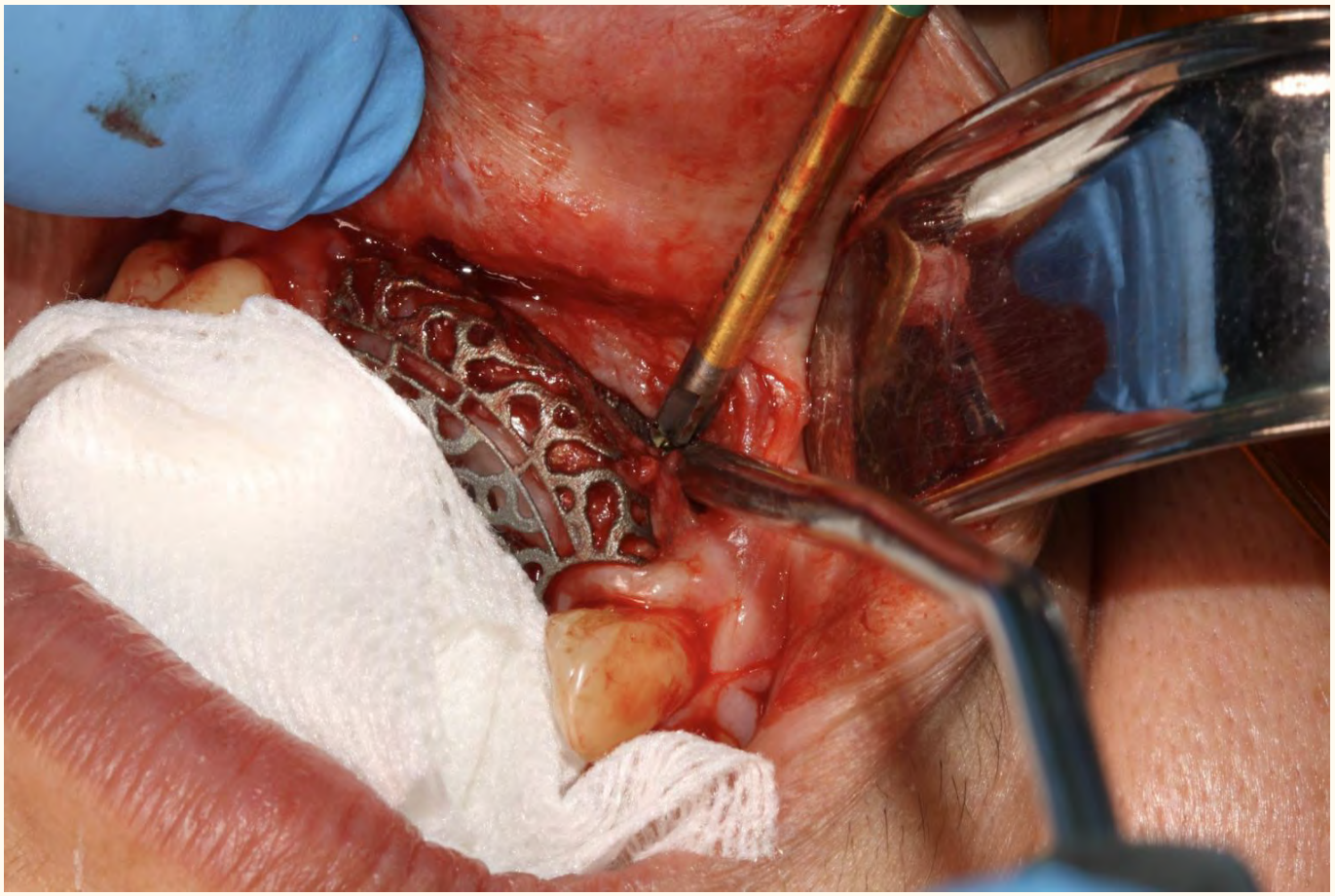
Exposing Titanium Mesh



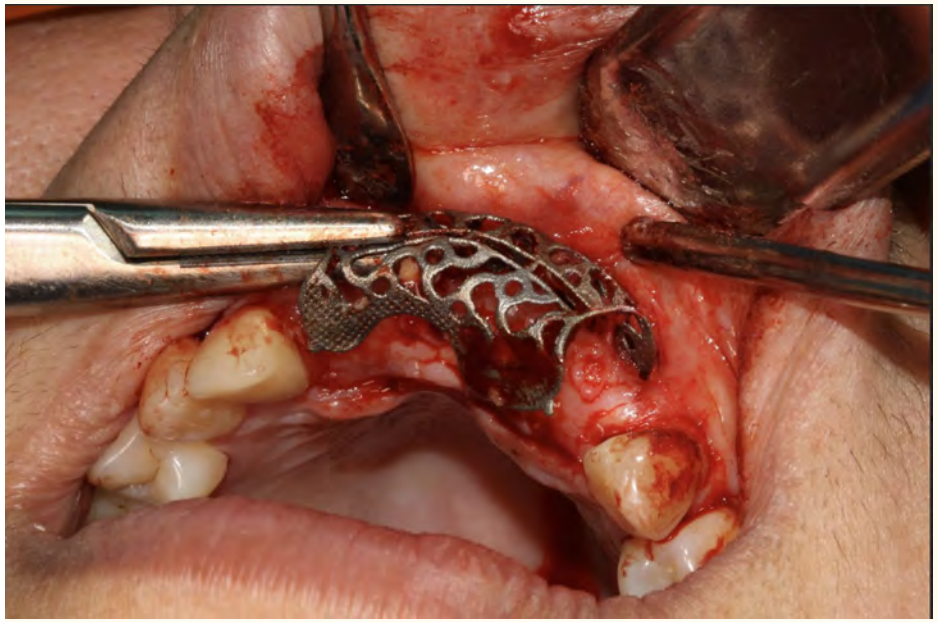
Removing the Upper Right Screw

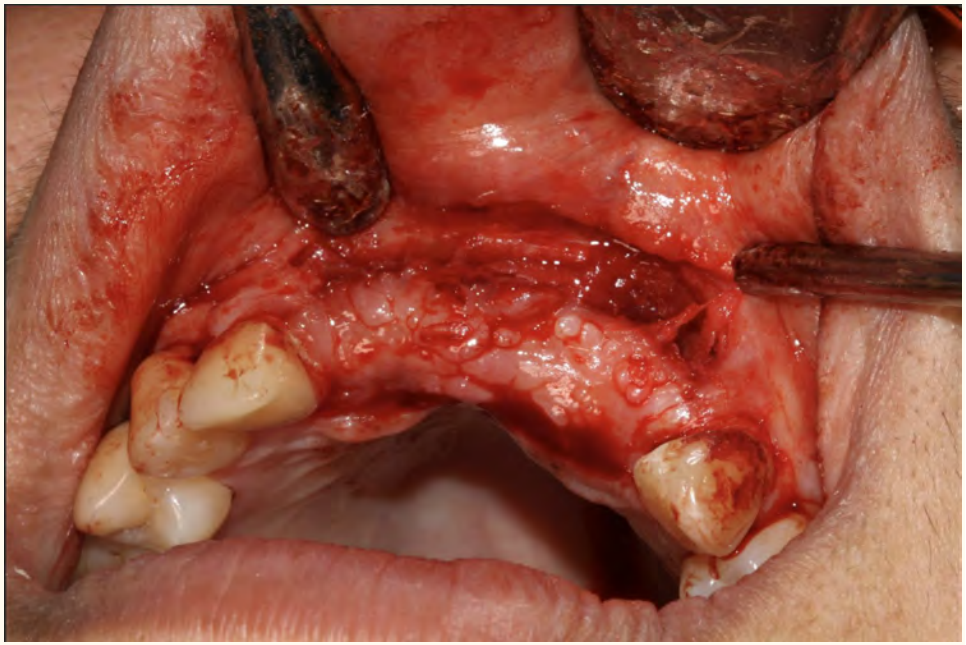


Removing the Upper Left Screw



Removing the Mesh

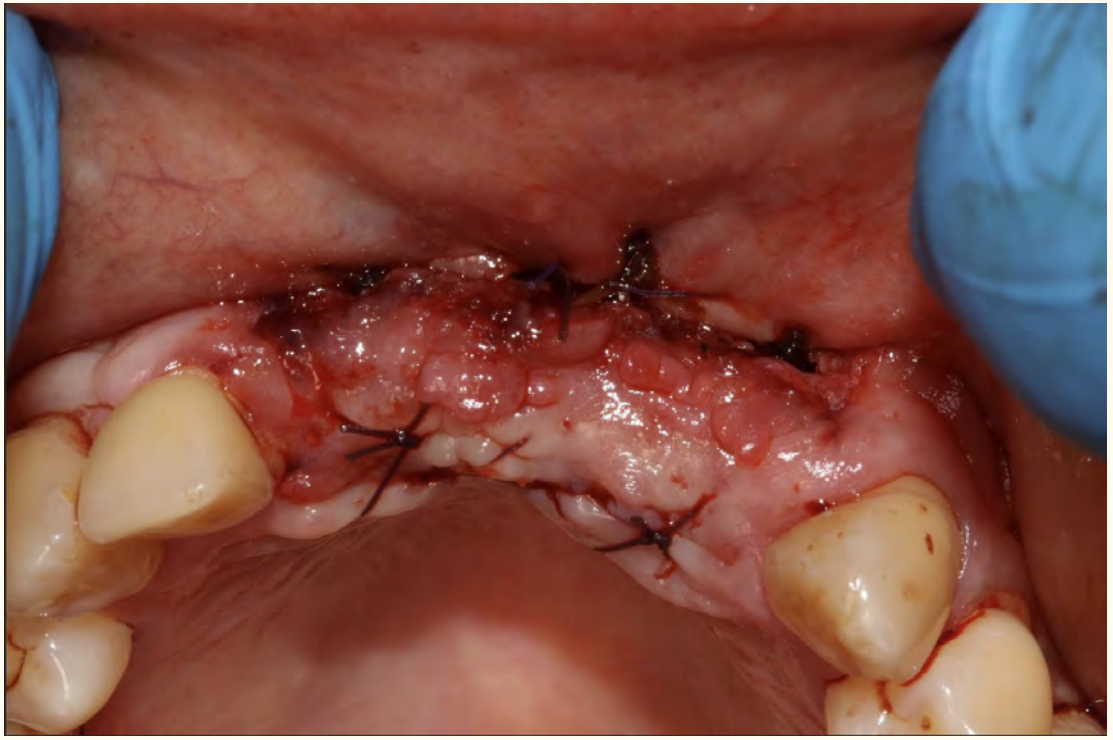




4 Months - Mesh Removal

Primary intention wound closure on the lingual.

Healing by secondary intention on the buccal to allow more attached gingiva growth while simultaneously creating a deeper vestibule on the buccal, which was reduced in the prior surgery to obtain primary closure.



Post Bone Augmentation CBCT and Implant Planning

3.17.23

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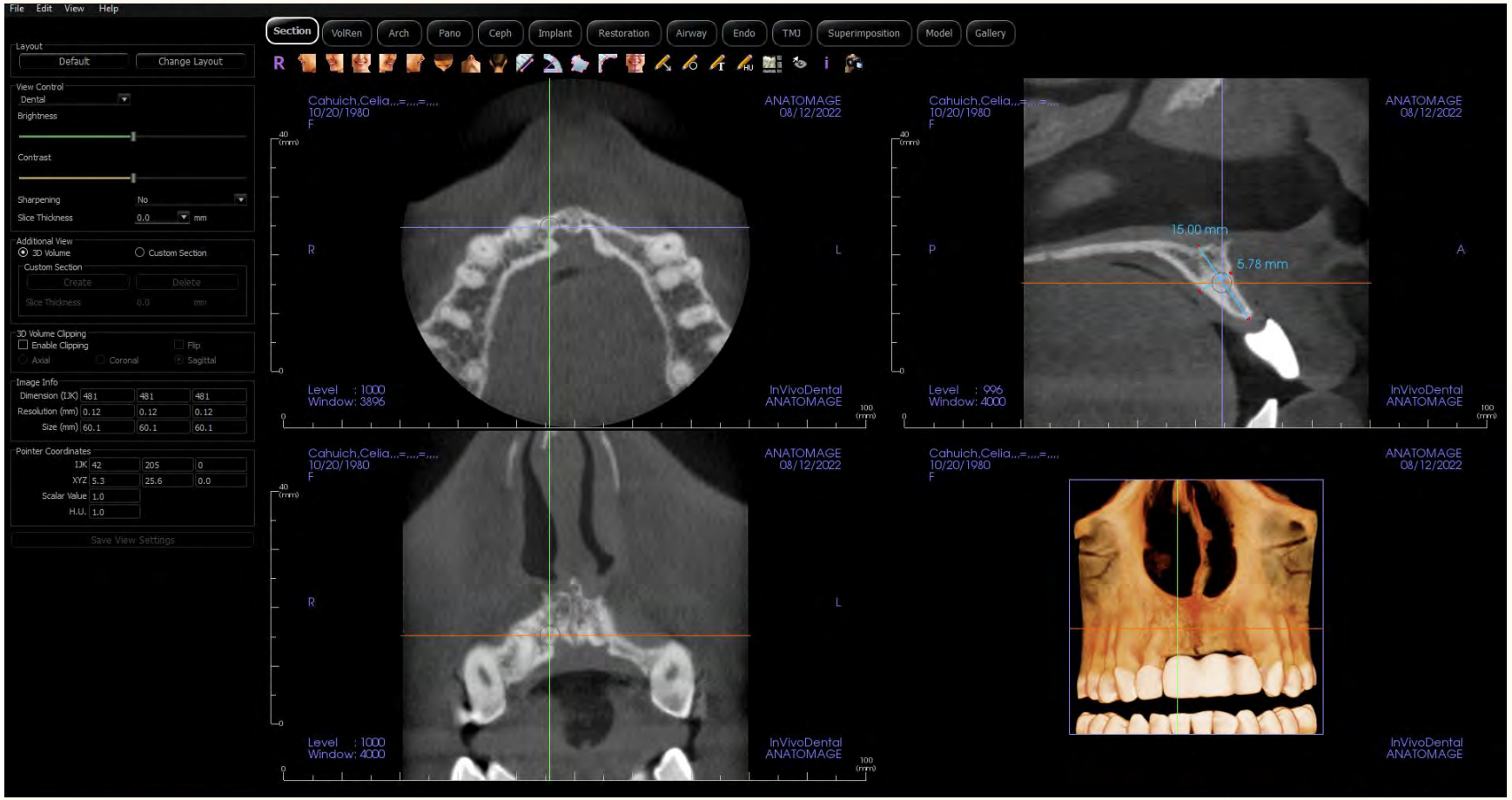
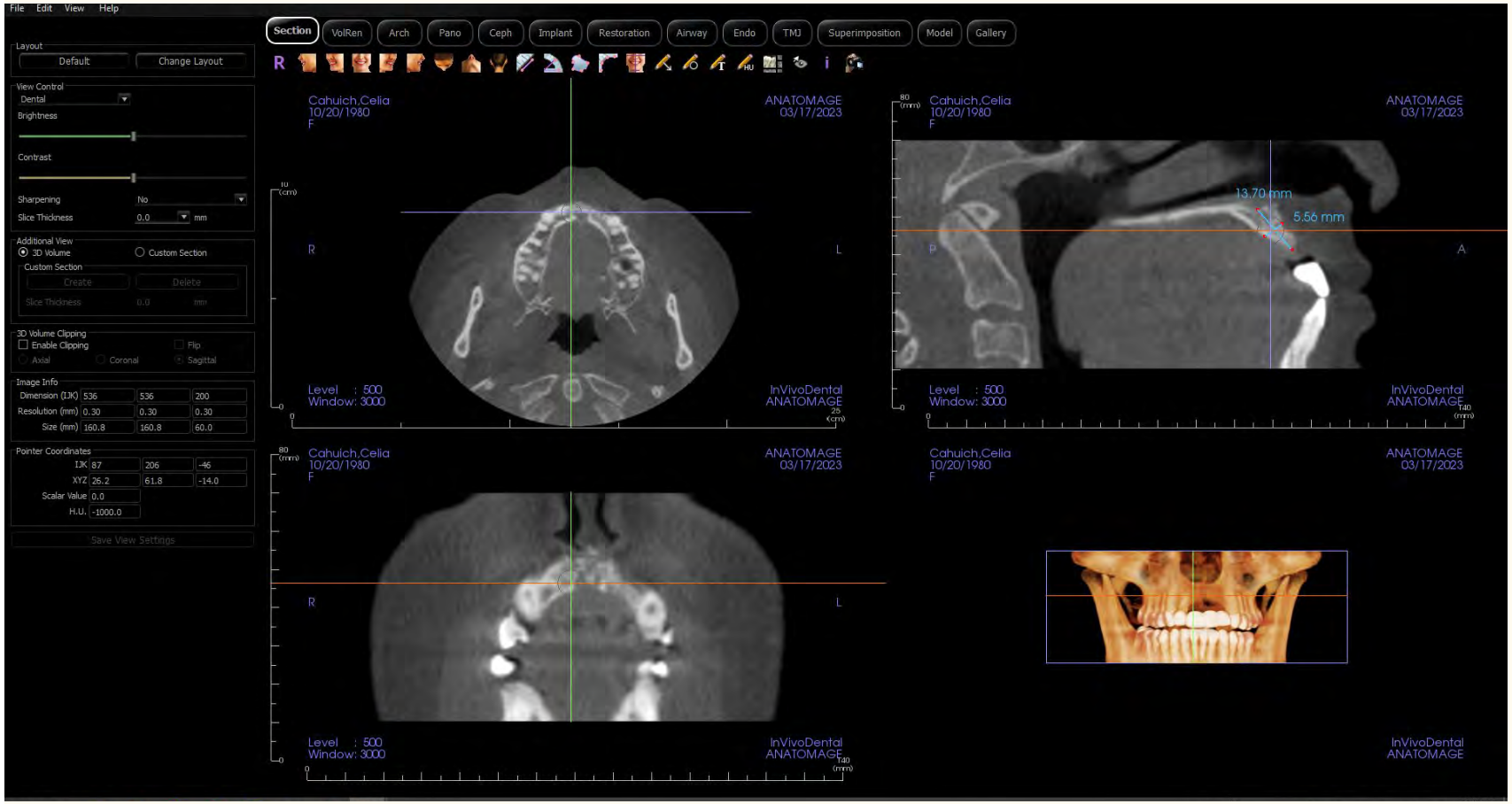
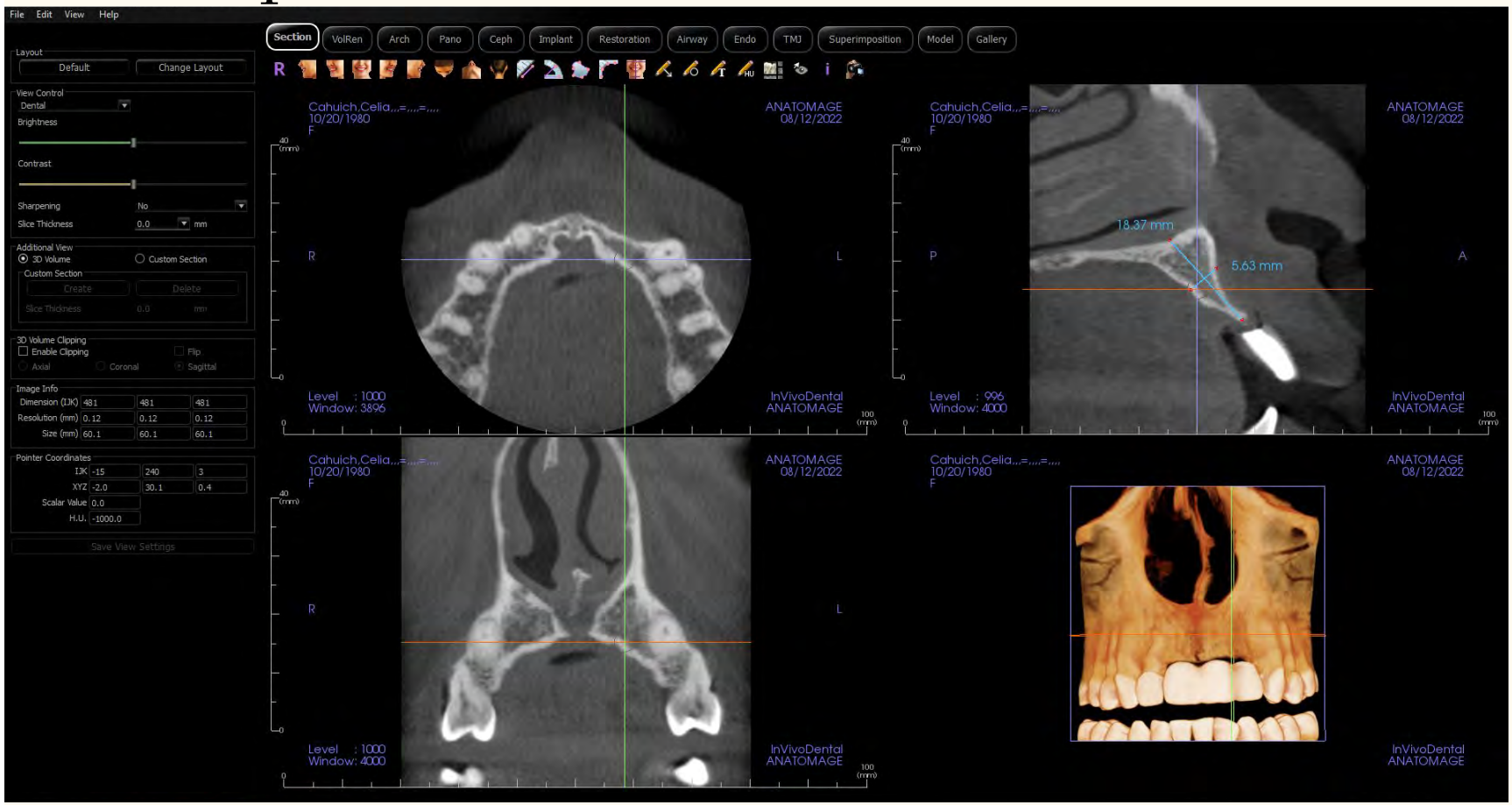
Pre-Op CBCT #8



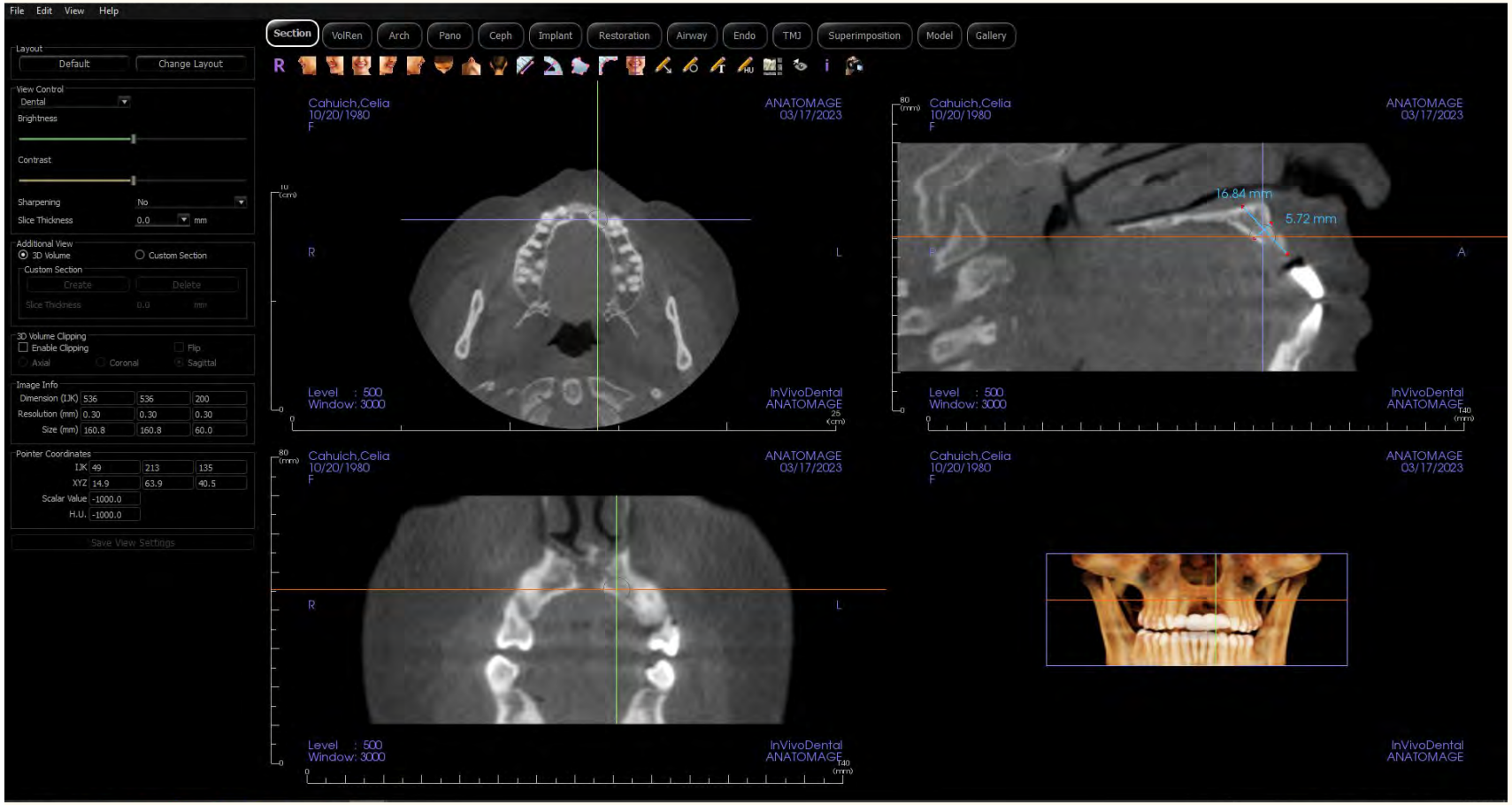
Post-Op CBCT #8



Pre-Op CBCT #10



Post-Op CBCT #10



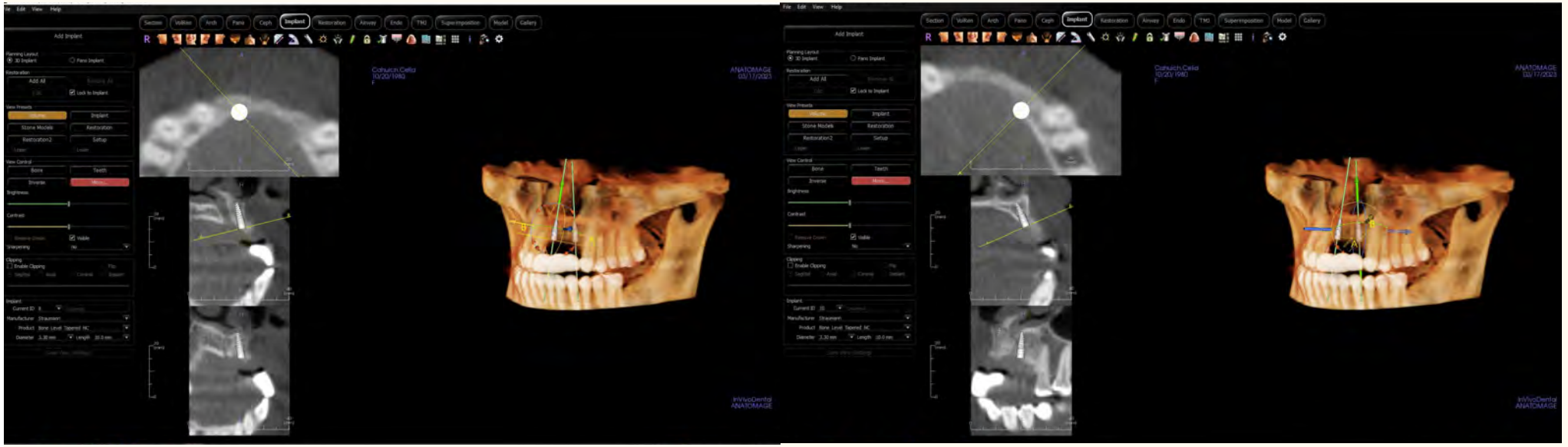
Pre vs. Post-Op CBCTs

Pre-op: D0364i | CBCT Morita Accuitomo Standard Resolution 6x6, #6-11

Post-op: D0366PO | CBCT ICAT - Post-op Maxillary

Implant Restorative Plan Revisited

Based on post bone augmentation CBCT, we can still pursue #8-#10 Implant Bridge and will require additional bone graft at the time of implant placement. Planned #8 & #10 implants: 3.3x10mm Straumann Bone Level Tapered NC



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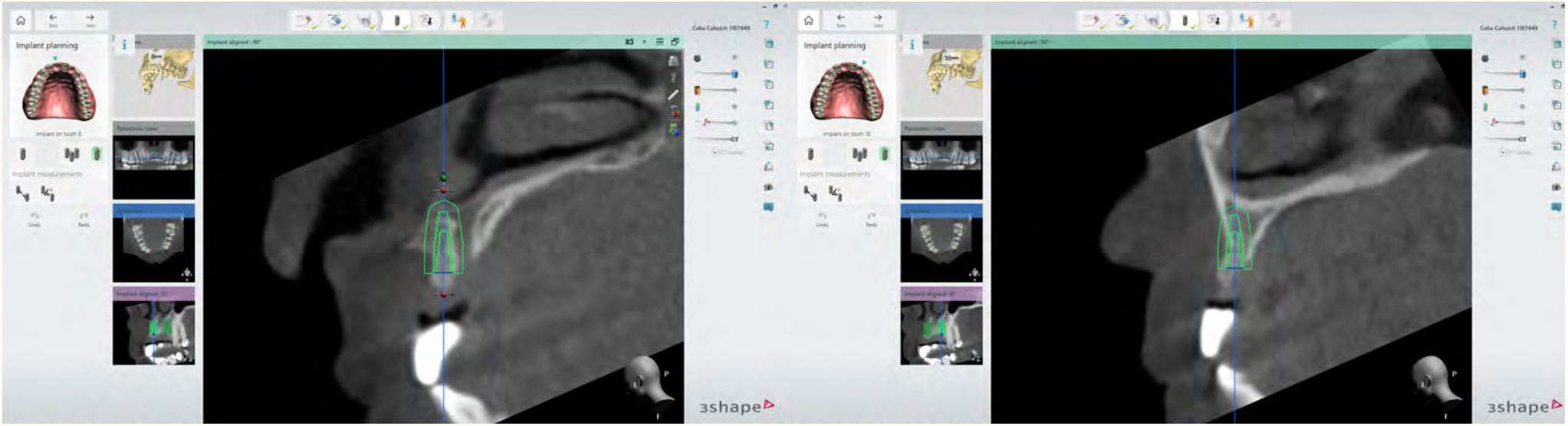

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Follow Up Visits

At 4 weeks and 6 weeks

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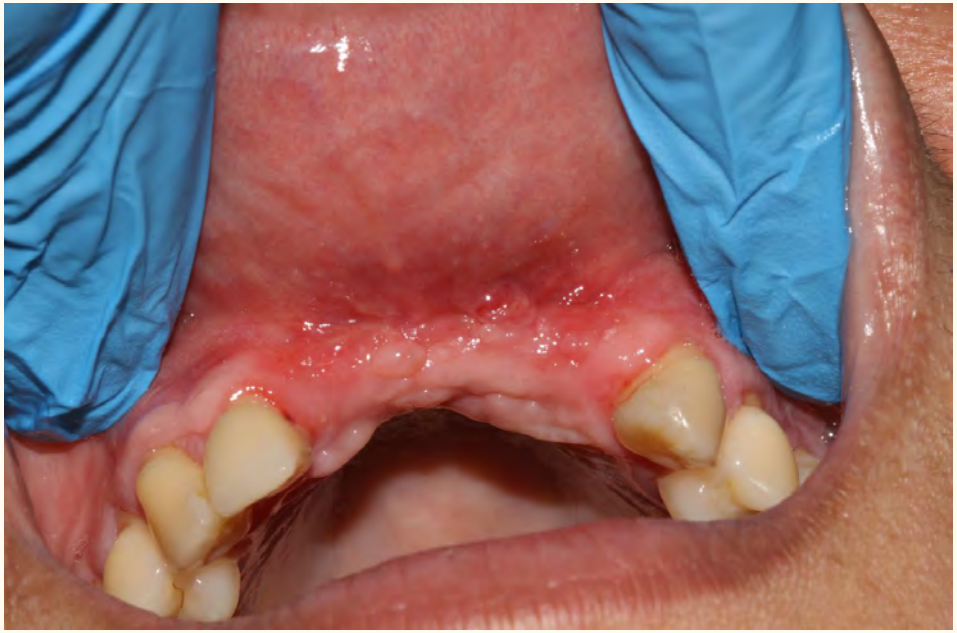
4 Weeks Post Mesh Removal

(Ideally 3 weeks, but 4 weeks due to clinic closure over break)

CC: “It’s slightly uncomfortable where the sutures are.”

Removed one remaining suture in the buccal vestibule. Slightly erythematous.

Prescribed 0.12% chlorhexidine rinse.



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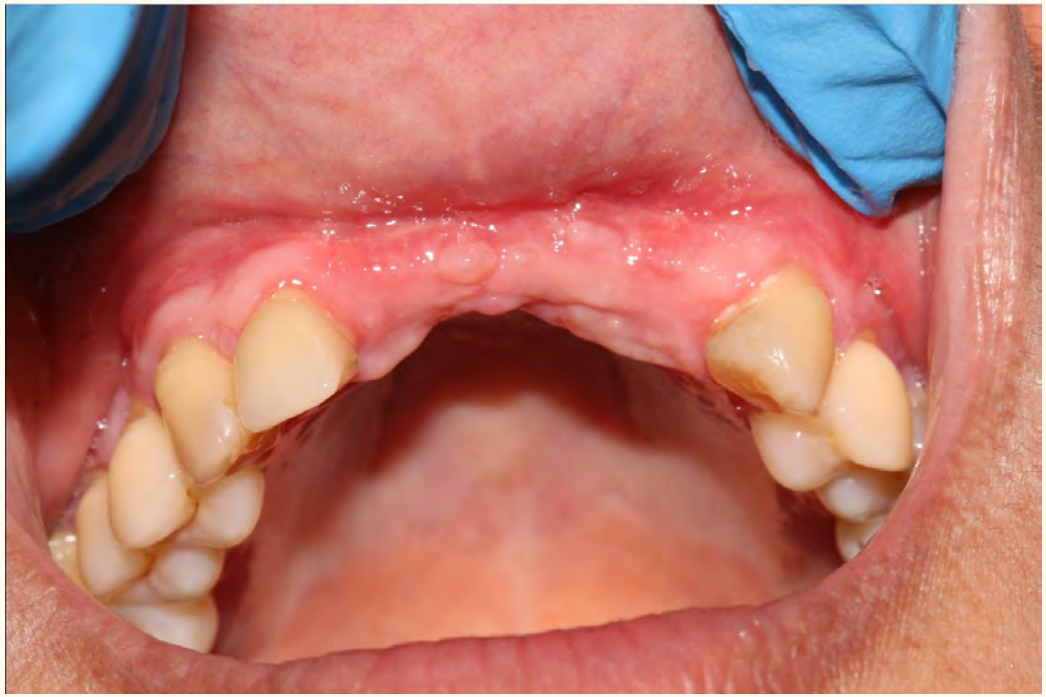
6 Week Follow-Up

CC: “Everything is feeling good, and there’s no more irritation after we removed the suture last time.”

Schedule implant placement end of May (6 months after initial bone augmentation) with additional bone graft at time of implant placement.



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Acknowledgements

I would like to acknowledge Dr. Eduardo Gonzalez, Dr. Fatima Mashkoor, and Dr. Hussein Al-Wakeel for their guidance and experience in this clinical case. I thank them for their heart and passion in each stage of the case from planning to rendering treatment, and the reflective discussions afterwards. It has been an honor being your student and sharing this case with you all.

Thank you!

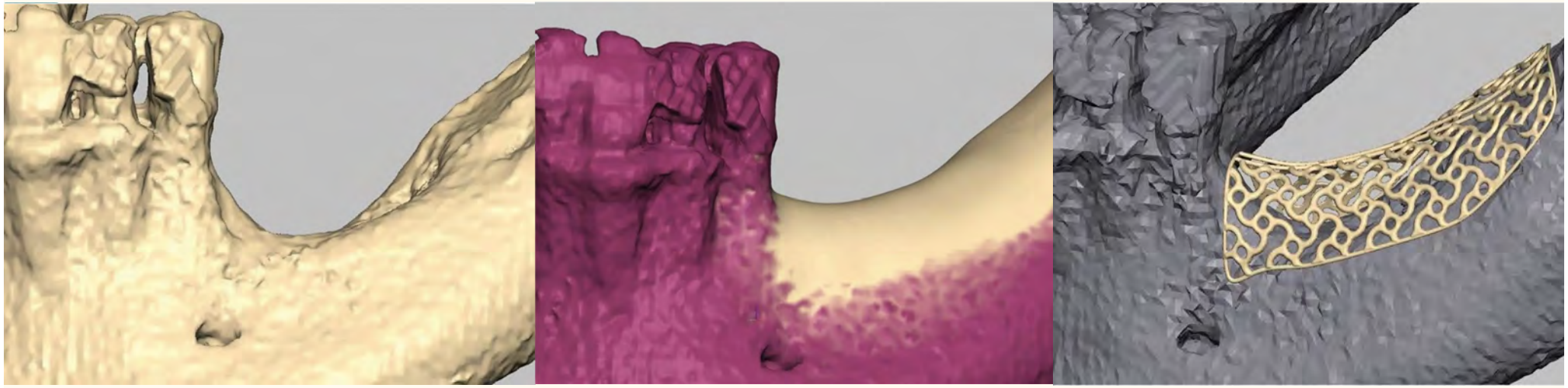
Appendix

ReOss Yxoss CBR

Yxoss CBR® - The first customized 3-D printed bone regeneration solution for complex bone defects

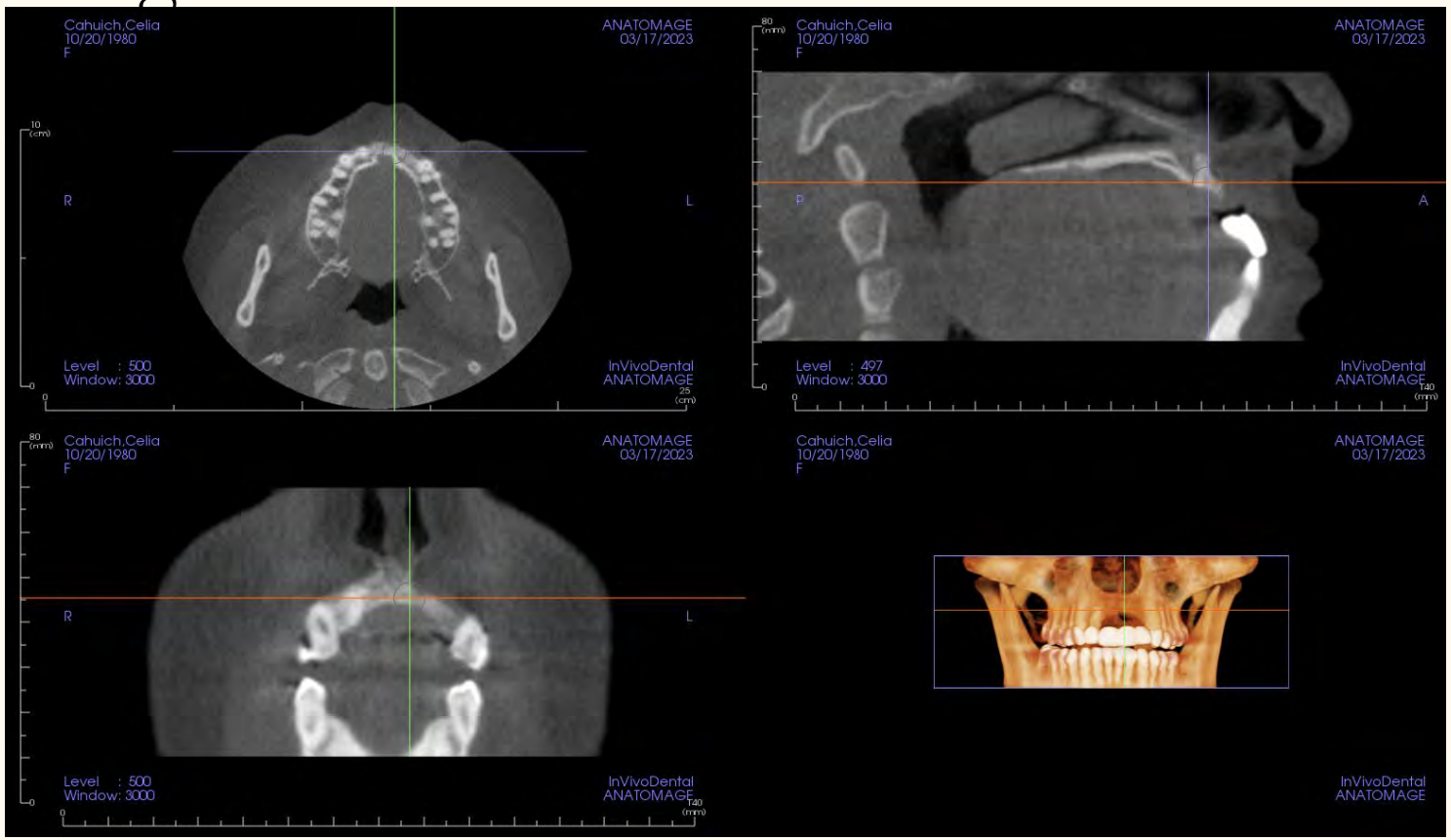
ReOss® uses the most up-to-date CAD/CAM technology available to satisfy patient-specific requirements regarding a planned bone augmentation. In a patented process, a contoured, form-stable scaffold is 3-D printed of the purest titanium based on CT- or CBCT-images, allowing customized bone regeneration (CBR®). Yxoss CBR® has the clear potential to revolutionize oral bone augmentation by customizing the commonly used "titanium mesh", using a digital workflow to fit the individual anatomy of each patient."

ReOss Yxoss CBR



Source: https://www.geistlich-pharma.com/dental/products/3-d-titanium-scaffold/yxoss-cbr

Bone Augmentation at site #9



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OKU Sutro Excellence Day Project Cover Sheet

(ONE Cover Sheet per project)

Project Title: Clinical Case of Titanium Mesh for Bone Augmentation

Award Category: DDS & IDS - Clinical: OKU Implant Dentistry

List names of all contributors to this project:

1. Student Name: Jade Chang #989 045752
   Program: DDS Class Year 2023
2. Student Name: _____ #989 _____
   Program: Please select... Class Year _____
3. Student Name: _____ #989 _____
   Program: Please select... Class Year _____
4. Student Name: _____ #989 _____
   Program: Please select... Class Year _____
5. Student Name: _____ #989 _____
   Program: Please select... Class Year _____
6. Student Name: _____ #989 _____
   Program: Please select... Class Year _____
7. Student Name: _____ #989 _____
   Program: Please select... Class Year _____

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8. Enter your abstract text here (300 word max) :

Summary of Project
This clinical case will discuss the application and 5 month follow up period after guided bone regeneration using titanium mesh in the anterior maxilla for future implants. My 40 year-old female patient presented with partially edentulous sites #8-10 and severely atrophied alveolar ridge resulting from extractions performed over 10 years ago. A titanium mesh was designed based on the patient's CBCT and planned for bone augmentation in sites #8-10. A crestal incision was made in the edentulous site and vertical releasing incisions at teeth #6 and #11 to create a full thickness flap. Several perforations were made in the buccal plate to allow diffusion of heme and growth factors to the bone graft. The titanium mesh was verified to assess fit, adequate stability, and appropriate shape of vertical and horizontal augmentation outline. Allograft and platelet rich fibrin was placed into the titanium mesh and screwed in place with 2 screws on the buccal alveolar bone. Resorbable collagen membrane was placed over the titanium mesh and primary closure was obtained. Follow ups were performed at 3 weeks and 2 months and the titanium mesh was removed at 4 months with implant placement surgery planned 6 months after the bone graft.

Significance
Implants are often regarded as the ideal restorative treatment option for replacing missing teeth, however, may not be an option for individuals with significant alveolar bone loss. In healthy individuals, a titanium bone mesh may restore the ability for individuals with significant bone loss to pursue implant restorations.

Acknowledgments
I would like to acknowledge Dr. Eduardo Gonzalez, Dr. Fatima Mashkoor, and Dr. Hussein Al-Wakeel for their guidance and experience in this clinical case. I thank them for their heart and passion in each stage of the case from planning to rendering treatment, and the reflective discussions afterwards.

Thank you for filling out the OKU Sutro Excellence Day Project Cover Sheet!Please merge this Cover Sheet with your Final Project Materials (ie, research poster, clinical case, paper, or other creative production) before uploading to the Final Project Submission Form.