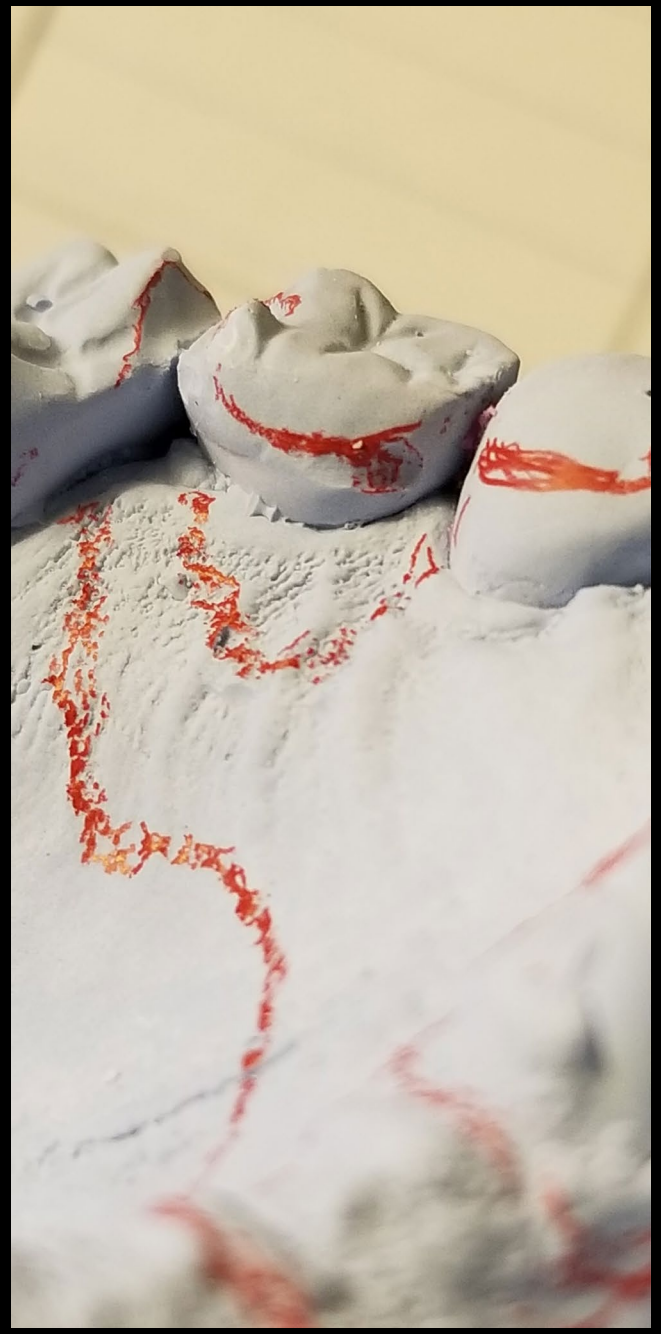
Oral Rehabilitation with Implant Supported Prosthesis

Austin Kim

DDS Candidate 2021

Group Practice 2C



Patient Overview

74 year-old male

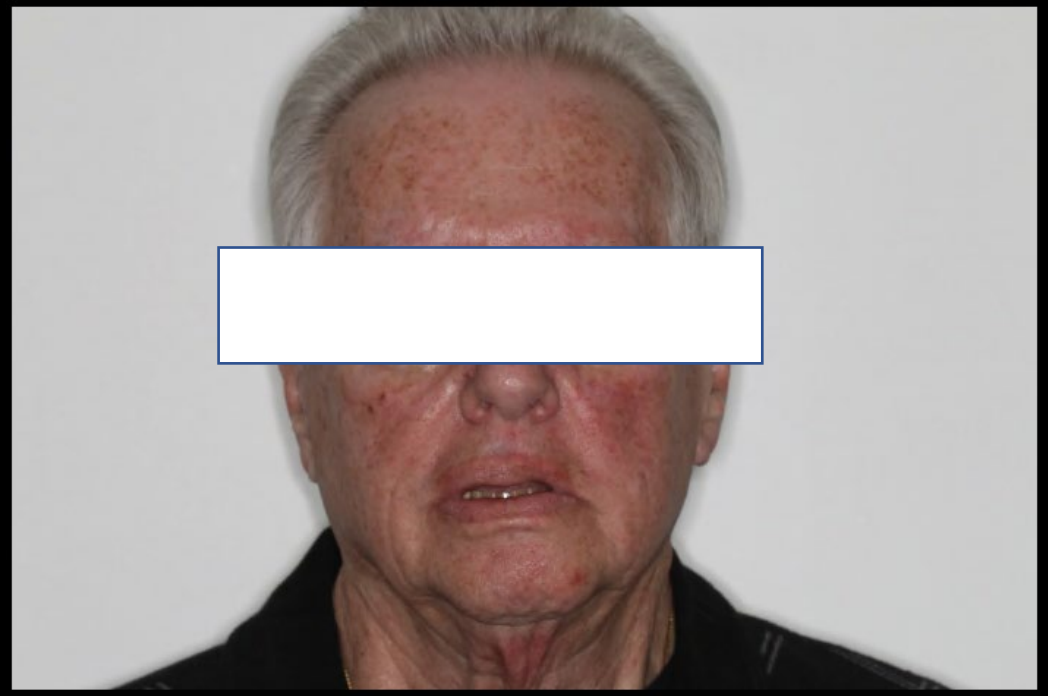
CC: Lost upper left teeth due to accident in June 2019.

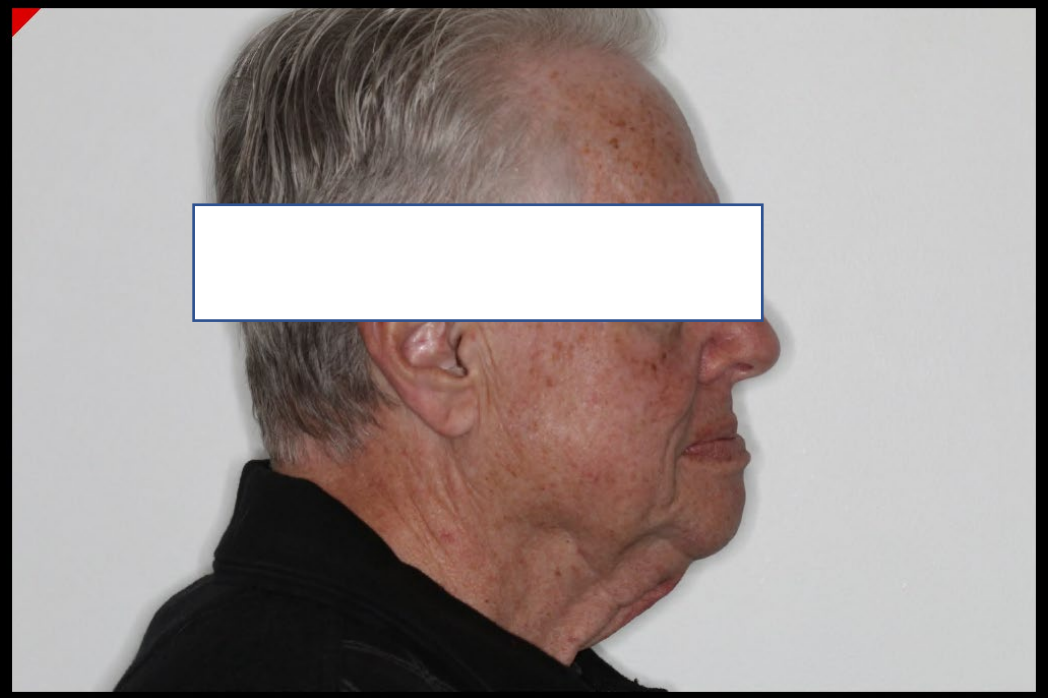
MH: Diabetes (Dec 15; Hba1c=6.5) , Hypothyroidism

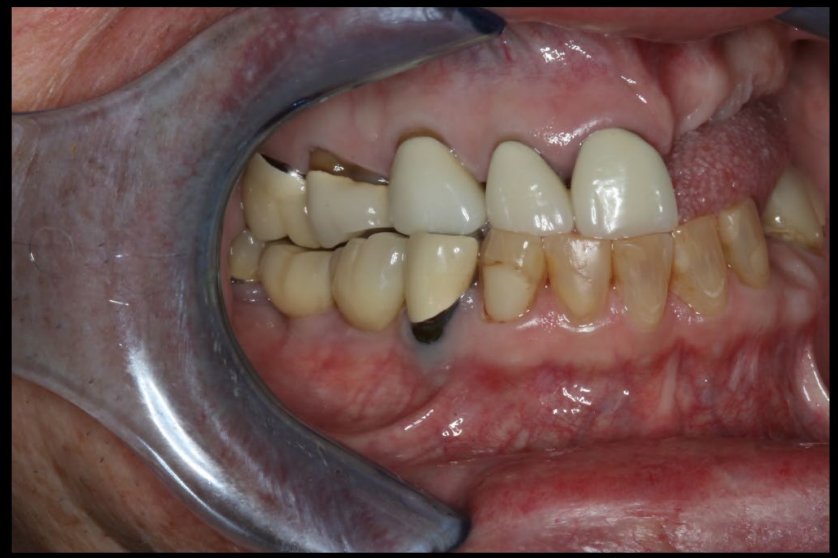
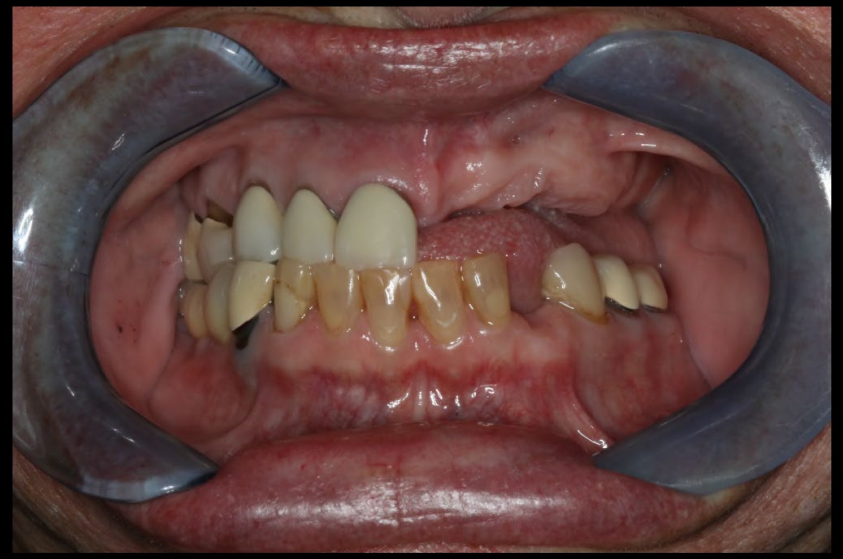
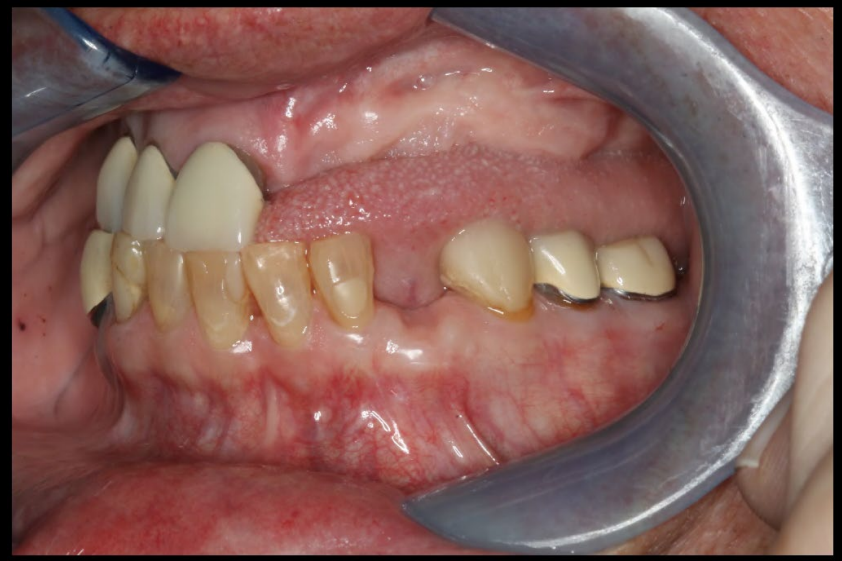
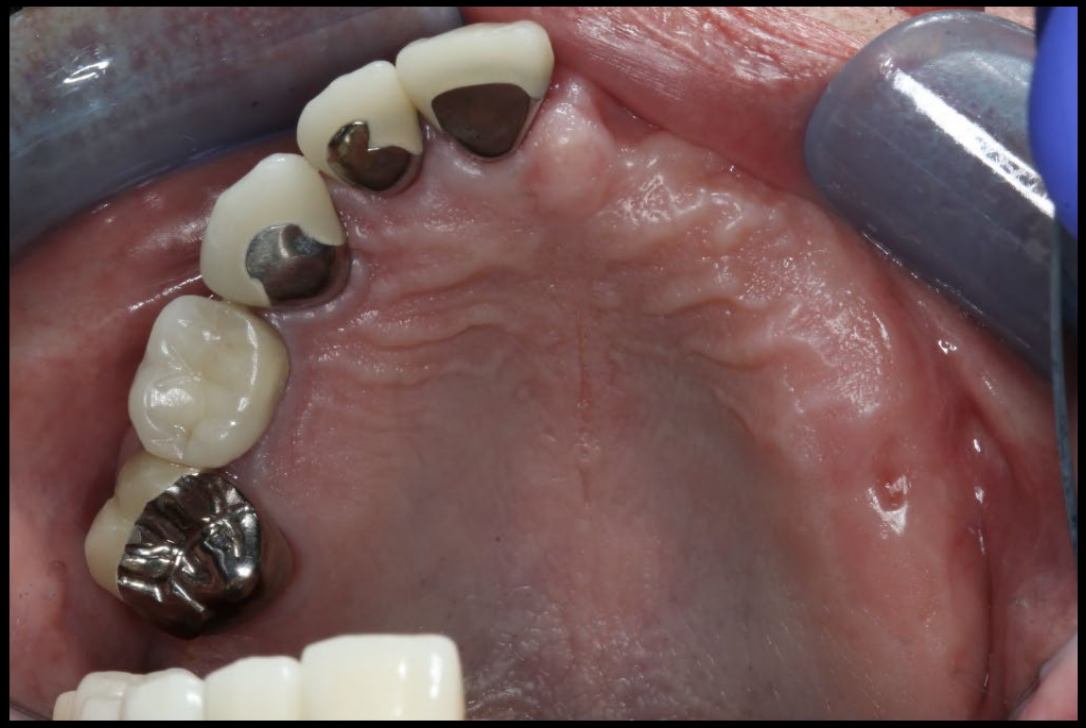
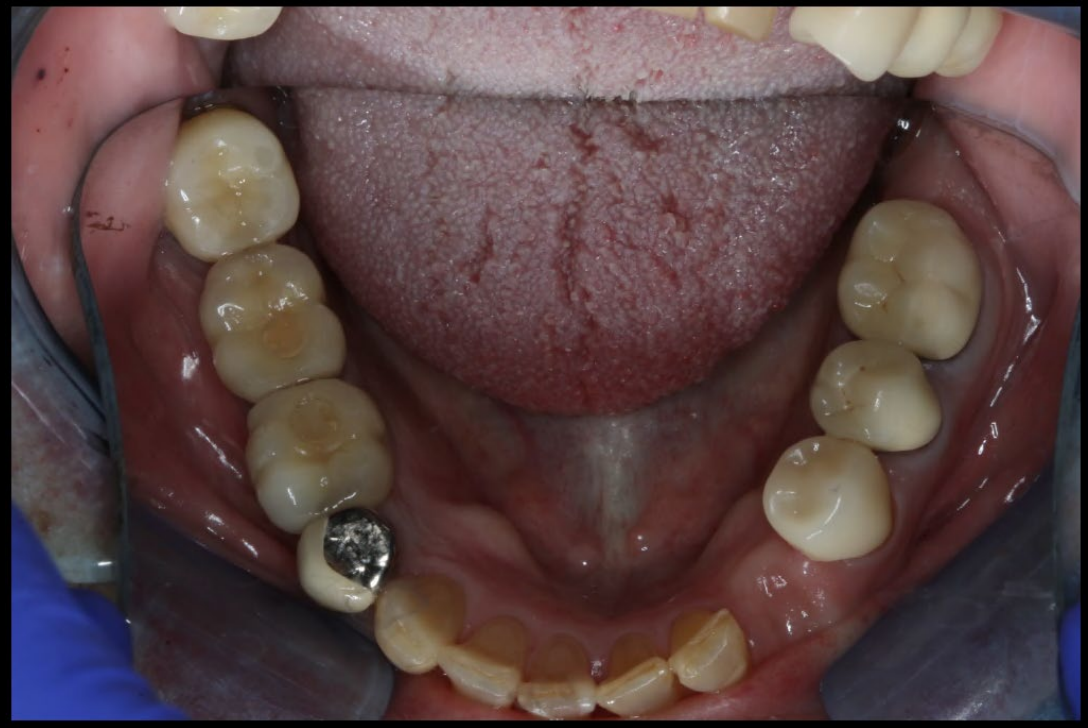
Meds: Metformin (1000 mg 1x/day), Levothyroxine (0.25), Baby Aspirin (81 mg 1x/day), Lipitor (2 mg 1x/day)

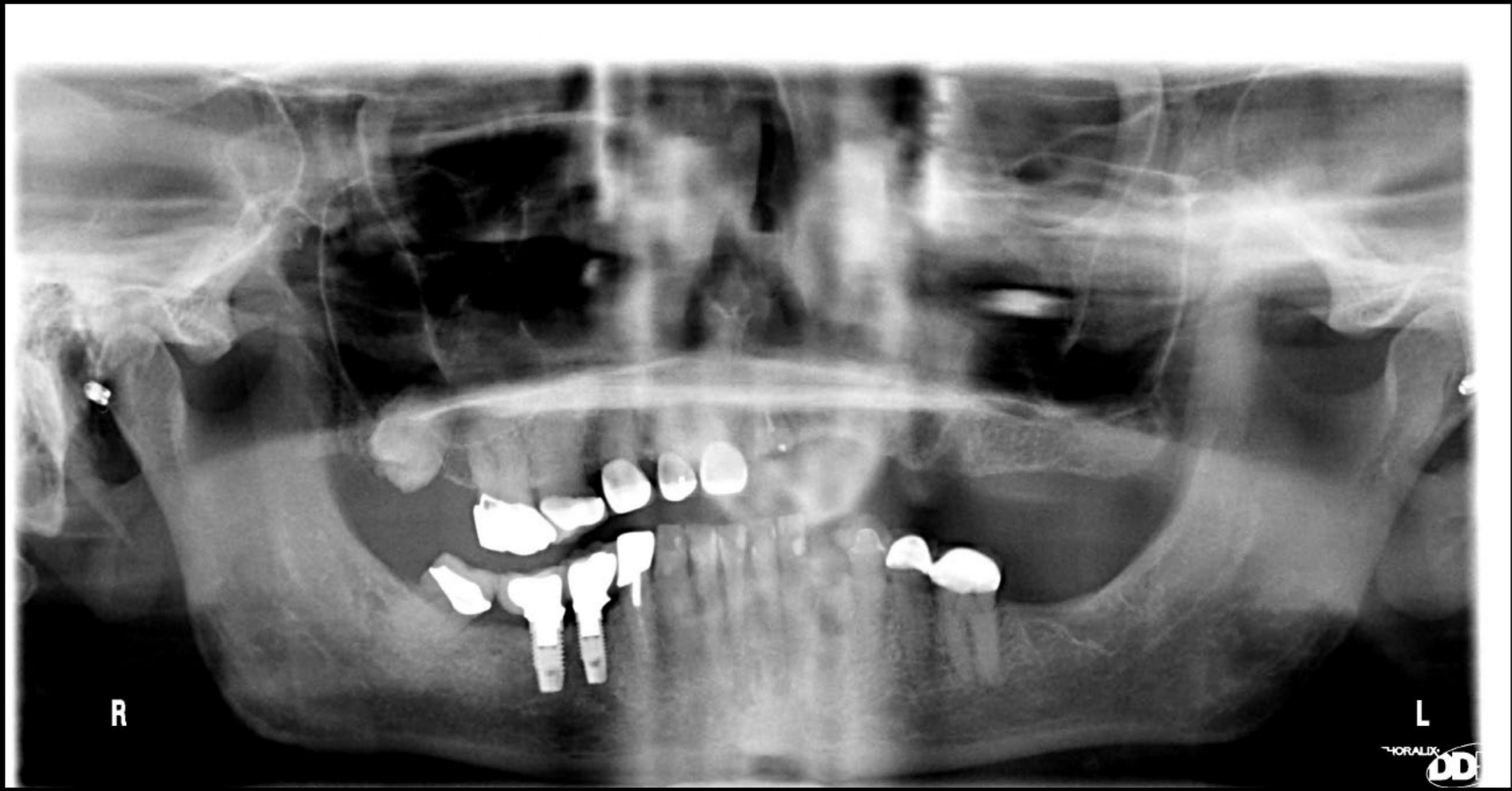
SH: Retired. Wife of 41 years passed away recently. Has a close relationship with daughter and her in-laws.

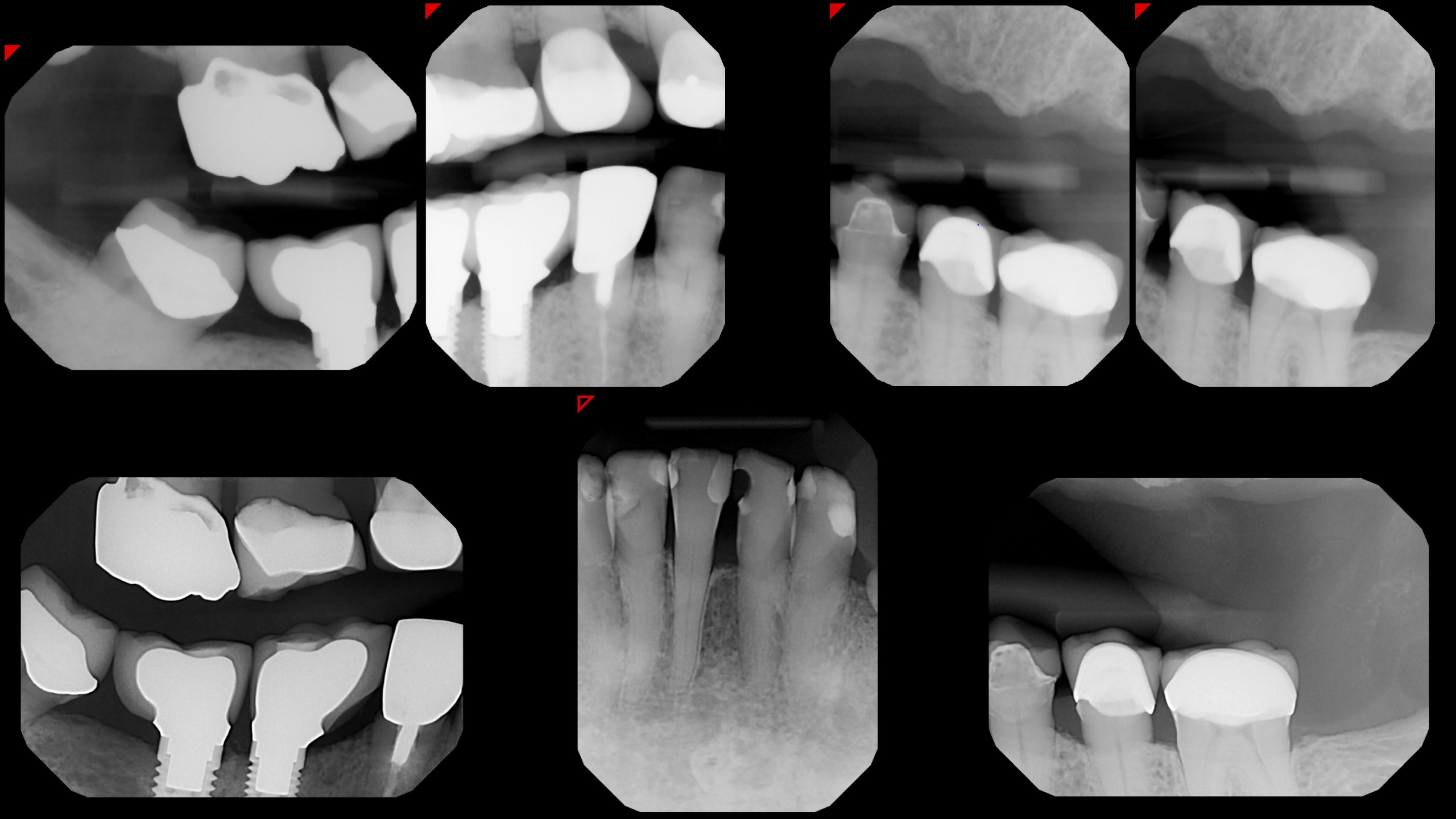
DH: Highly restored. New UOP patient (screened Aug, 2019). Old dentist charged $30,000 to restore UL w/ implants. Used to see regularly.



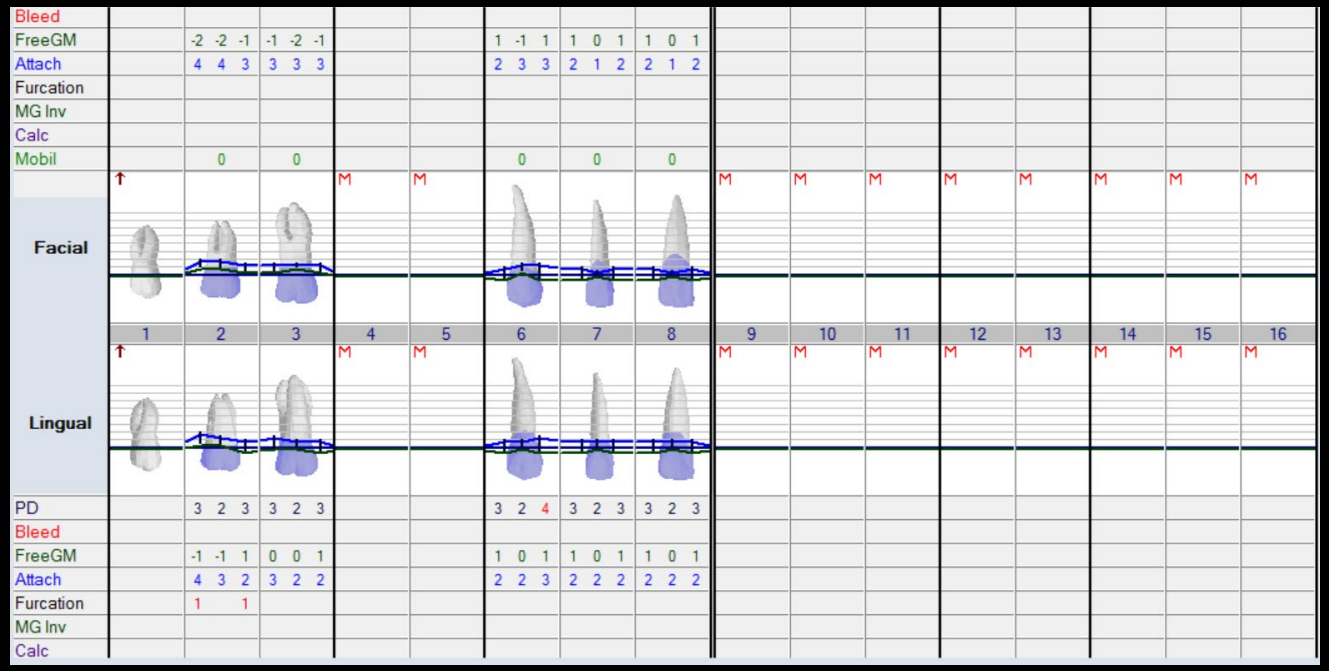


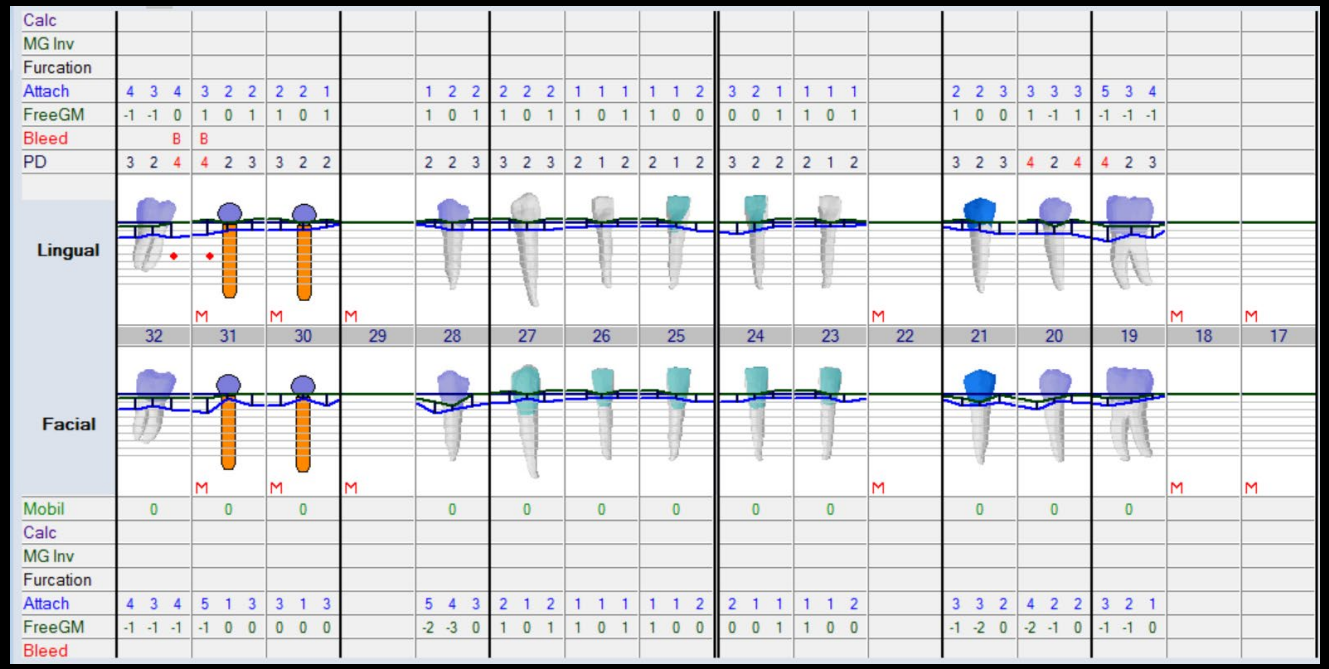







R
L



Perio Chart & Diagnosis





Assessment:

- PD: 1-4 mm
- Attachment loss: minimal
- Mobility: 0 all around
- Furcation: class 1 slightly around #2
- Plaque index: 0.8, Good

Etiology:

Plaque, Bacteria

2ndary included restoration margins

also Primary occlusal trauma (uneven occlusion)

Diagnosis:

stage I class C, generally healthy periodontium considering age

Prognosis:

Excellent all around remaining teeth

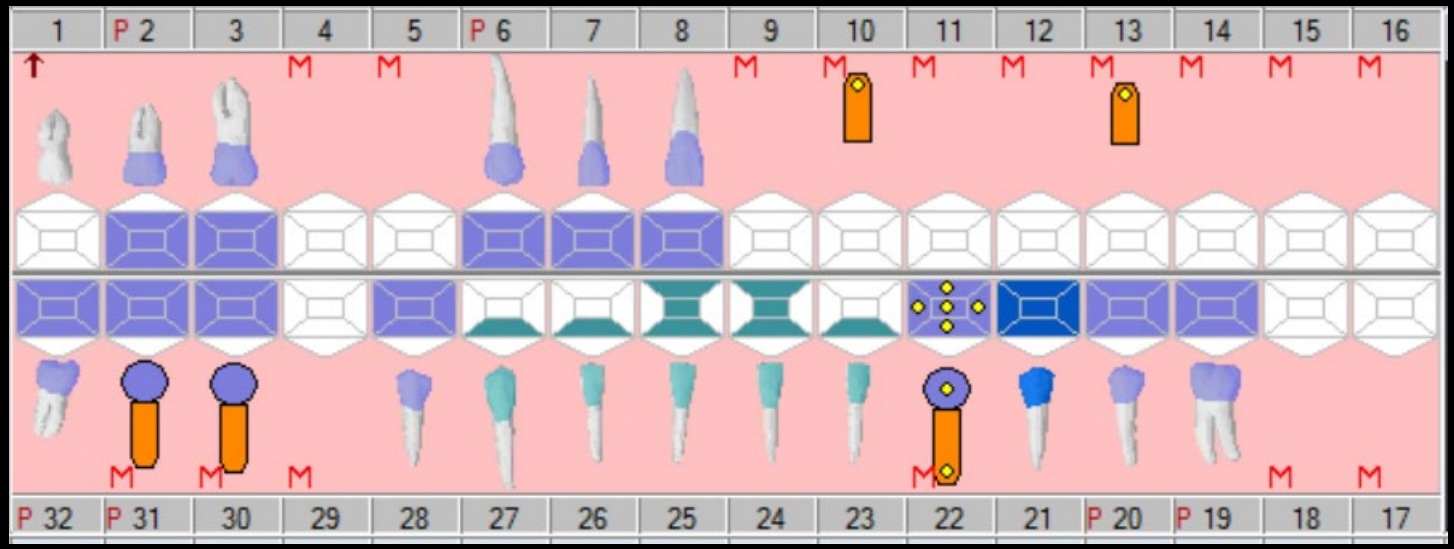
Hard Tissue Charting & Findings

Findings:

PFM crowns (many areas), fillings, implants, partially erupted #1

highly restored, but well maintained (great pt compliance)

need to replace UL arch – TMJ right side feels tired



CRA:

1668 ATP reading

>7 pH saliva

many protective factors (saliva flow, fluoridated, OH practices)

high risk

Etiology: plaque retention at margins; good OHI

Diagnosis: sound restorations

Prognosis: Good

CAMBRA products – Maintenance rinse

Ideal Treatment Plan

Urgent Phase:

Pt already had root-tips extracted and bone graft done (prior to UOP - cadaver)

Disease Control Phase:

OHI, Prophy, re-evaluation, maintenance rinse (CTx3)

Restorative Phase:

implant placement into sites 10 and 13, per Drs. Noble and Nattestad

implant placement on site #22

CBCT to check if bone graft was sufficient on maxillary sites (may need bone graft, ridge preservation) - Acciumoto

visual inspection of site 22 by Dr. Nattestad, bone graft was sufficient

locator precision attachments for site 10 and 13

implant supported removable partial denture covering UL quadrant

implant abutment and PFM implant crown on #22

Maintenance Phase:

denture check, implant site evaluation, recall 6 months

Total cost: $8,200

Time for Treatment:

~1 year

Type II Diabetes

Type 1

- 10% of diabetics
- Age of onset – young
- Severe
- Requires insulin
- Normal build
- Little genetic component
- Autoimmune

Type 2

- 90% of diabetics
- Age of onset – 40+
- Mild
- May require insulin, usually diet or oral hypoglycemics
- Obese
- Strong genetic component

Symptoms

- Polyuria (increased urination)
- Polydipsia (increased drinking)
- Weight loss
- Weakness
- Increased infections and impaired healing
- Blurred vision

Dr. Nattestad's Lecture, "Common Medical Conditions and Prescribed Drugs"

Diagnosis of Diabetes

Blood Glucose

- Normal range of fasting blood glucose:

  82 to 110 mg/dL

- Shortly after eating, it may go up to 140 mg/dL
- Diagnosis of DIABETES is based on

  Random glucose

  >200 mg/dL + symptoms

  or

  Fasting glucose

  >126 mg/dL on 2 occasions

Hba1c

- Glycated hemoglobin is a form of hemoglobin that is measured primarily to identify the average plasma glucose concentration over prolonged periods of time
- In the normal ~120-day lifespan of the red blood cell, glucose molecules react with hemoglobin, forming glycated hemoglobin. In individuals with poorly controlled diabetes, the quantities of these glycated hemoglobins are much higher than in healthy people
- Levels
  Normal: Less than 5.7%
  Pre-diabetes: 5.7% to 6.4%
  Diabetes: 6.5% or higher
- If you have diabetes, you and your doctor or nurse will discuss the correct range for you. For many people the goal is to keep your level at or below 6.5 - 7%.

Dr. Nattestad's Lecture, "Common Medical Conditions and Prescribed Drugs"

Dental management

- Treatment plan modification
  - AM appointments
  - Normal meds and diet pre-op
  - Limit treatment duration
  - Antibiotic coverage???
  - Post-op diet instructions
  - Hospitalization for larger surgeries
  - Consultation with the MD

- Try schedule AM appointments
- Ask if they had a good breakfast
- Always have a source of sugar (glucose tablets) in case of hypoglycemia
- Absolute contraindication to implants if poorly controlled diabetes (Hba1c $\geq$ 8.1)
- Slower healing

Dr. Nattestad's Lecture, "Common Medical Conditions and Prescribed Drugs"

Alternative Treatment Plan

Urgent Phase:

already ext root tips/bone graft prior to coming to UOP

Possible ext of #1 partial bony distalized wisdom tooth

Disease Control Phase:

OHI, prophy, re-evaluation, maintenance rinse (CTx3)

Restorative Phase:

orthodontic intrusive movement of LL arch

implant supported fpd (bridge)

-3 implants (5 unit bridge)

2 pontics, 3 abutments

bone graft 3 sites (#9, 11, 14)

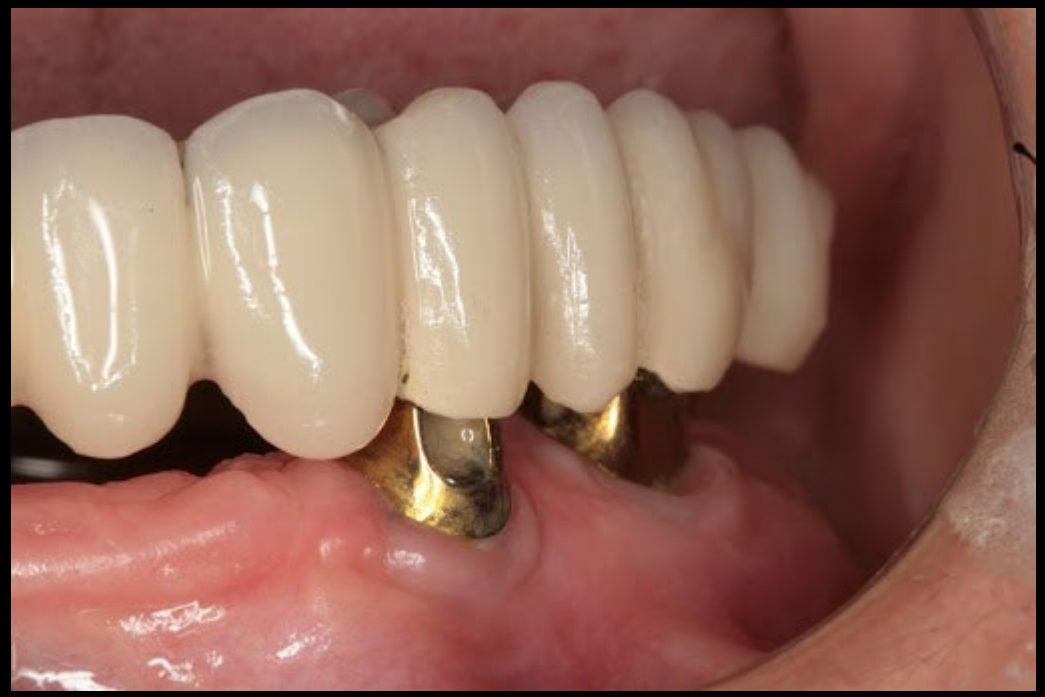
implant and crown at site #22

OR nothing

Porcelain veneers for #23-27

Maintenance Phase:

recall 6 months, maintenance rinse



Why implant supported RPD?

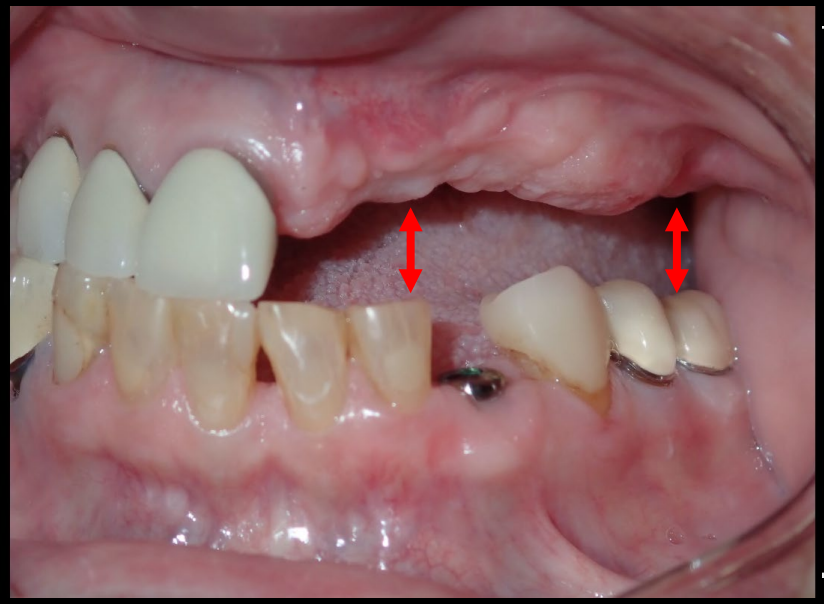
- Survivability
  - A long-term study of at least 15 years was published in 2015 by Mijirisky et al. The authors placed 43 implants with 20 patients and reported no implant failures. The **marginal bone loss ranged for 0.0 to 2.0 mm with a mean of 0.64 ±0.6 mm**. The only reported mechanical complication was rest fracture associated with a natural tooth abutment. No clinical mobility nor gingival inflammation was found around the implants or teeth.
- Quality of life
  - OHIP (oral health impact profile)
  - Campos et al. used implants to support RPDs in 12 patients with only the anterior teeth remaining. The authors reported **significantly improved OHRQoL when mandibular extension base RPDs** were supported bilaterally by an implant and ball abutments in the mandibular 1st molar region.

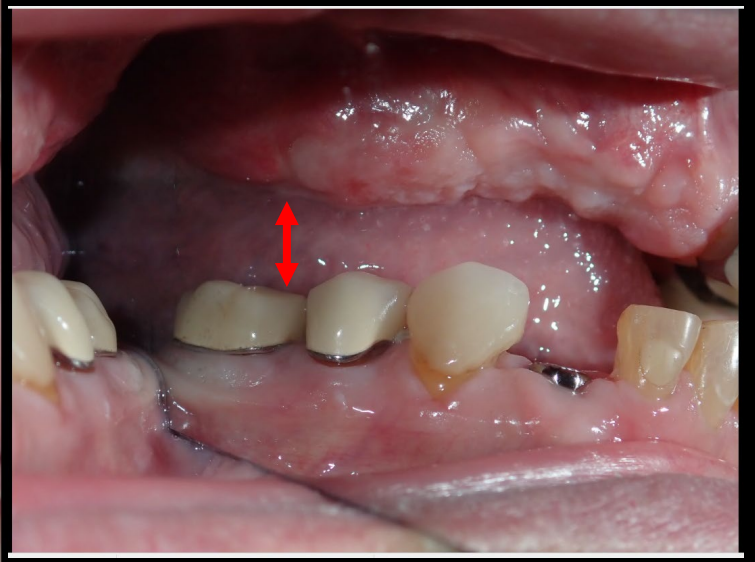
[1]Mijiritsky E, Lorean A, Mazor Z, Levin L. Implant Tooth-Supported Removable Partial Denture with at Least 15-Year Long-Term Follow-Up. Clin Implant Dent Relat Res. 2015 Oct;17(5):917-22. doi: 10.1111/cid.12190. Epub 2013 Dec 27. PMID: 24373248.

[2]Campos CH, Gonçalves TM, Garcia RC. Implant-Supported Removable Partial Denture Improves the Quality of Life of Patients with Extreme Tooth Loss. Braz Dent J. 2015 Oct;26(5):463-7. doi: 10.1590/0103-6440201300097. PMID: 26647929.

Unsplinted locator abutments vs Bar splinted Overdentures

According to a systematic review done by Carpentieri et al. in 2019, there is a 3-dimensional hierarchy of restorative space necessary for different types of implant constructs. The minimum amount of vertical space required for implant prostheses is as follows: fixed screw-retained (implant level): 4 through 5 millimeters; fixed screw-retained (abutment level): 7.5 mm; fixed cement-retained: 7 through 8 mm; **unsplinted overdenture: 7mm; bar overdenture: 11 mm**; and fixed screw-retained hybrid: 15mm.

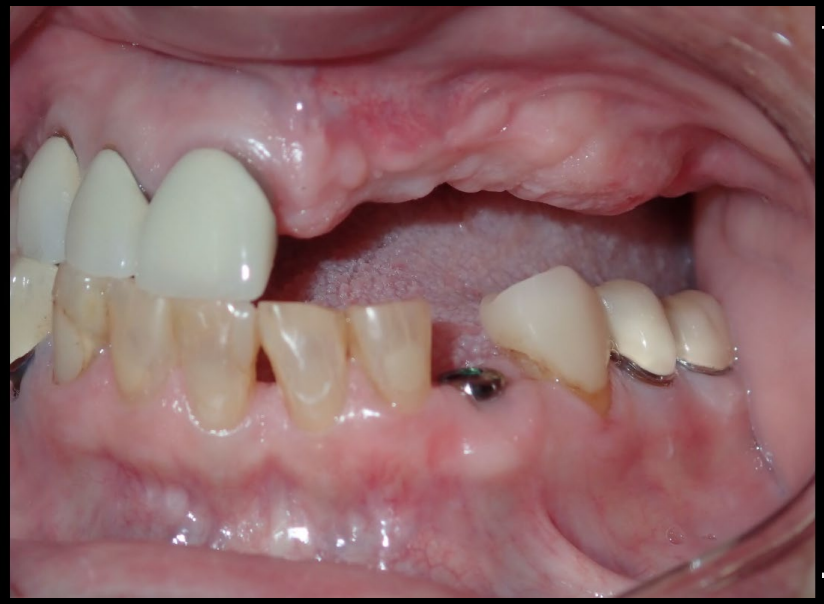


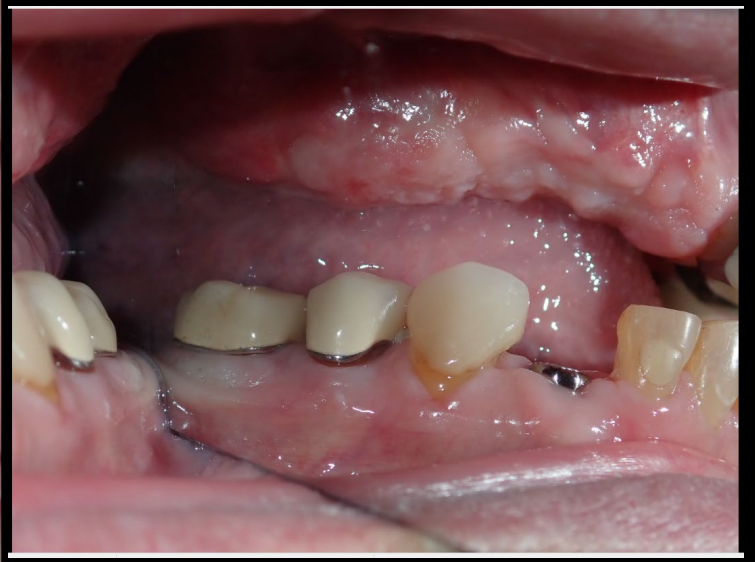


[3]Carpentieri J, Greenstein G, Cavallaro J. Hierarchy of restorative space required for different types of dental implant prostheses. J Am Dent Assoc. 2019 Aug;150(8):695-706. doi: 10.1016/j.adaj.2019.04.015. PMID: 31352966.

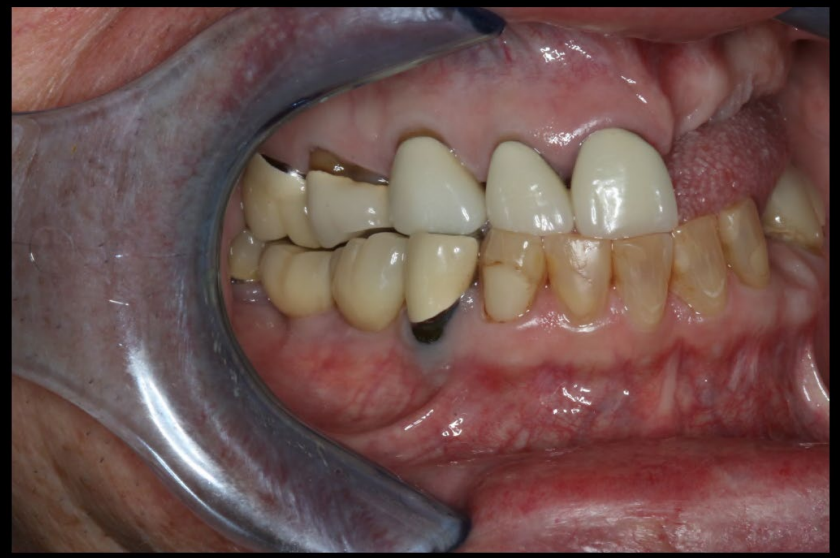
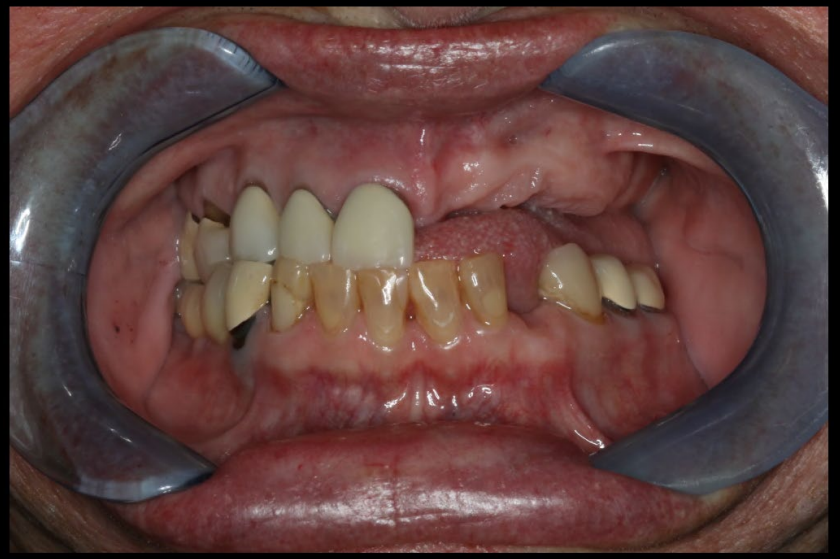
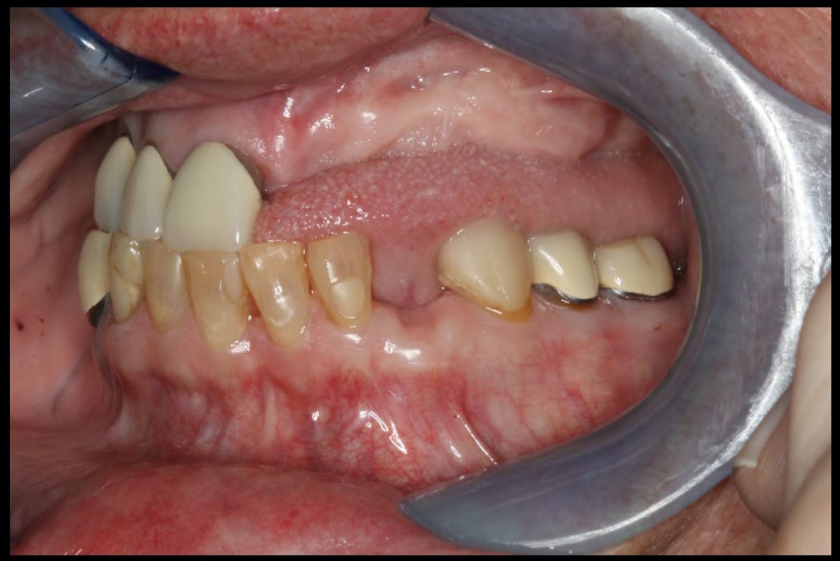
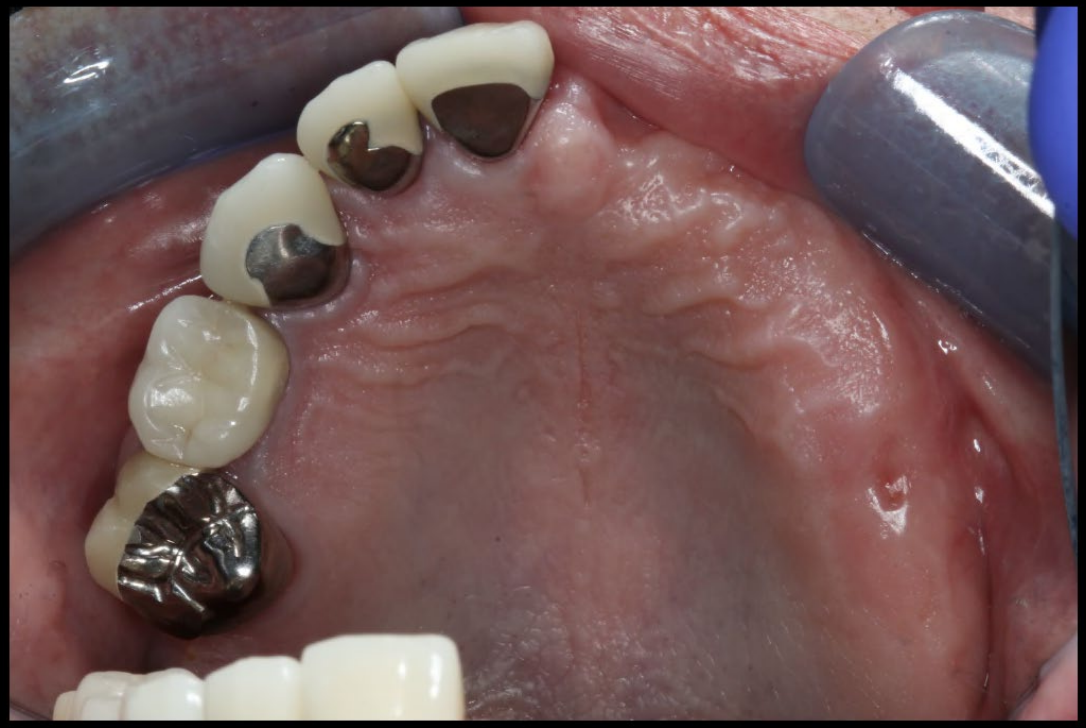
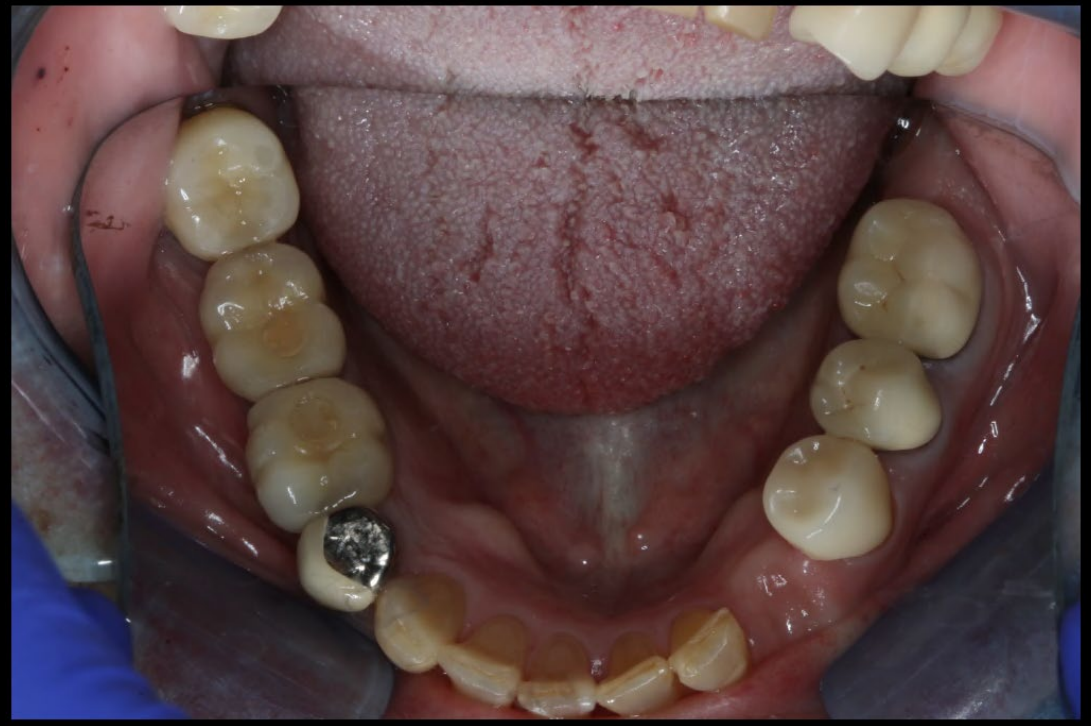
Unsplinted locator abutments vs Bar splinted Overdentures

According to another systematic review of 14 articles by inclusion criteria done by Di Francesco et al., it was **concluded that no statistical difference** was appreciable in survival rates and patient satisfaction between splinted and non-splinted overdenture implants. Only 4 of these articles noted survival rate of 95% or lower, of which 3 of these articles studied bar splinted overdentures.

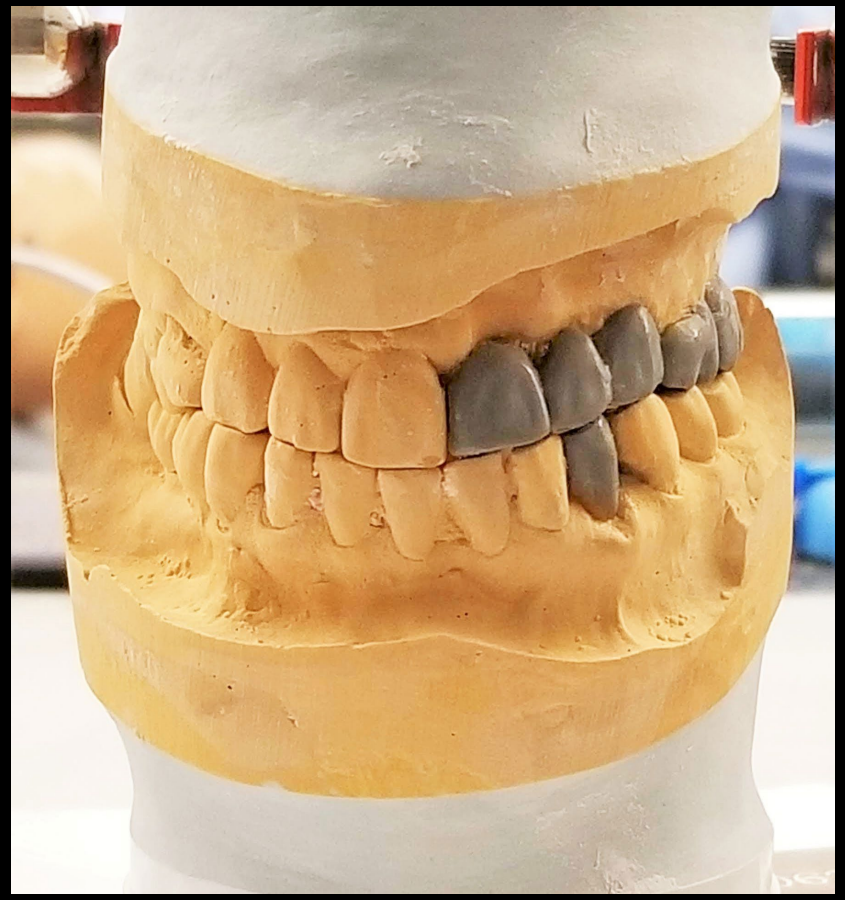


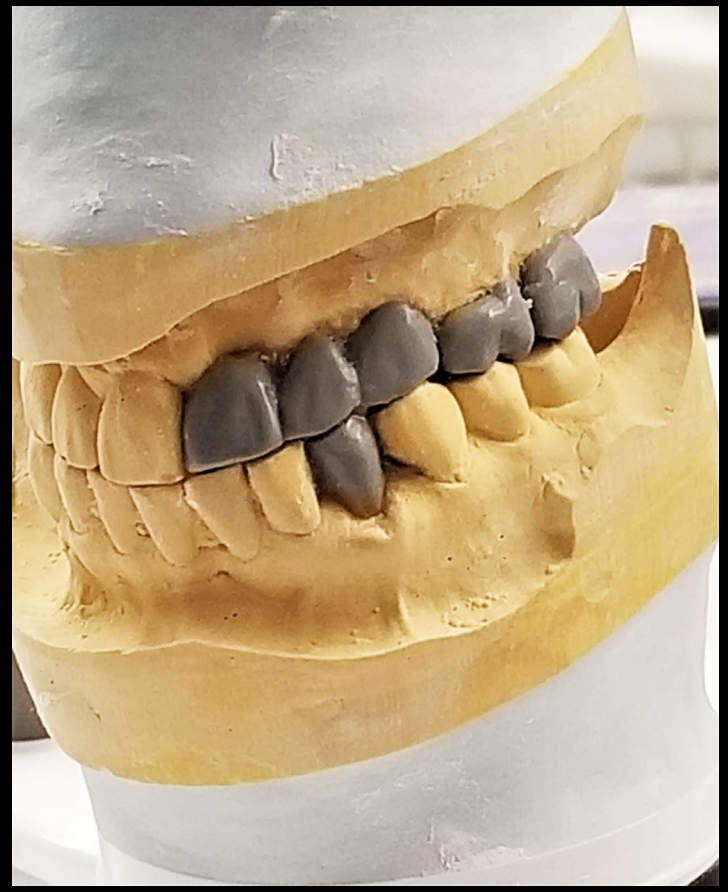


[4]Di Francesco F, De Marco G, Sommella A, Lanza A. Splinting vs Not Splinting Four Implants Supporting a Maxillary Overdenture: A Systematic Review. Int J Prosthodont. 2019 Nov/Dec;32(6):509-518. doi: 10.11607/ijp.6333. PMID: 31664267.

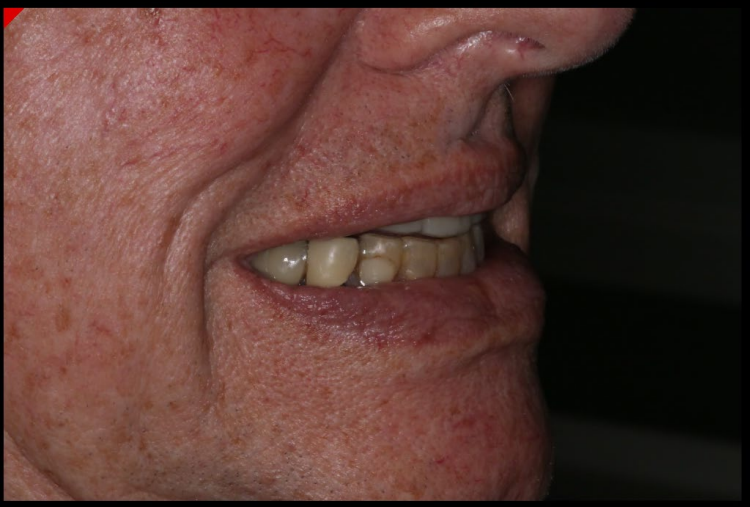






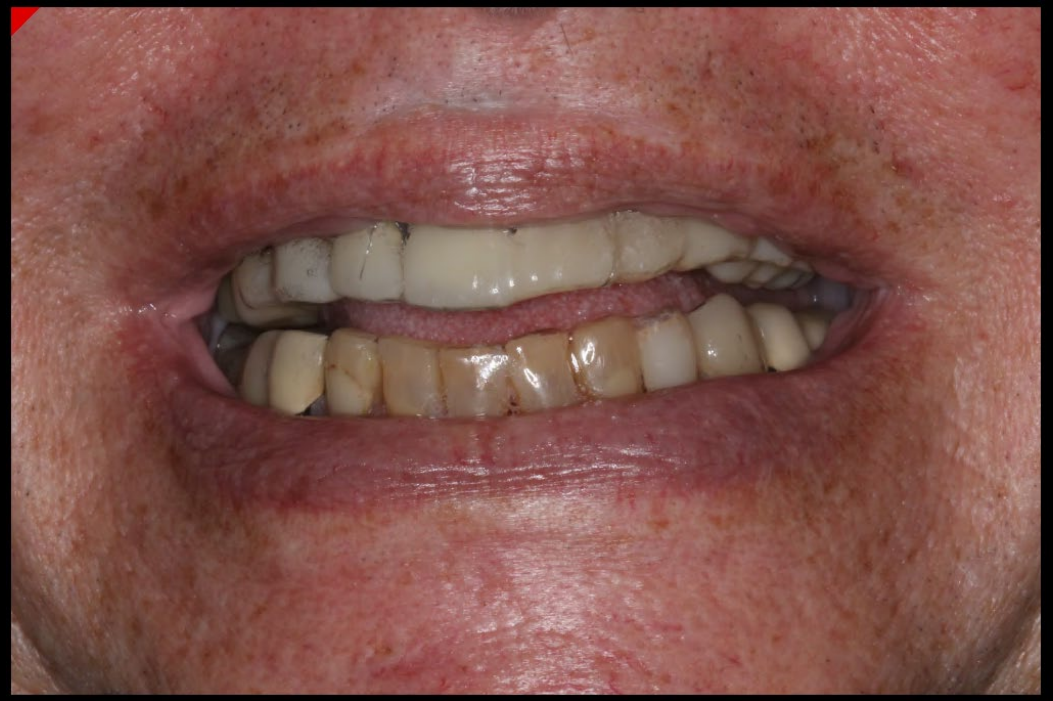
Initial wax-up

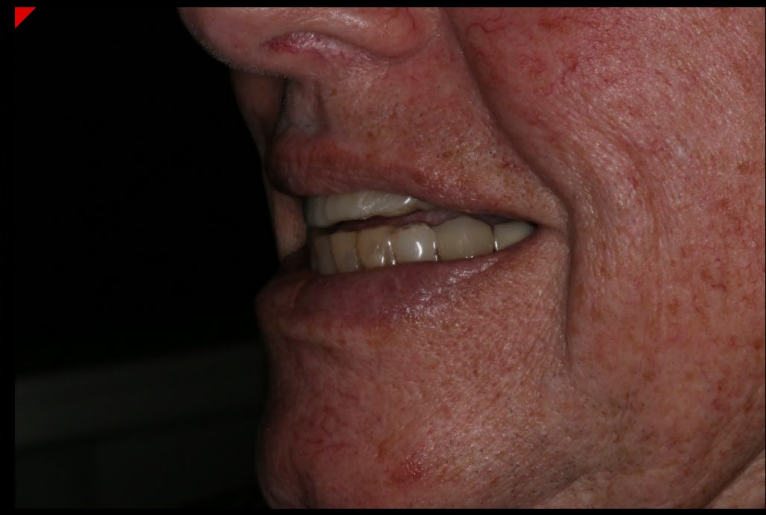


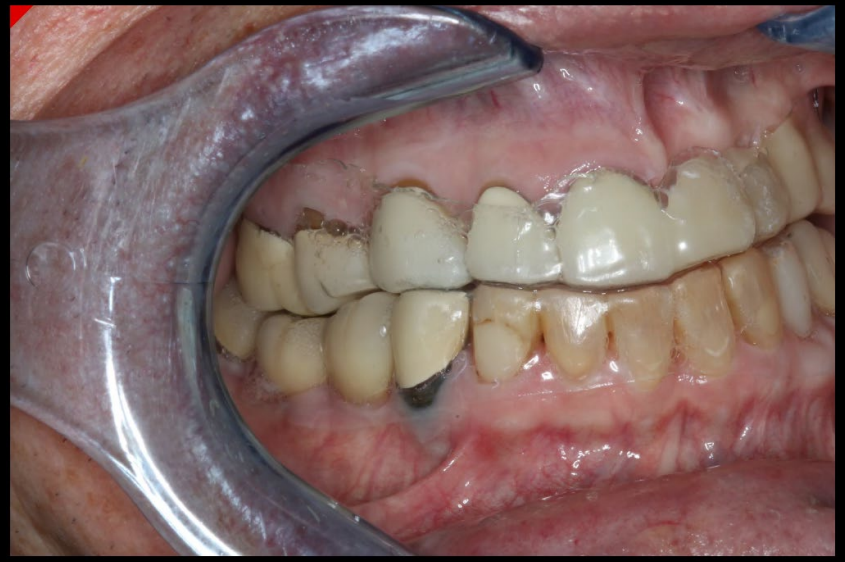
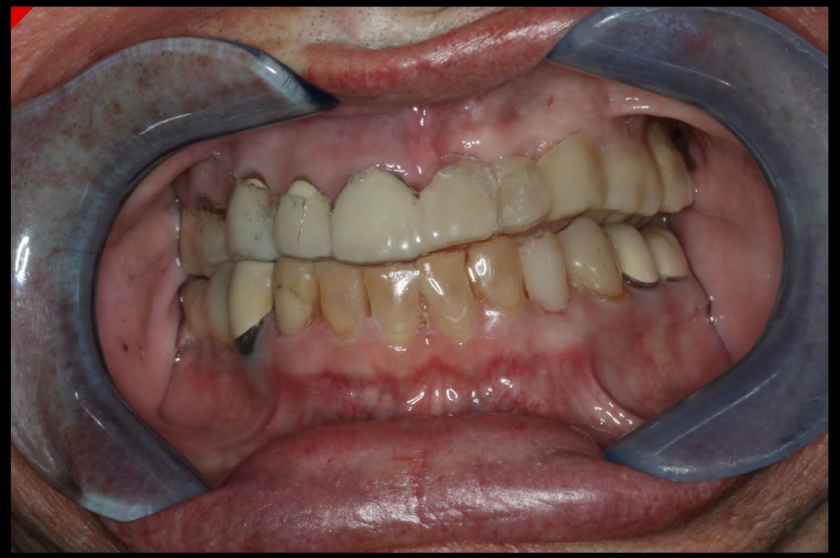
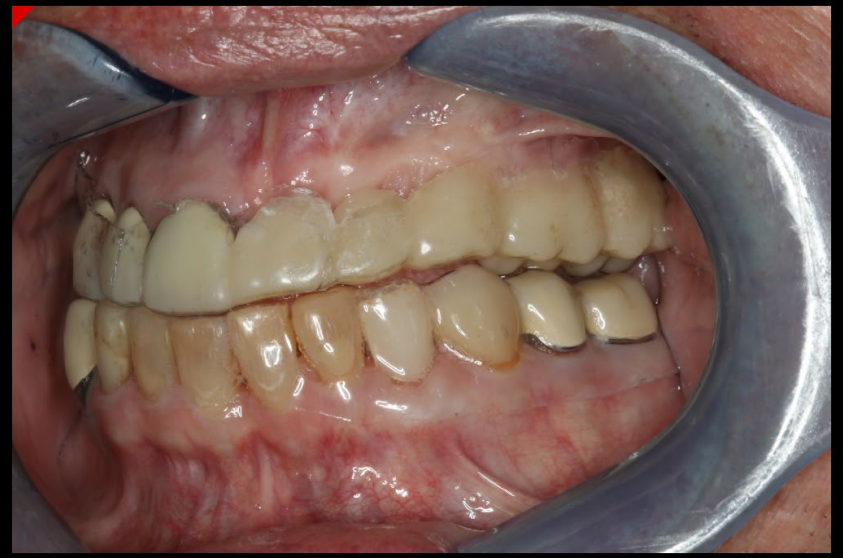
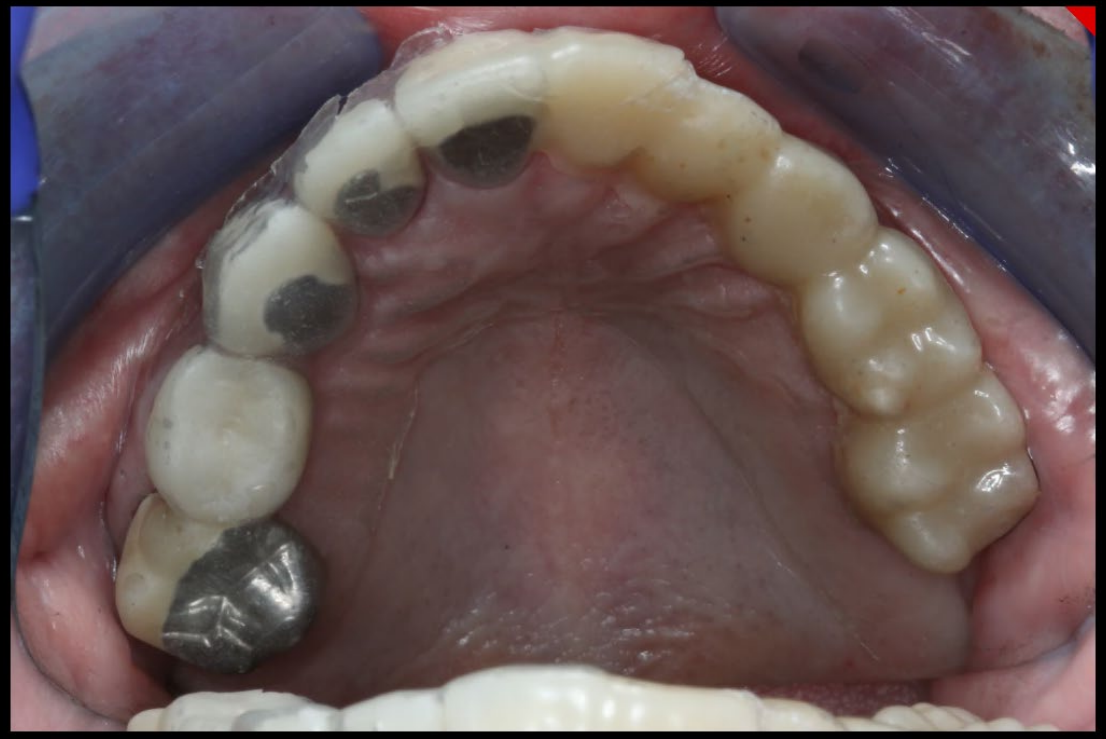
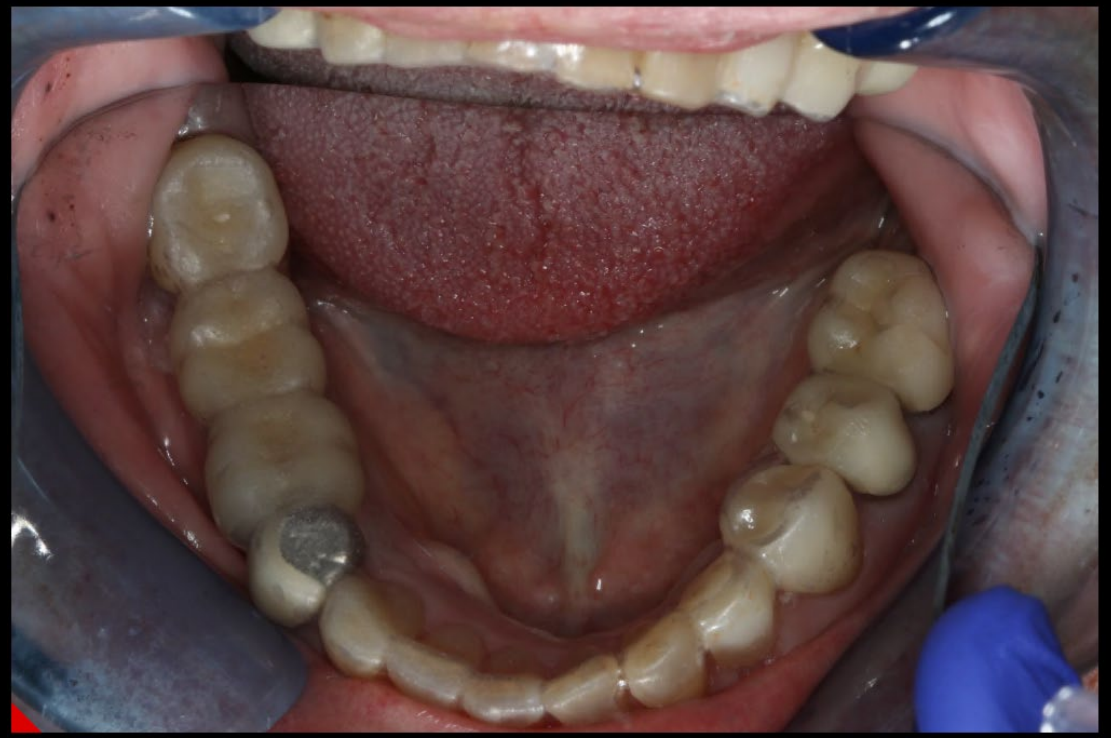


Initial Smile Design



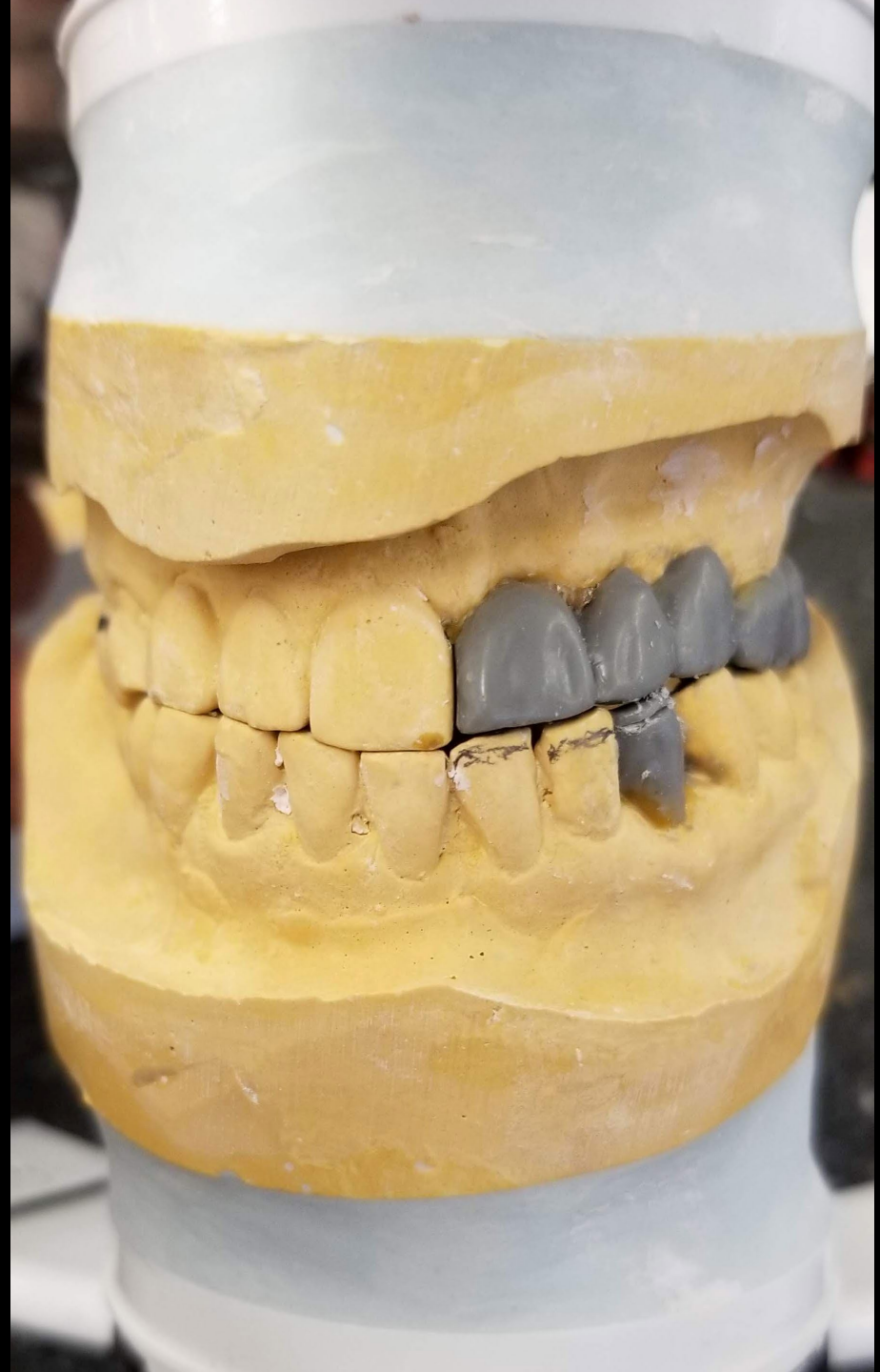




Esthetic Corrections

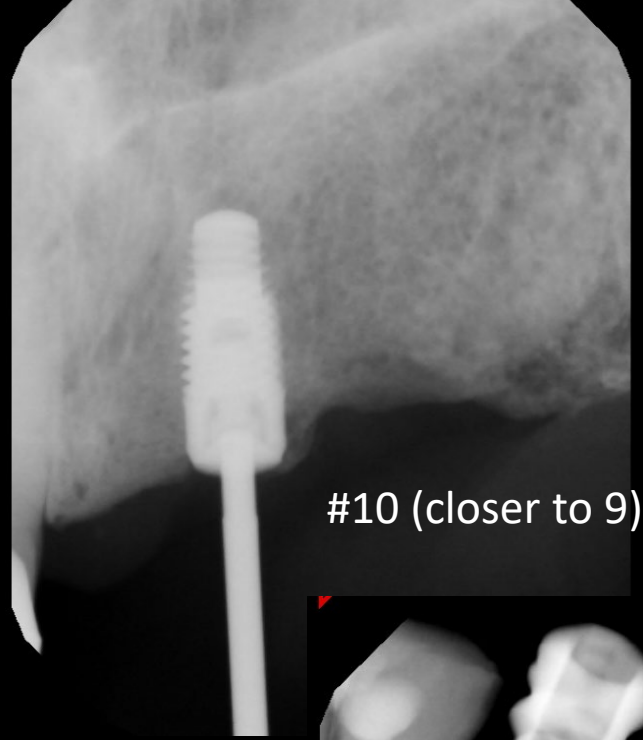
- Enameloplasty planned due to supraerupted lower left incisors #23 and #24
- Waxed up shorter implant crown on #22
- Allowed for a more esthetic horizontal plane that was parallel to interpupillary line



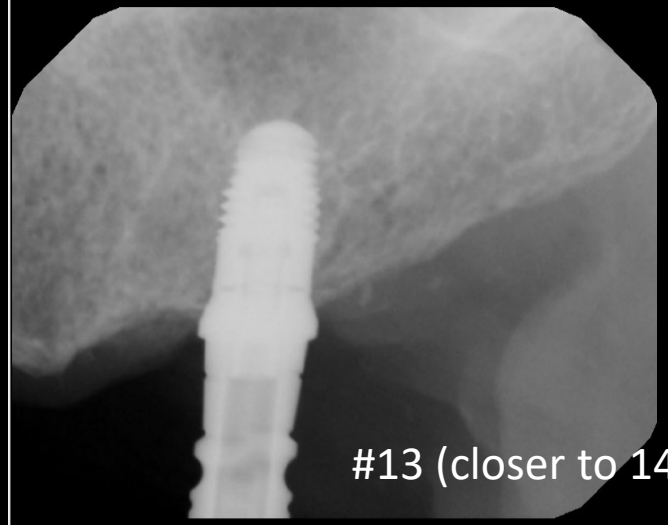
Implant placement (9/14/2020)

Placed by Dr. Fatima Mashkoor, DDS, Oral Surgeon

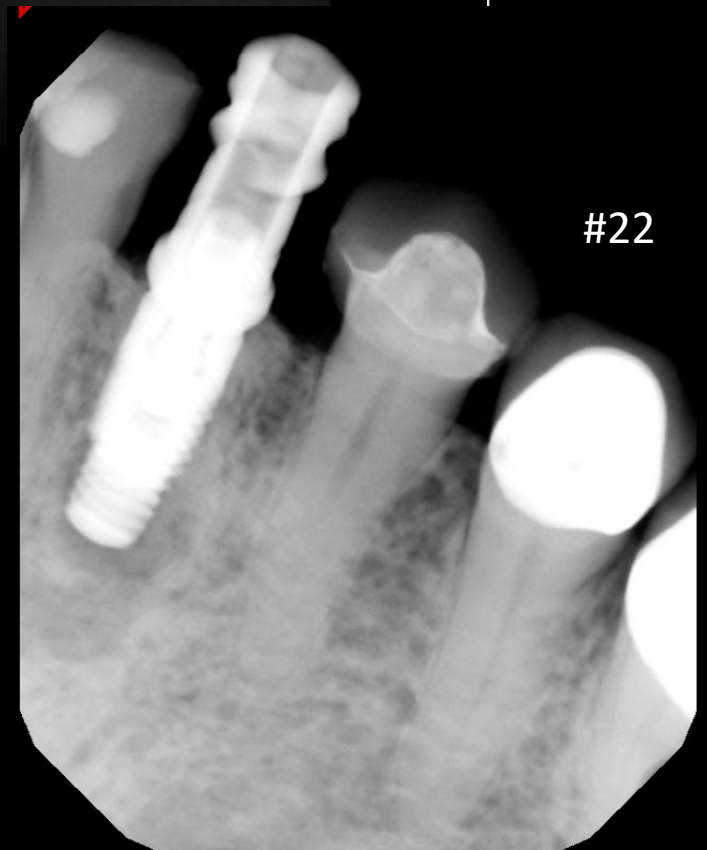
- #10 Zimmer 4.1x10 mm, Xenograft, PA radiolucency visible due to deeper osteotome, cover screw placed
- #13 Zimmer 4.7x8 mm, Xenograft, coverscrew placed
- #22 Zimmer 4.1x10 mm, PA radiolucency visible due to bone density, healing abutment placed
- Locations varied slightly from originally planned sites due to bone density + availability



#10 (closer to 9)

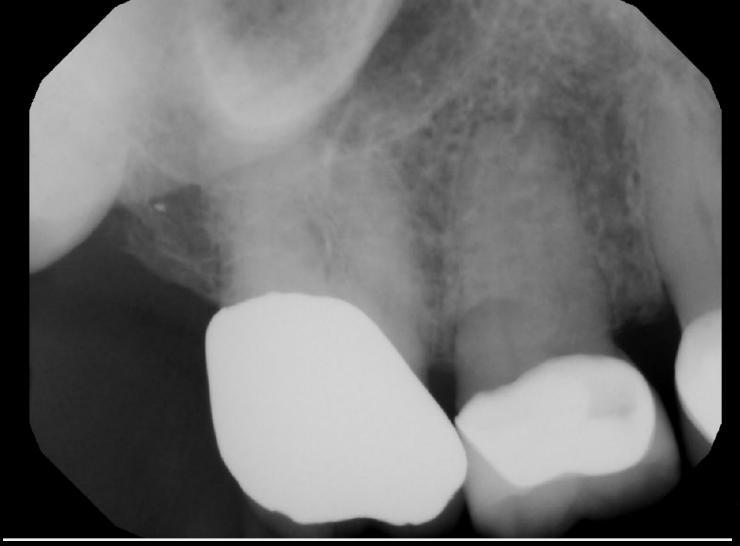


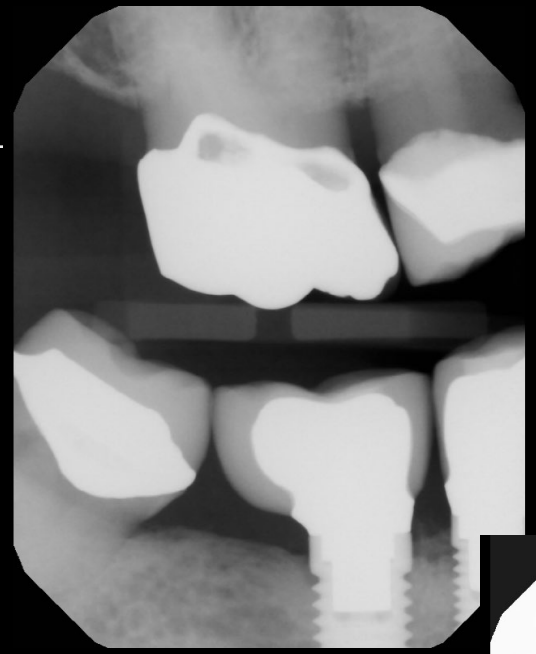
#13 (closer to 14)

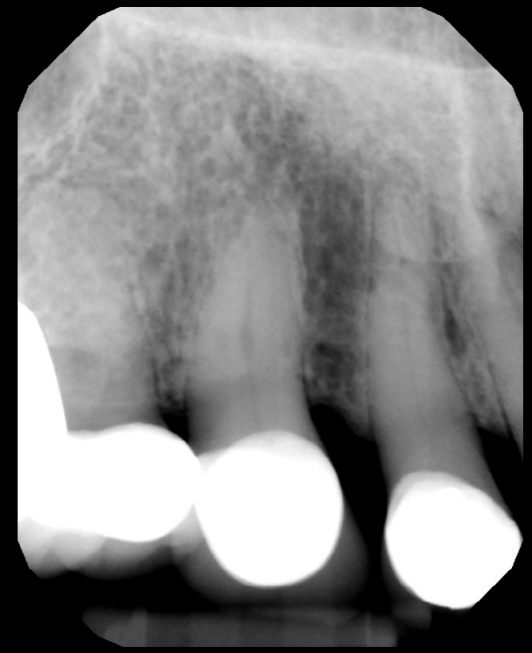


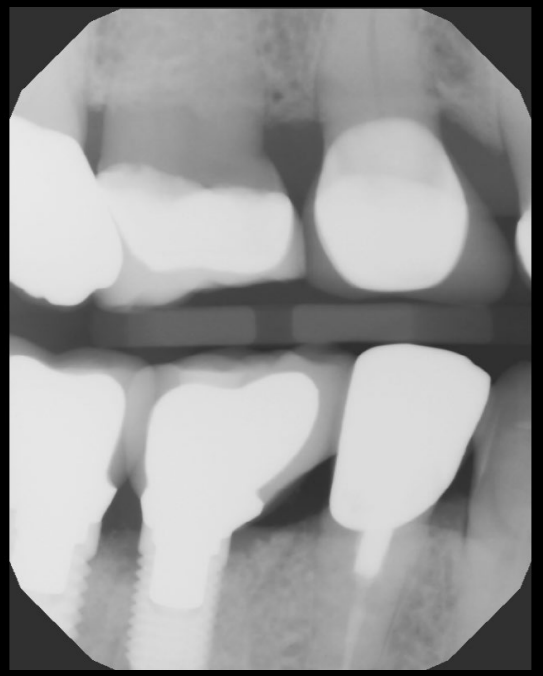
#22

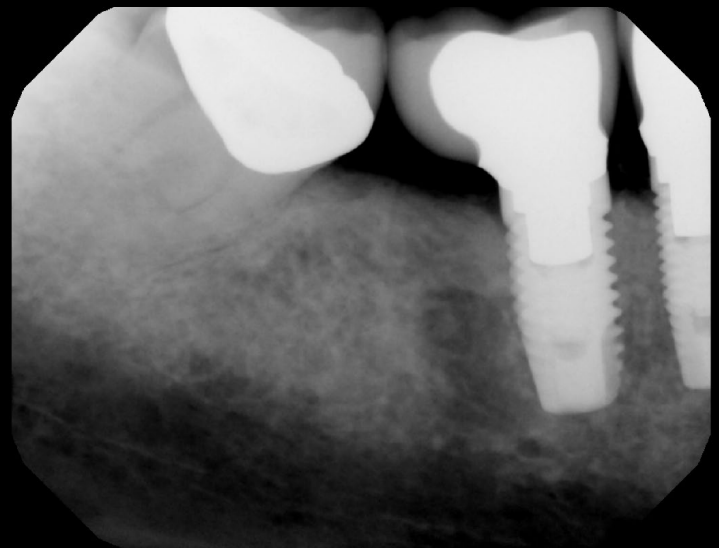
Right Posterior BWs + PAs
(12/7/2020)

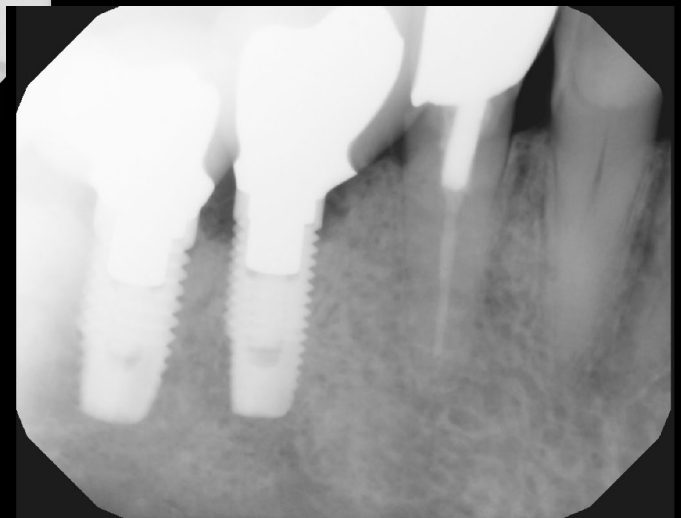




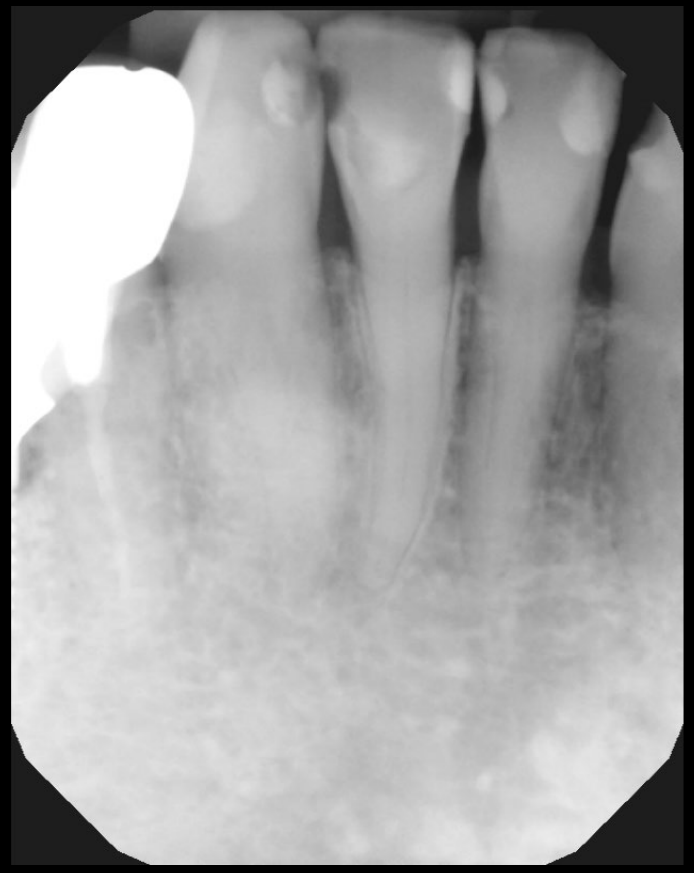


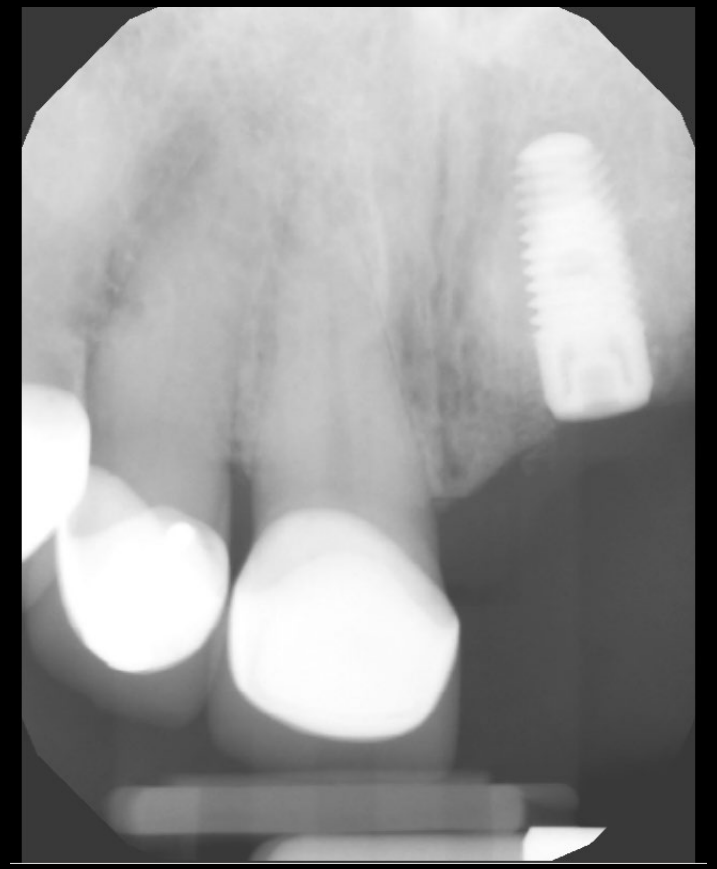


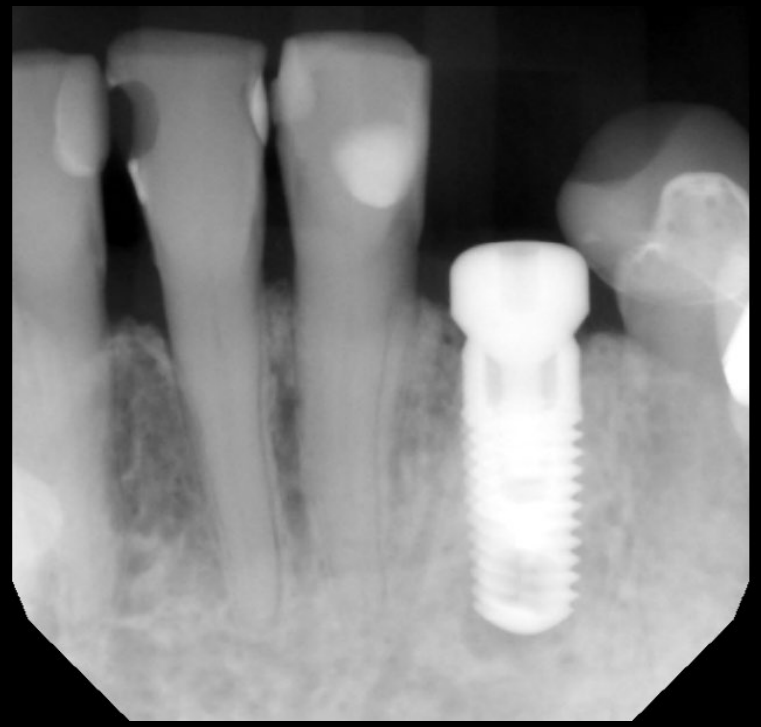




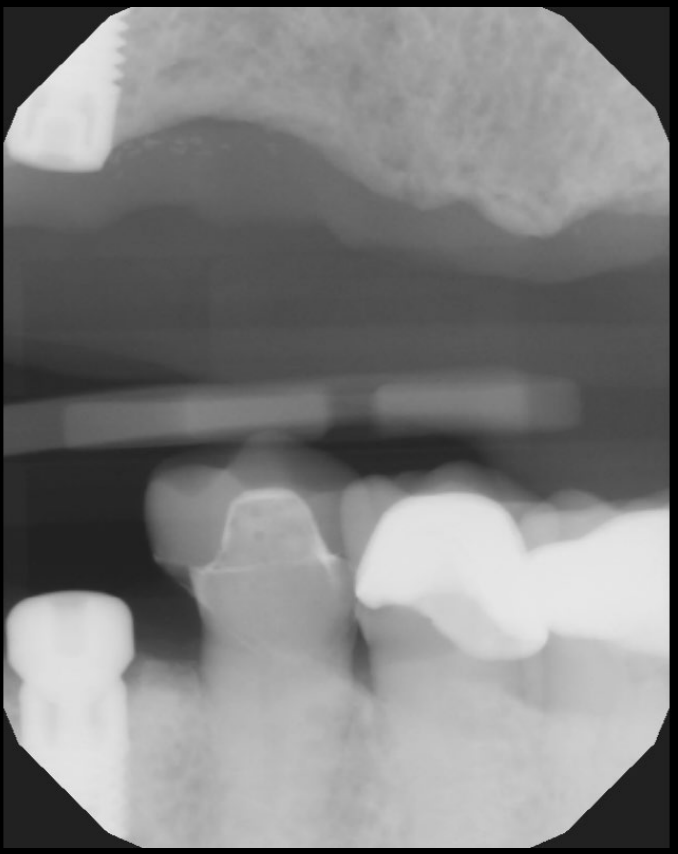
Anterior PAs
(12/7/2020)

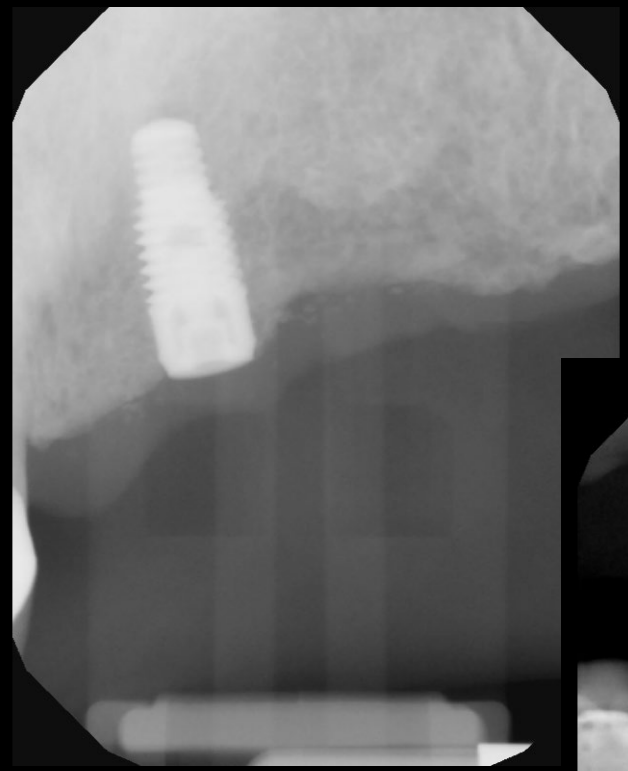


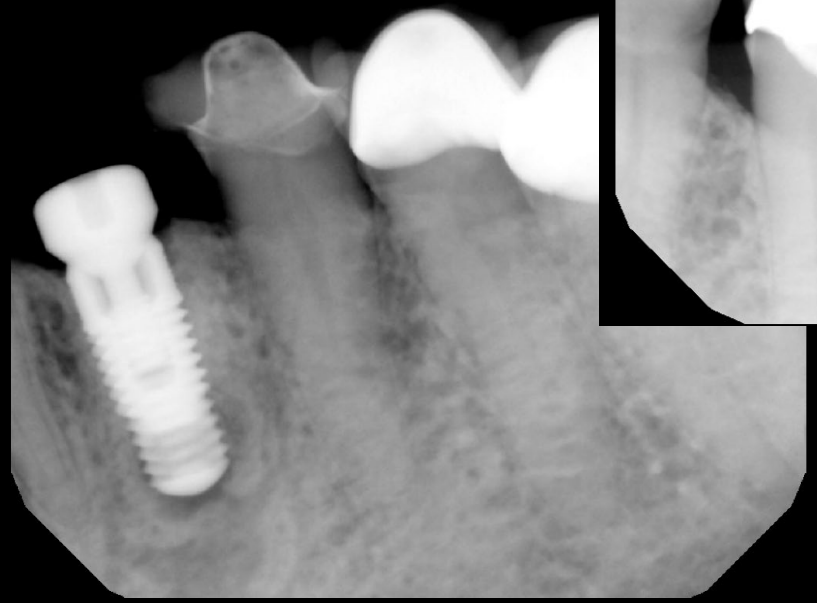


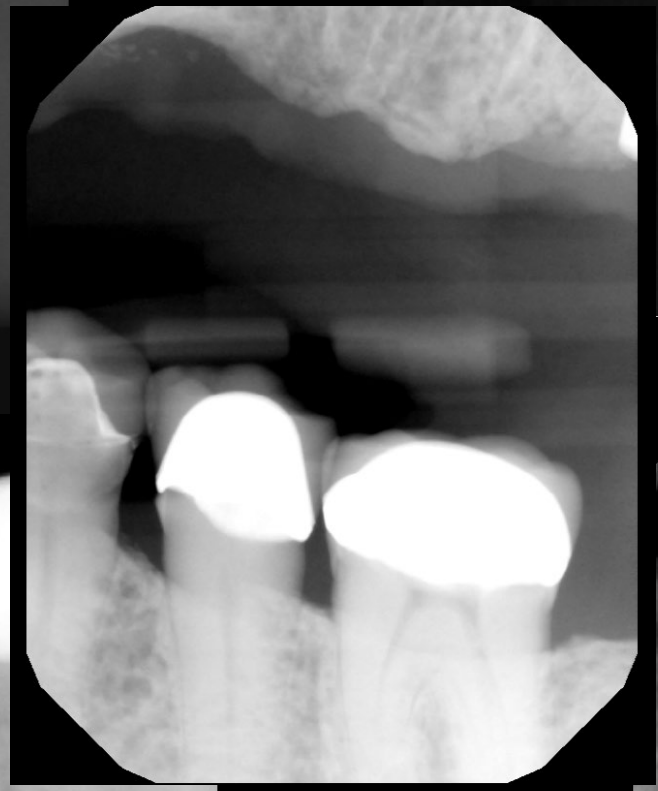


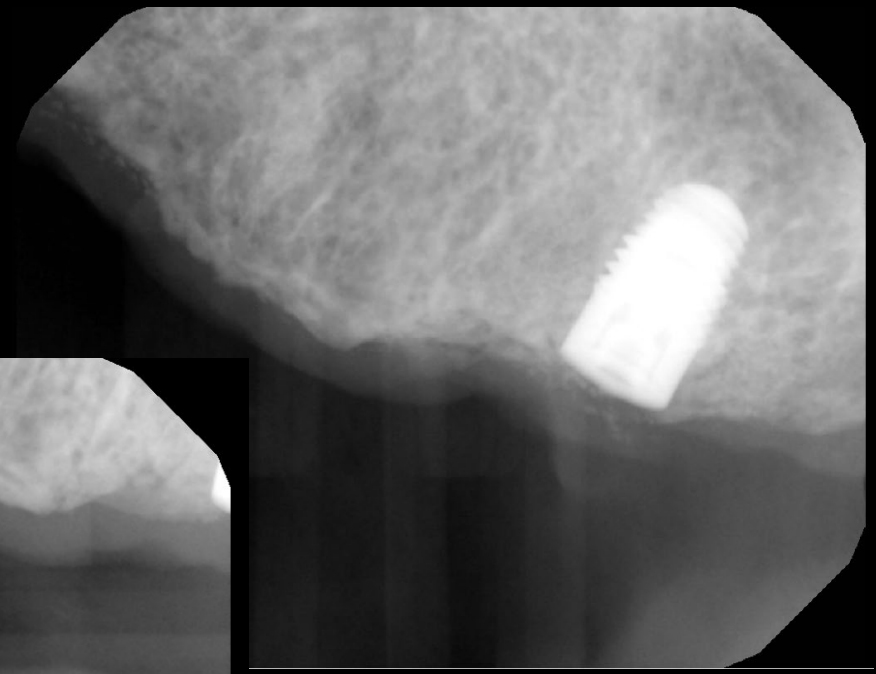
Left Posterior BWs + Pas
(12/7/2020)

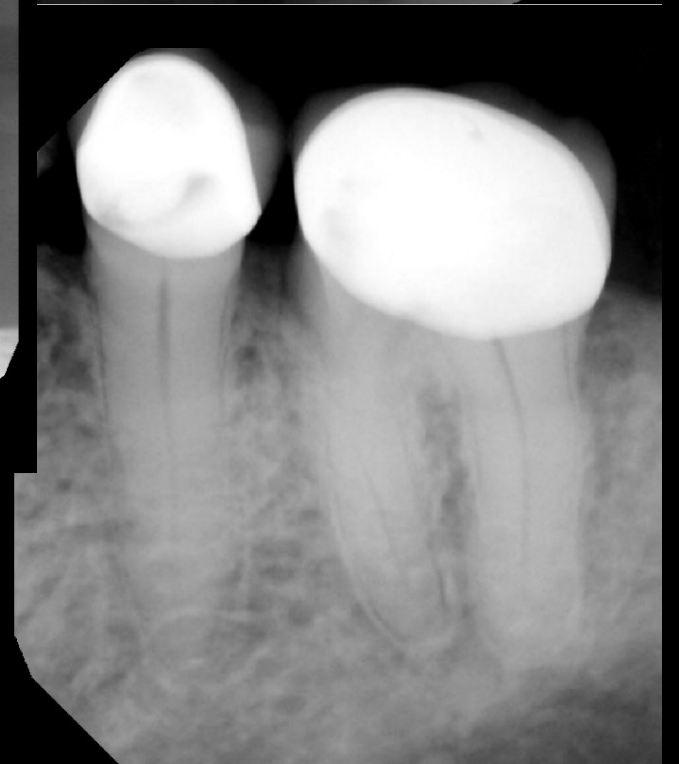






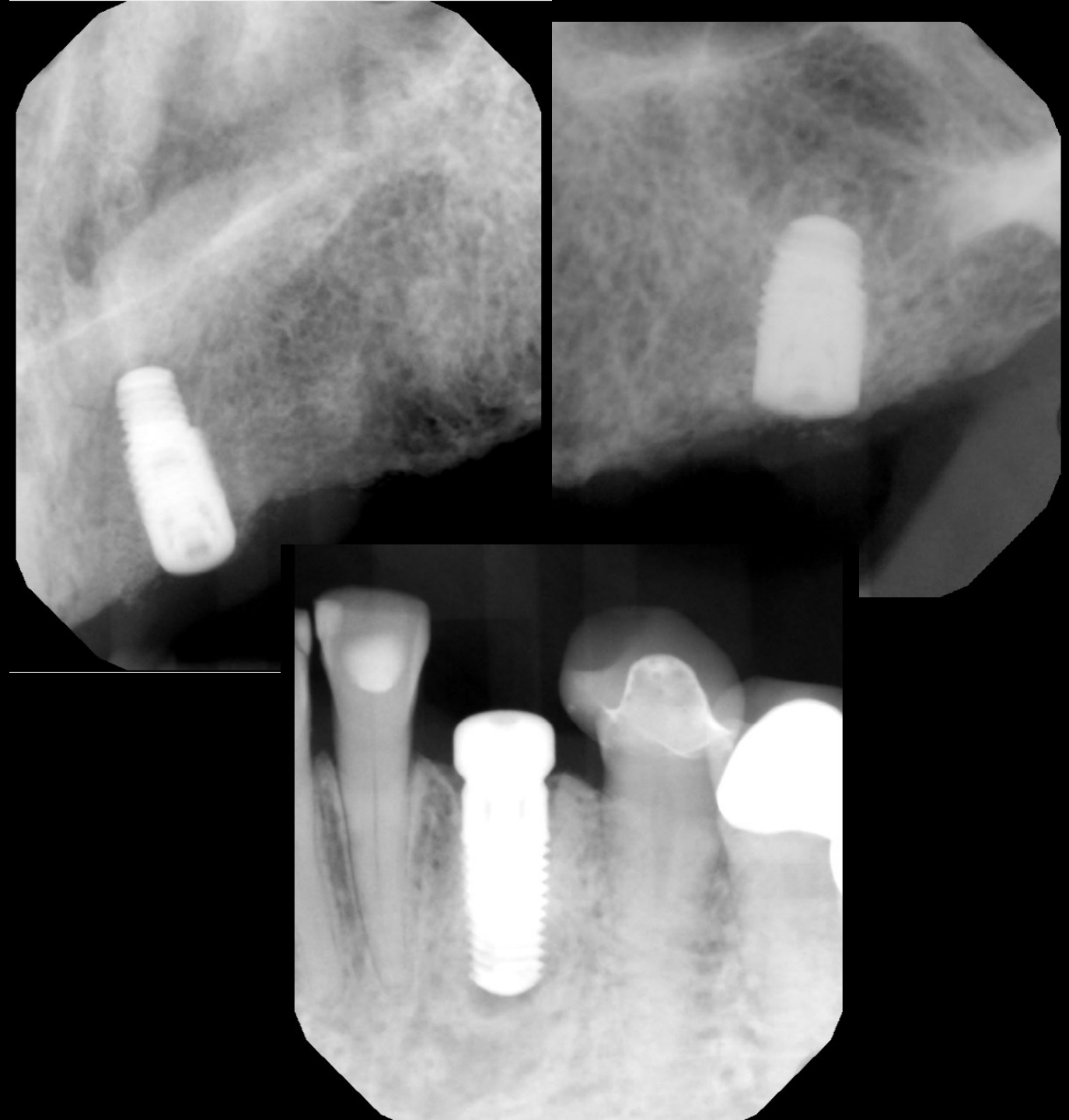






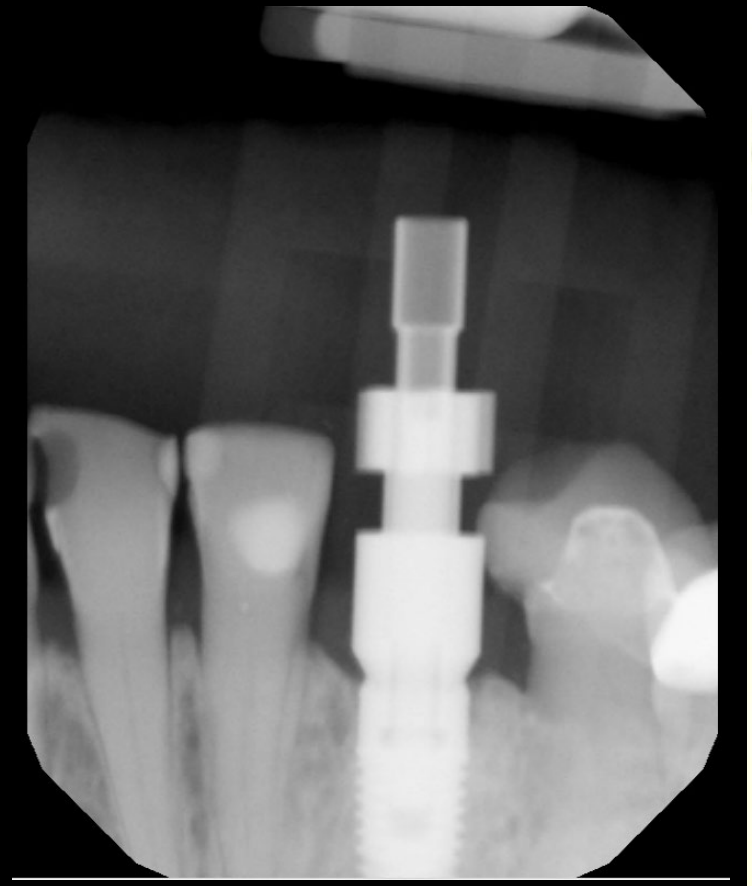
Osseointegration Check (2/1/2021)

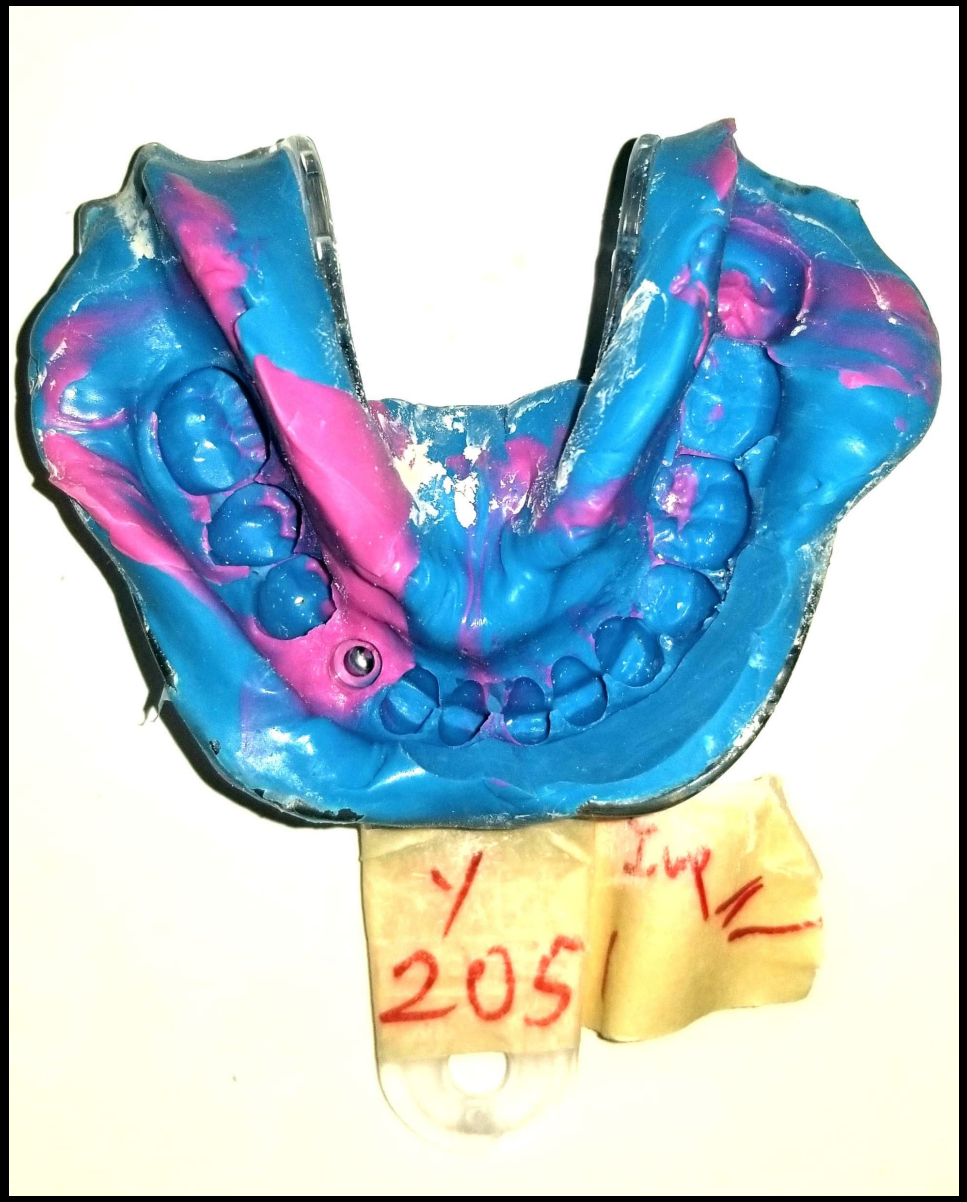
- Osseointegration check done w/ Dr. Fatima Mashkoor, DDS who placed the implant.
- Excess osteotome of #10 looks like it is decreasing in size.
- Apical radiolucency at #22 also looked like it was decreasing in size. During time of surgery, there was no pathology or infected tissue noted.
- Threads of all 3 implants looked well osseointegrated
- Stage III uncovering done for #10 + #13
- Dr. Fatima Mashkoor, DDS gave clearance to restore the implants in 2 weeks (upper implants)



Final Impression #22 Single-crown implant (2/17/2021)

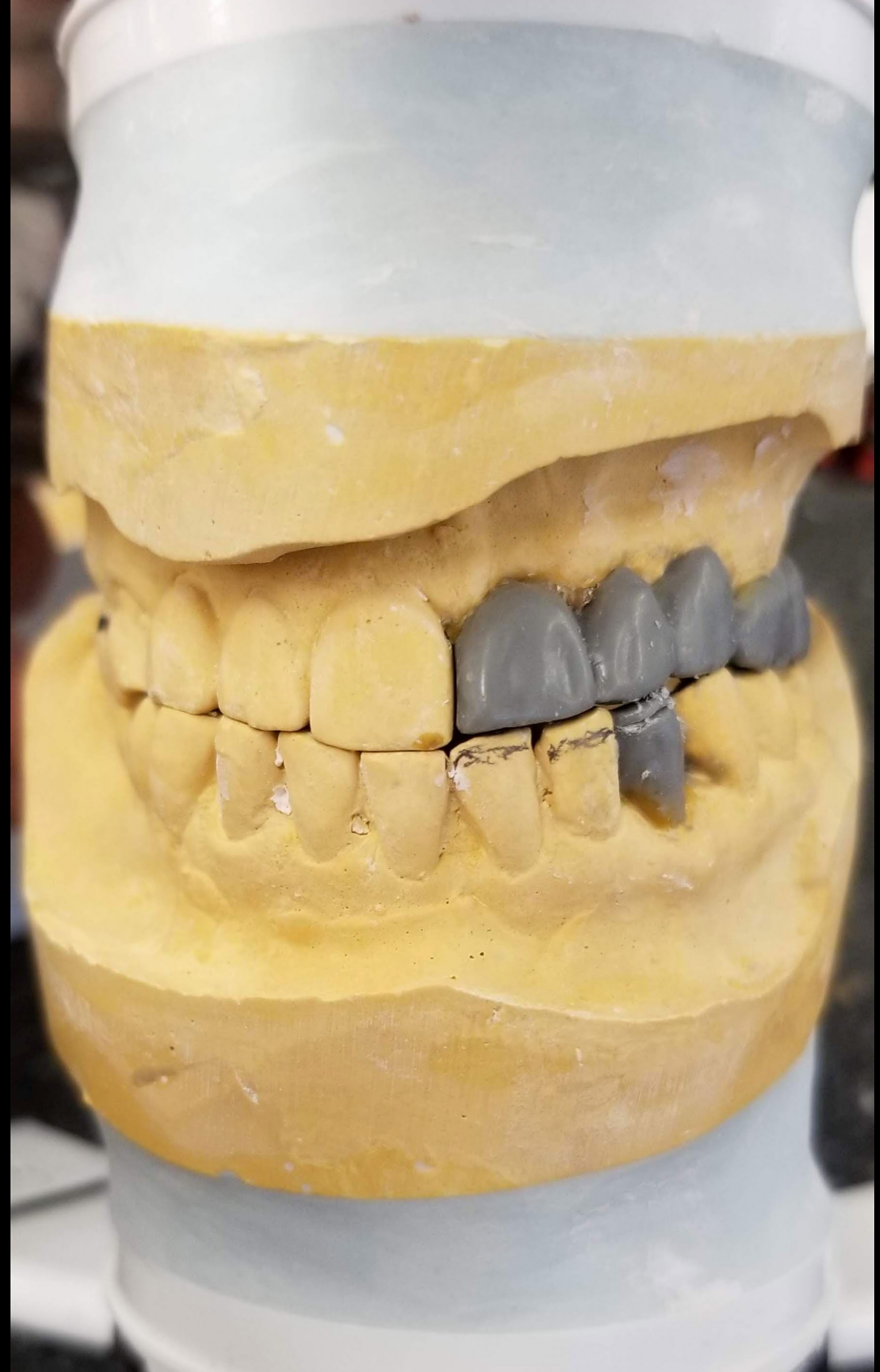
- Impression coping replace healing abutment
- Radiograph taken to make sure impression coping seated
- Enameloplasty performed to shorten #23 + #24
- Light + heavy body PVS used





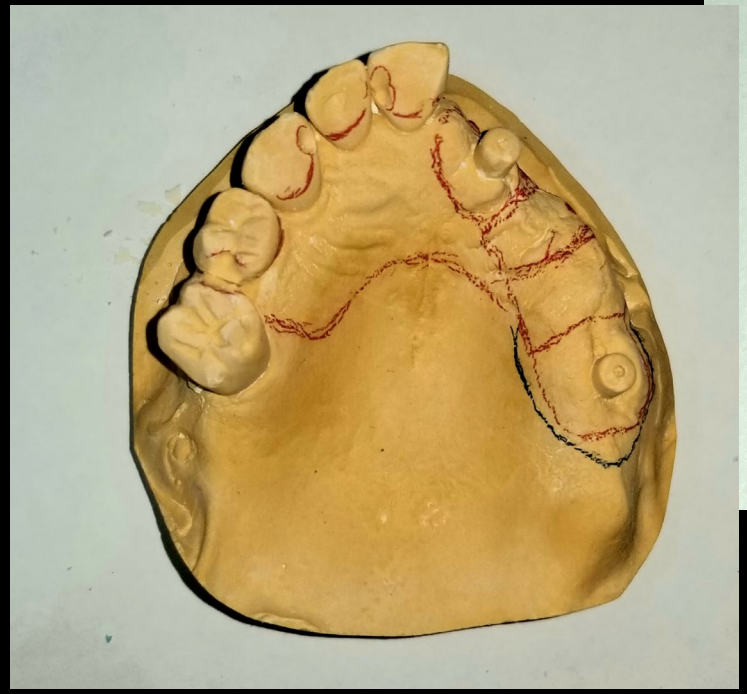
Esthetic Corrections

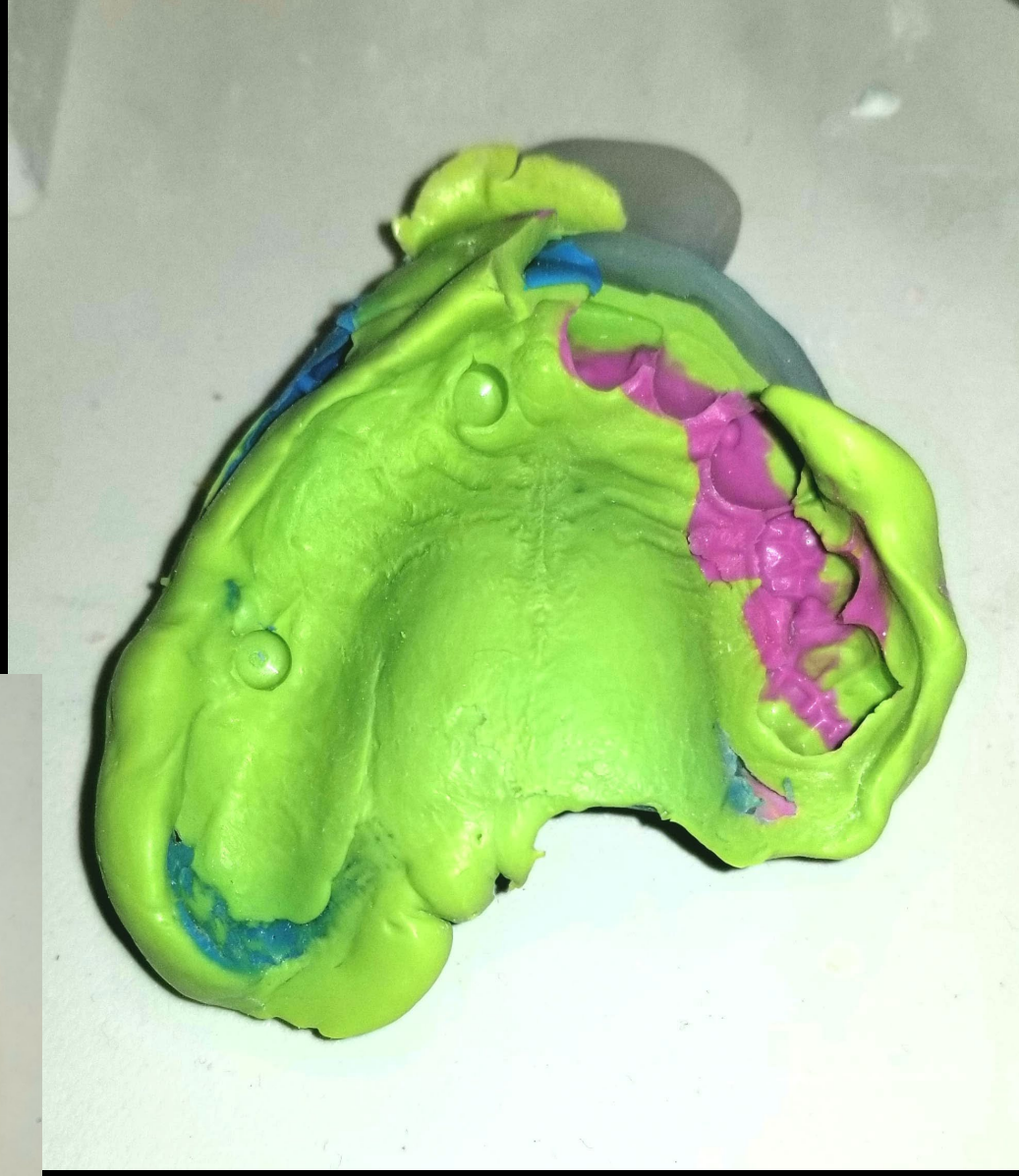
- Enameloplasty planned due to supraerupted lower left incisors #23 and #24
- Waxed up shorter implant crown on #22
- Allowed for a more esthetic horizontal plane that was parallel to interpupillary line



Impression for UA Partial Overdenture (2/19/2021)

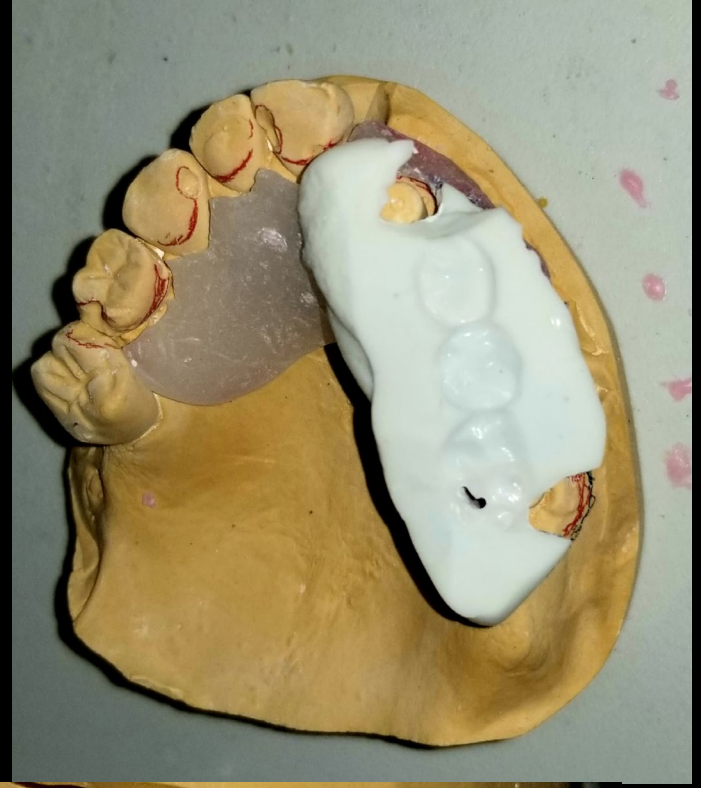
- Rest seats prepped on existing restorations (PFM and zirconia crowns without perforation
- Embrasure Clasp #2 and #3, M cingulum rest seat on #6, D cingulum rest on #8, ML dimple placed for retentive clasp
- Border molded custom tray around edentulous areas (UL quadrant) using heavy body PVS
- Took final impression using light body and heavy body (green) PVS
- Note Healing abutments captured to avoid w/ framework

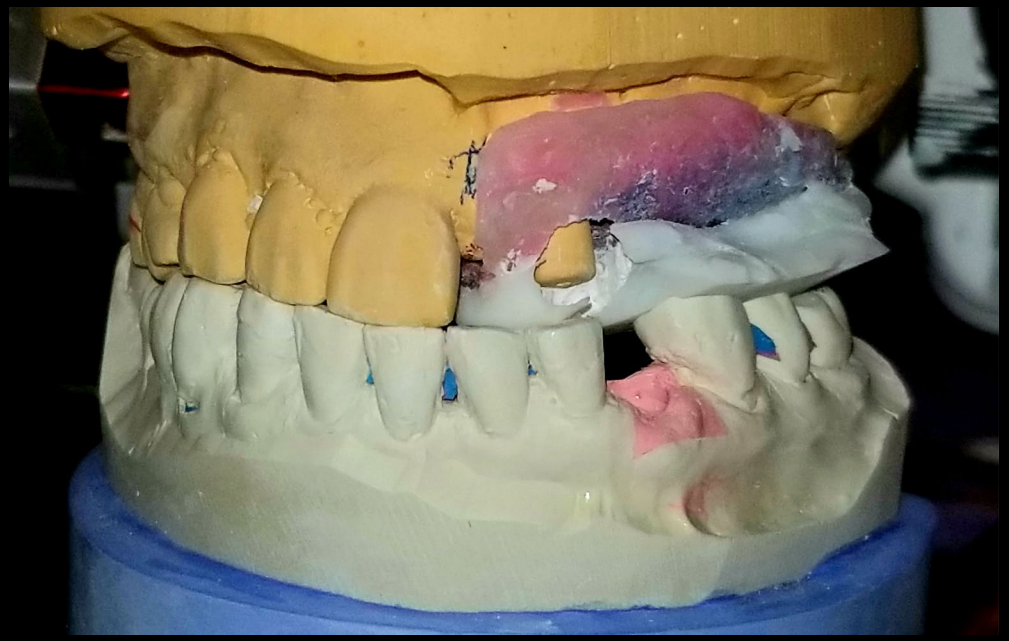


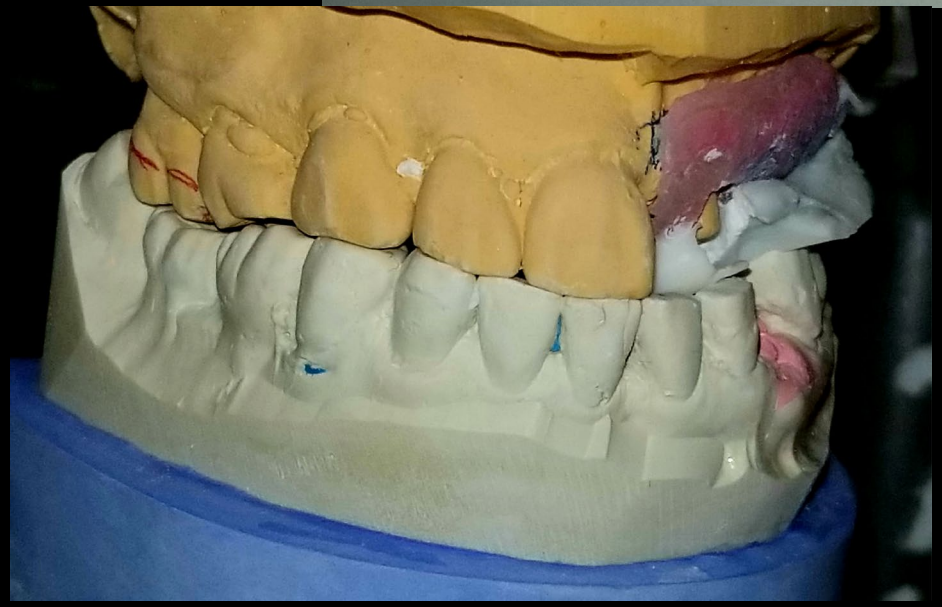


Occlusal Record

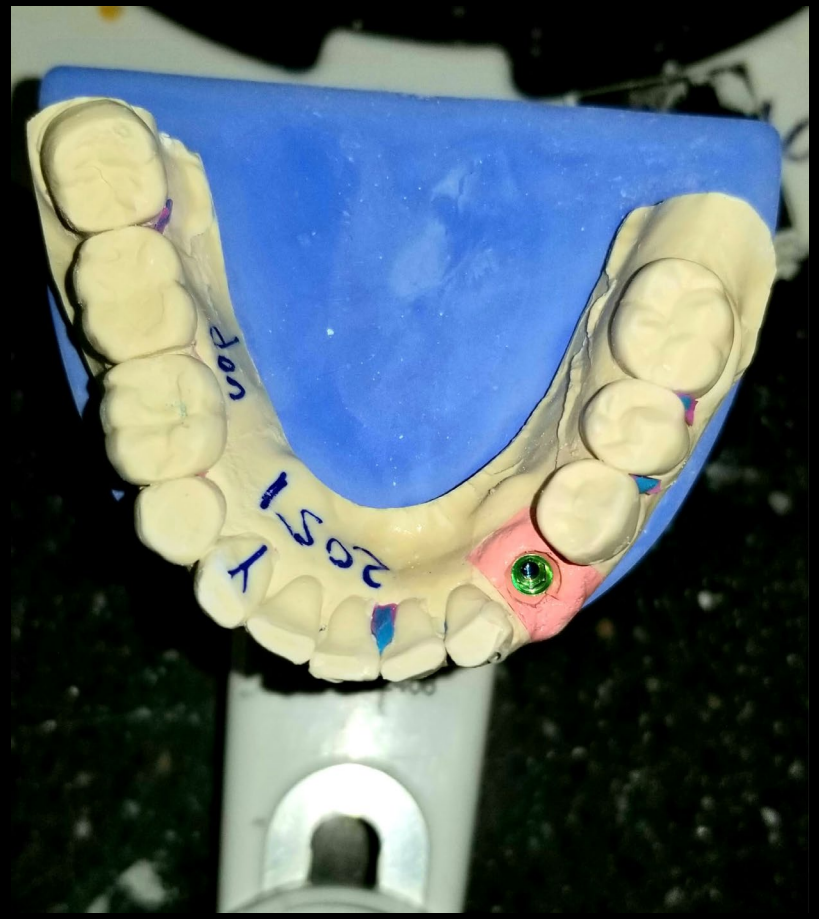
- Fabricated wax-rim using triad
- Used PVS adhesive and vanilla bite to take a bite record
- Relieved areas on wax-rim that would interfere with the healing abutments.



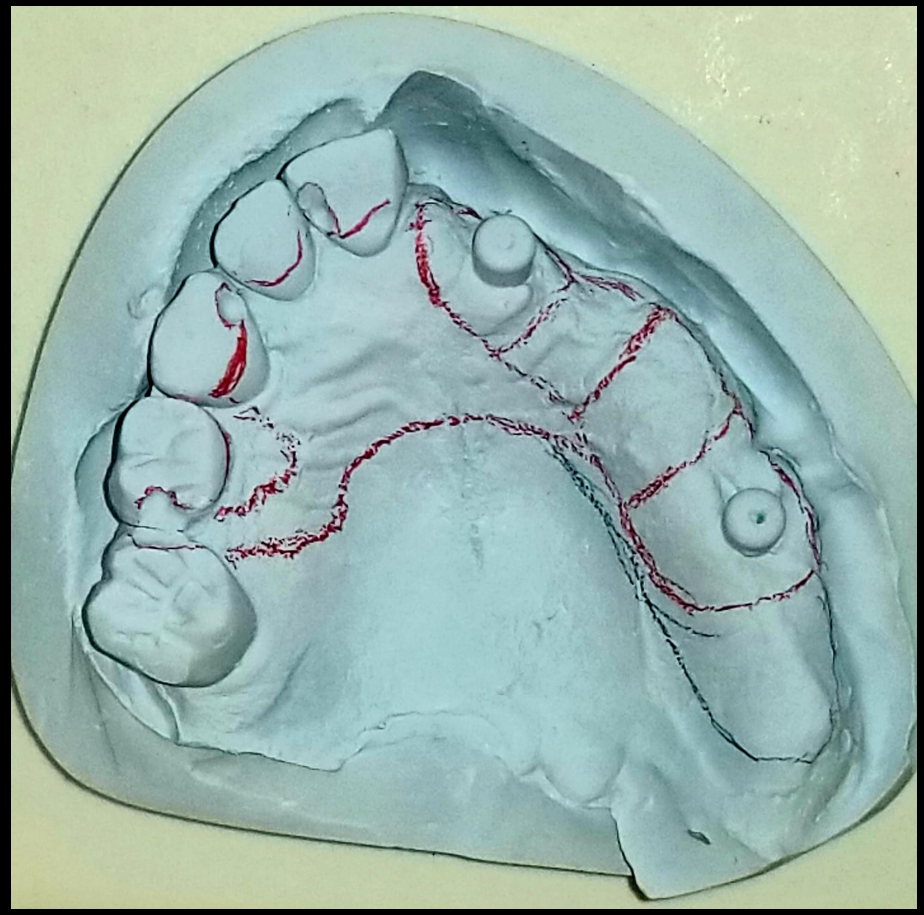




Master Casts



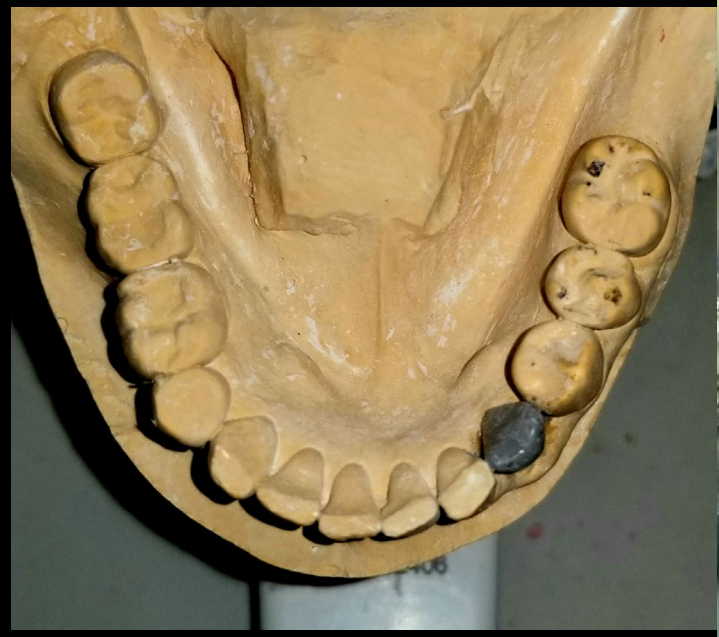
1. Soft Tissue Mastercast for single implant crown #22

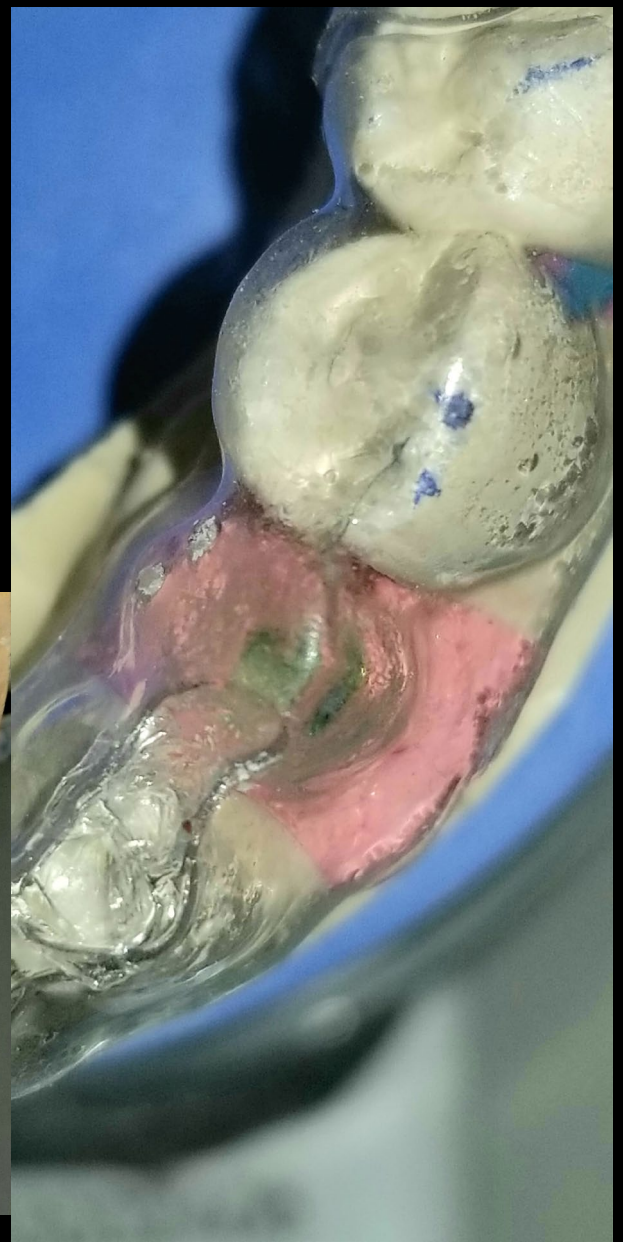


2. Mastercast for maxillary cast metal partial overdenture

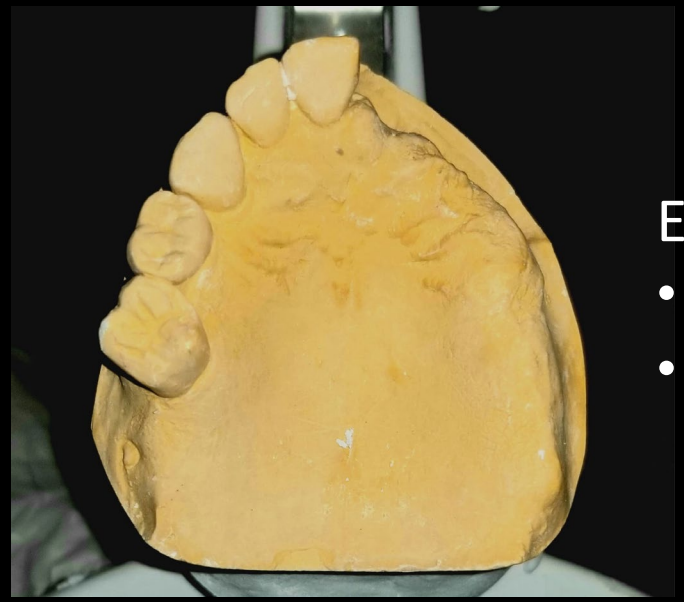
Lower single implant crown

- Wax-up had been completed + modified to new horizontal plane
- Used a pressed splint to check where the screw would be located on the implant crown
- Appears that the screw vent would come out on incisal edge of #22, which would be unesthetic.
- Angled screw channel used
  - BellaTek Zimmer
- Required 7-8 mm vertical space available (Carpentieri et al.)



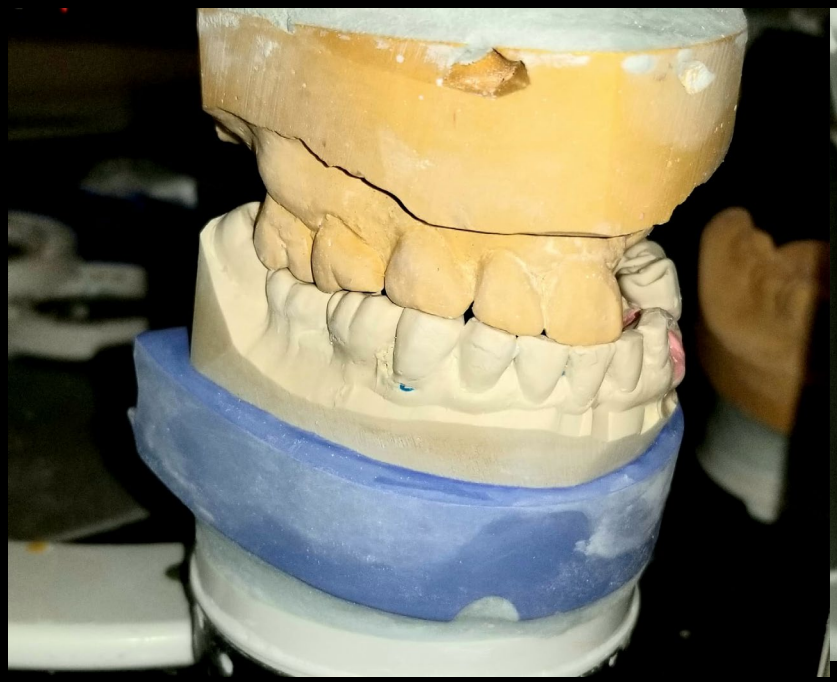


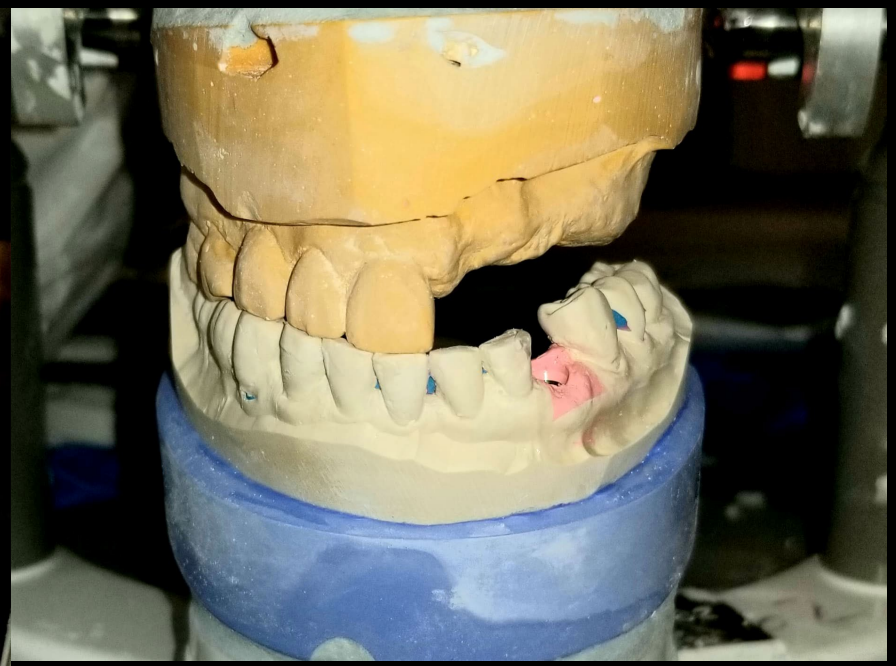
Communicating Occlusion to the Lab?

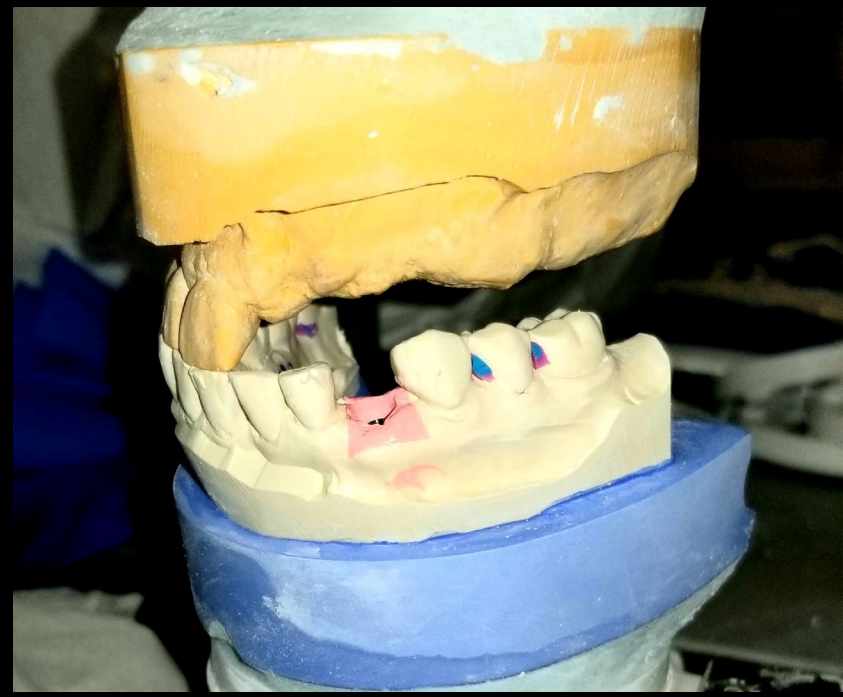


Edentulous opposing UL quadrant

- Trubyte for occlusal plane?
- Mock-up teeth?

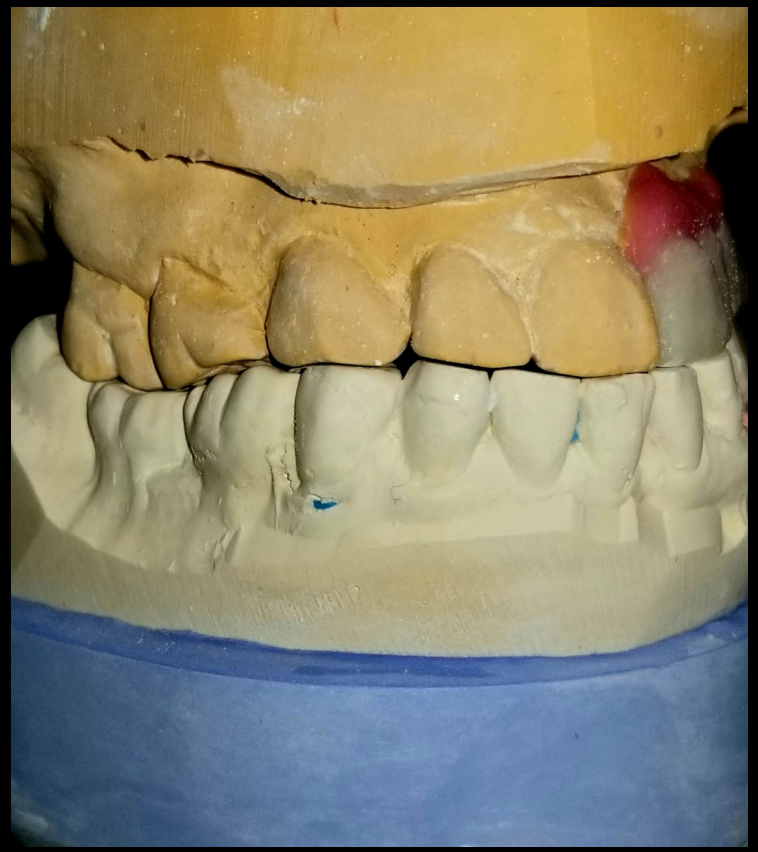


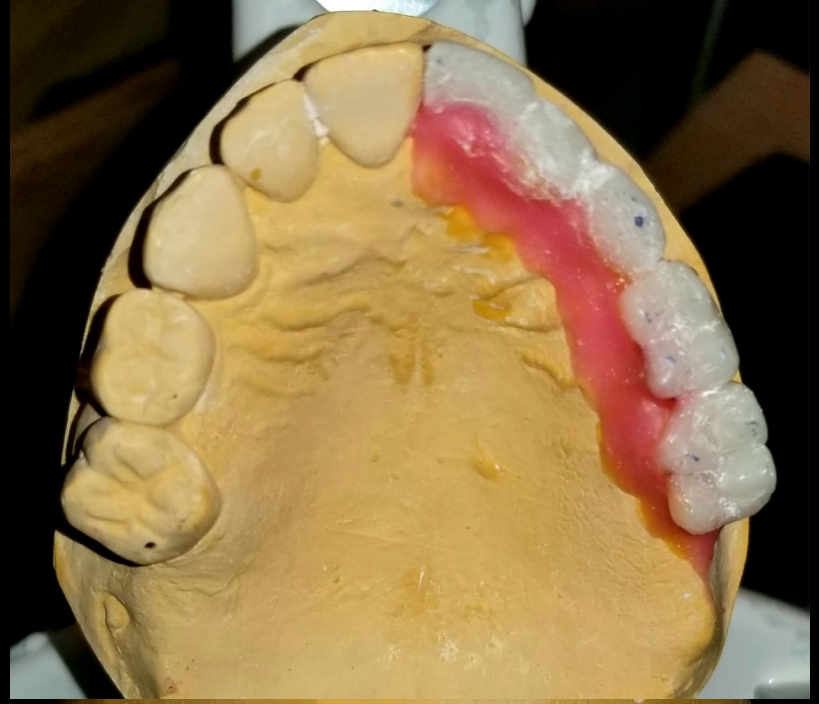


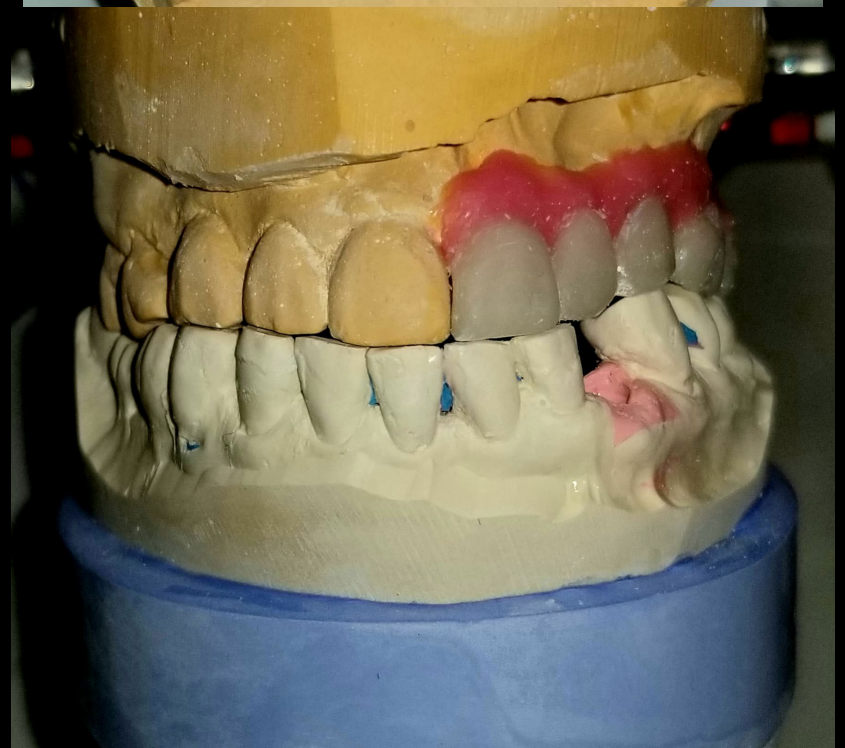


I chose to do a mock-up using previously waxed-up teeth.

The mock-up also gave an idea about the esthetics about the upper partial overdenture.

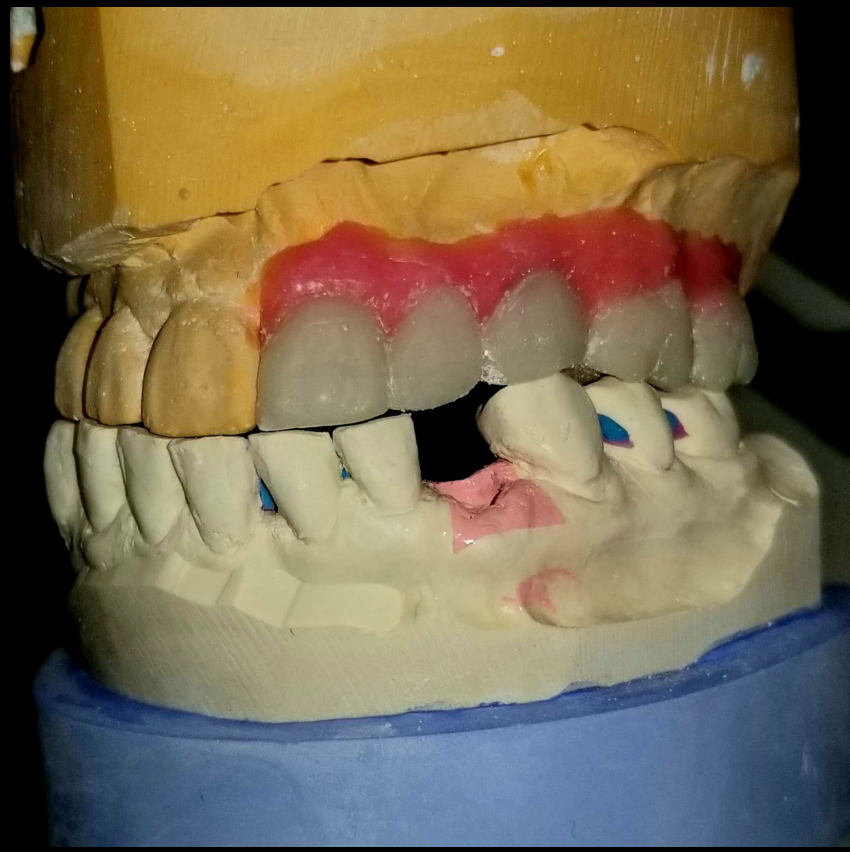


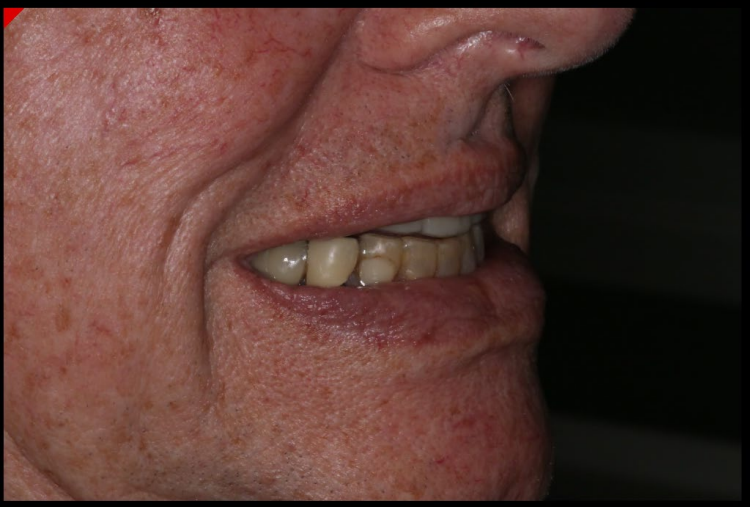


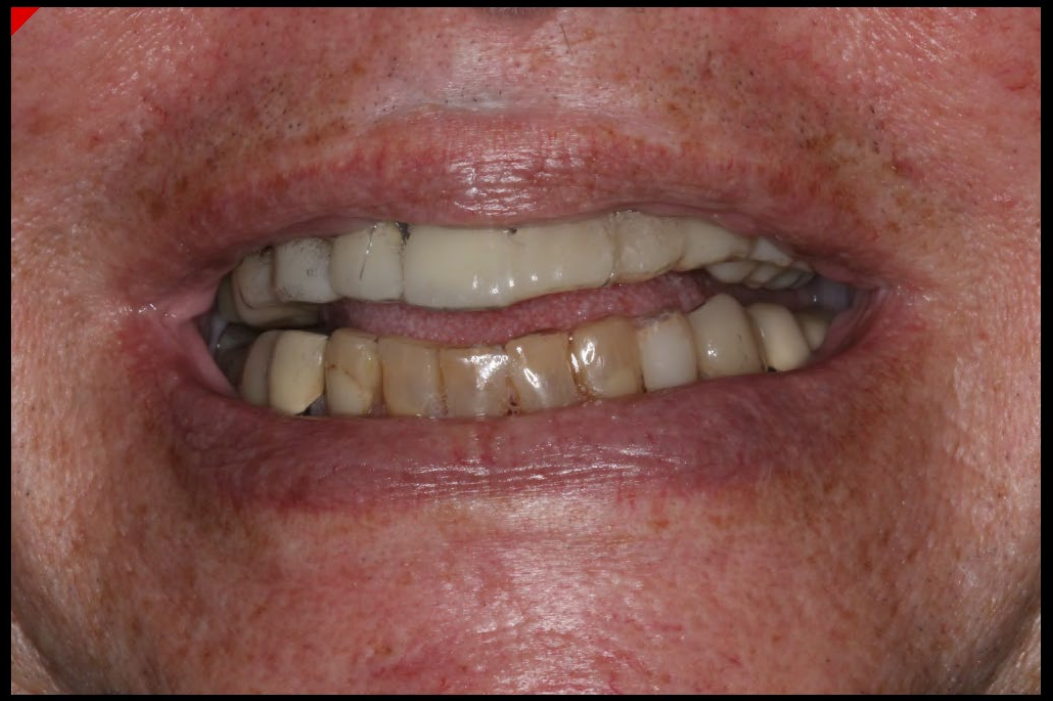


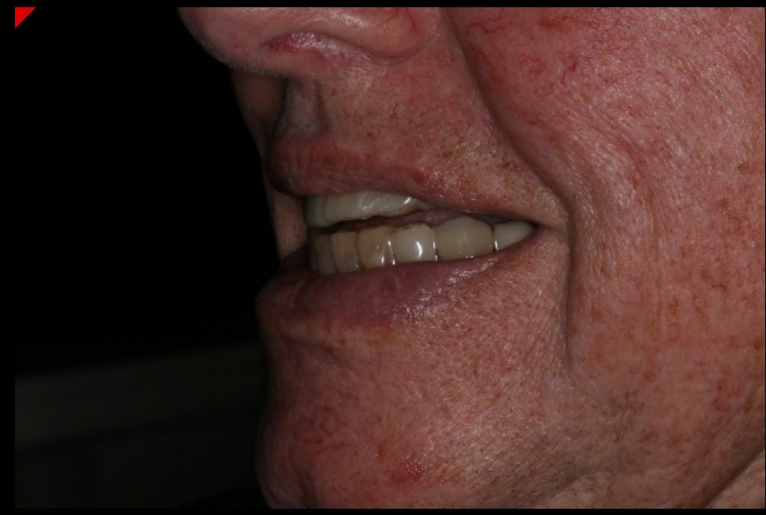
Esthetic evaluation of:

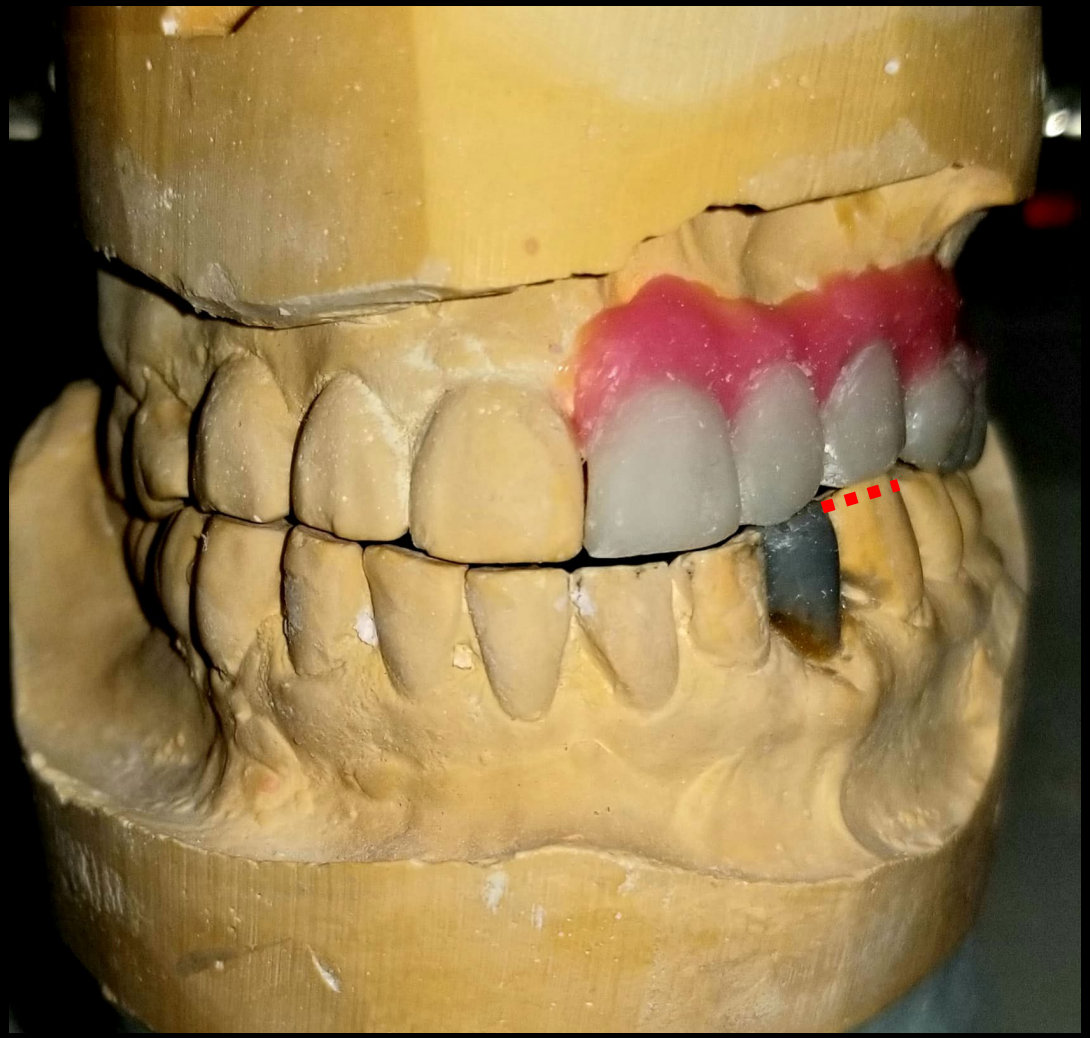
- Gingival line of overdenture
- New horizontal plane resulting from the enameloplasty.
- Overall improved from initial wax-up.

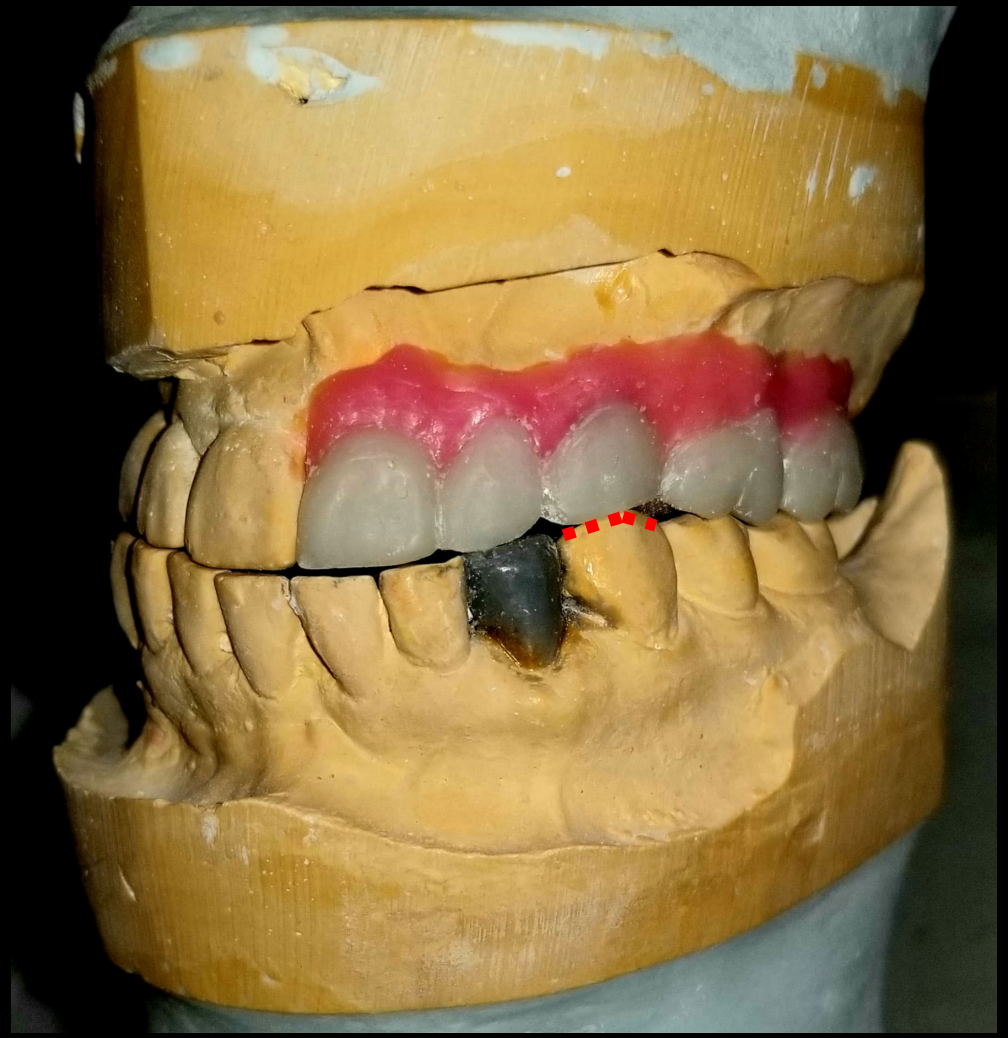






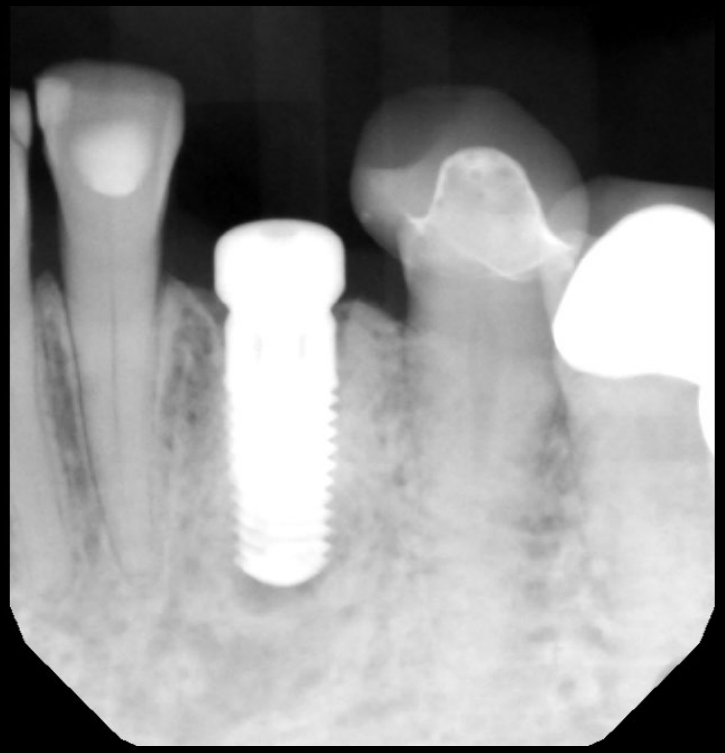






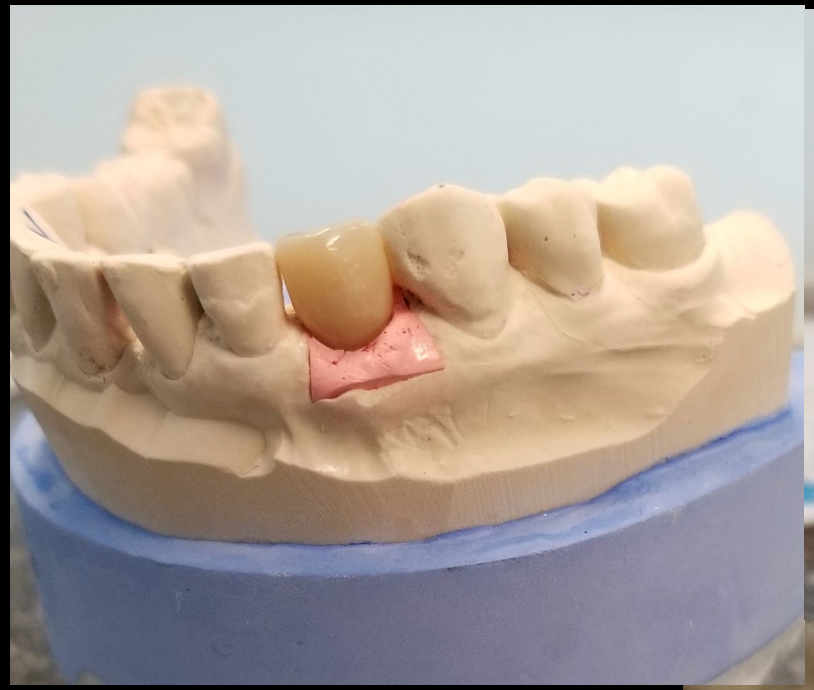
Considered now the possibility of reducing the Buccal cusp of crown #21 for better esthetics in terms of horizontal plane (supraeruption)– Performed porcelainoplasty 0.5 mm reduction 4/15/2021

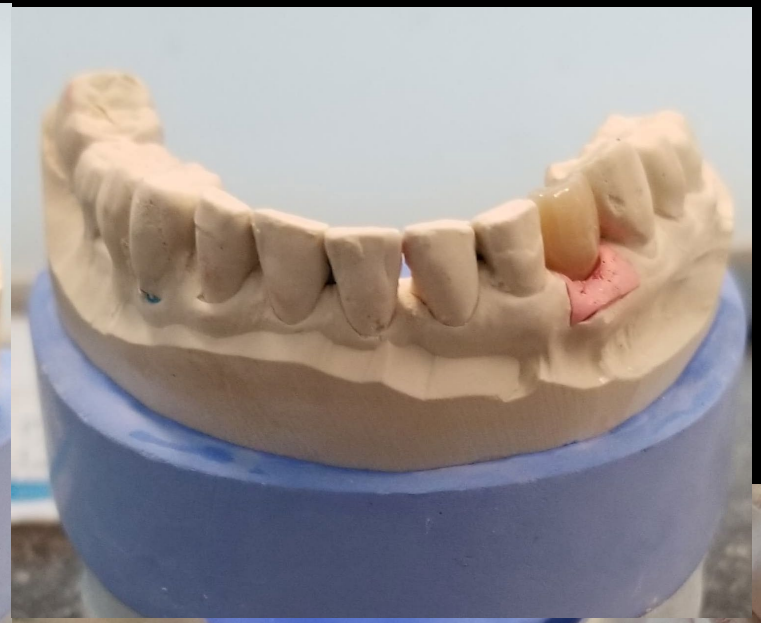
Porcelainoplasty on #21

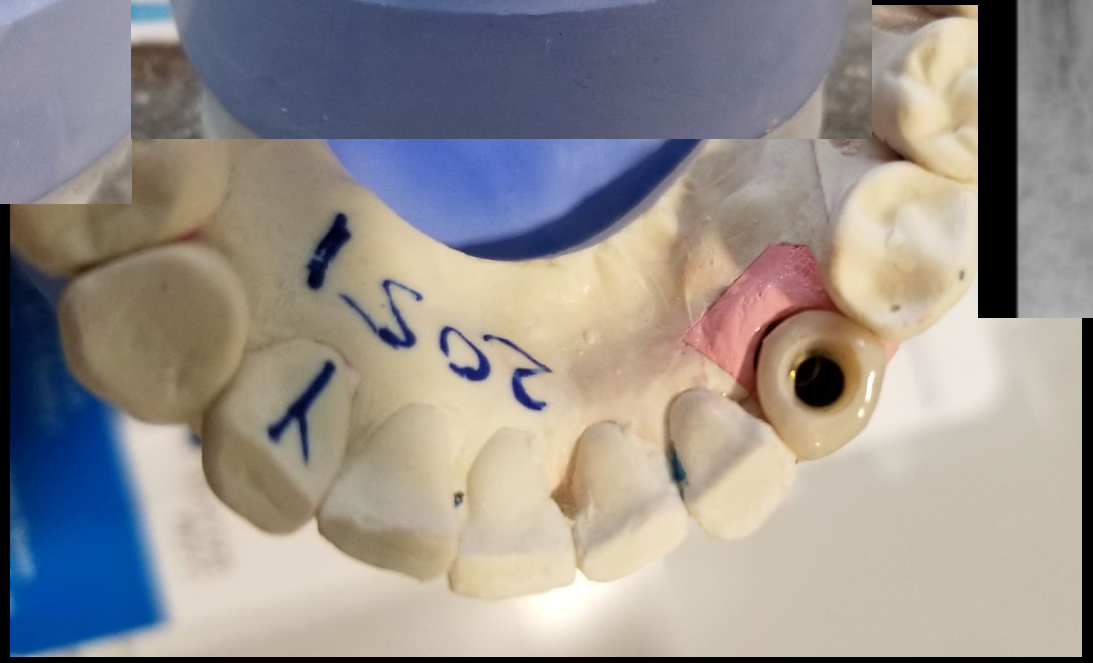


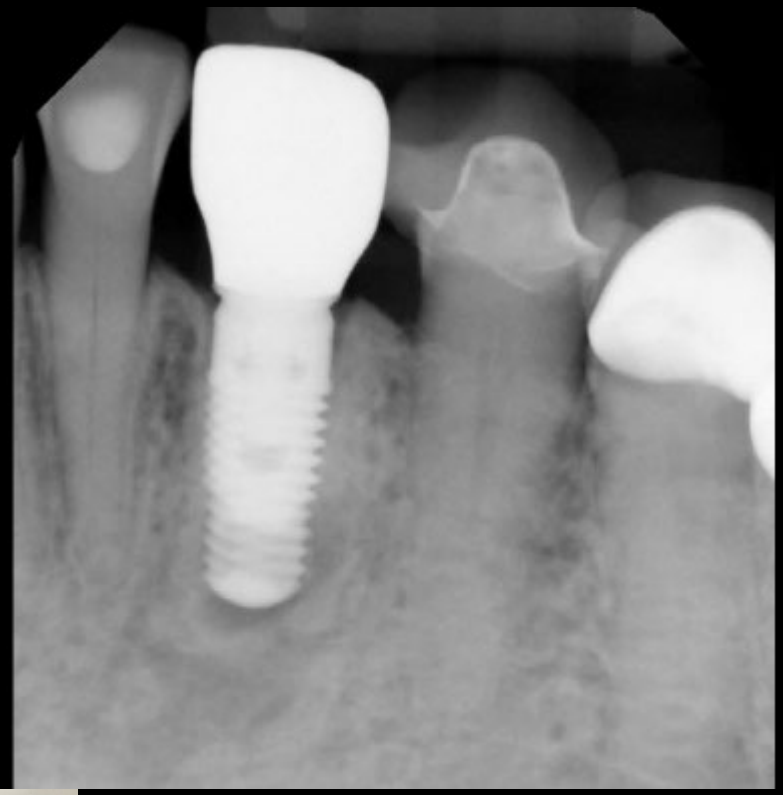
Porcelain crown w/ adequate reduction on prep to allow safe maximum of 0.5 mm reduction on B cusp of restoration

#22 single unit implant crown delivery





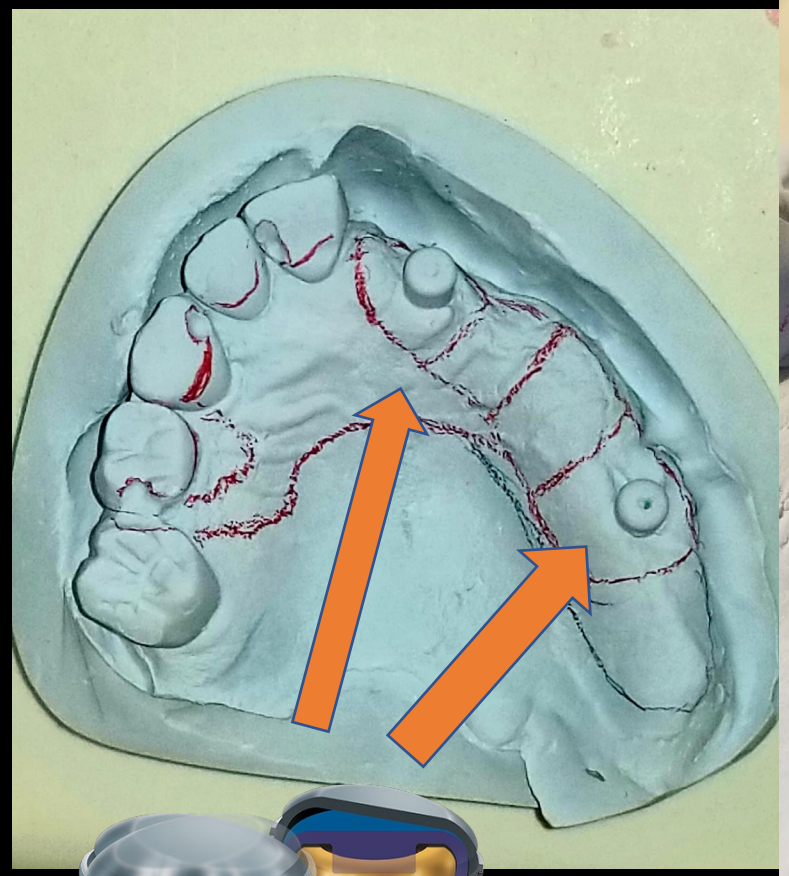


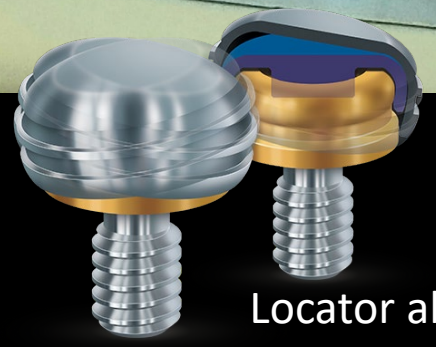


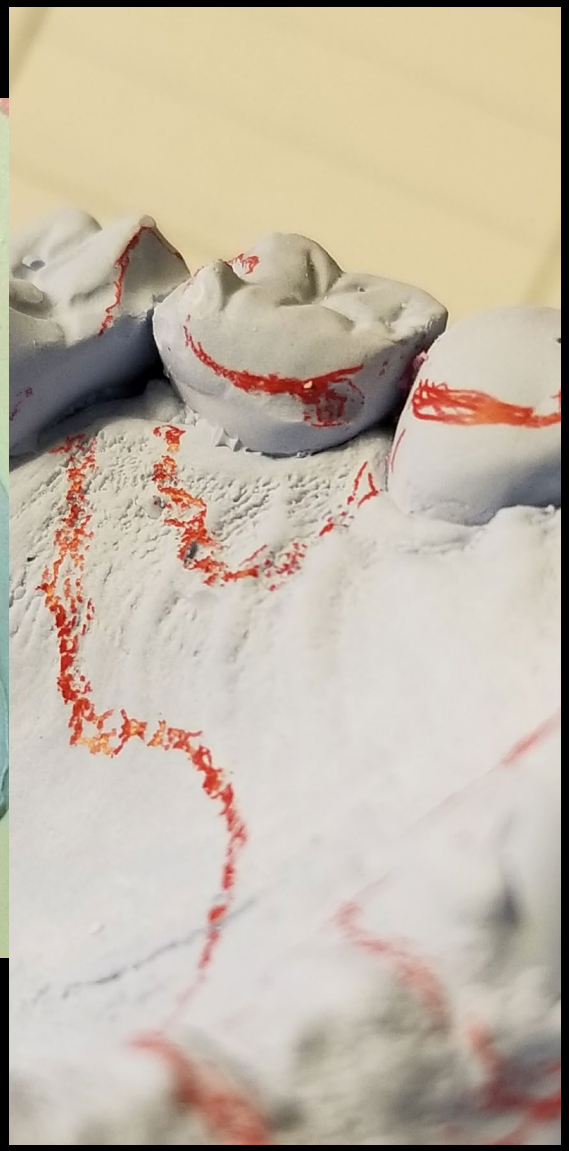
Torqued with zimmer wrench and omnitrix screwdriver to 35 Ncm

Framework Design of UA Partial Overdenture

- Framework clearly avoids the areas where the locator abutments will be placed.
- Embrasure clasp between #2 and #3.
  - For esthetics purposes, we will be using an extra long rest seat on distal of #3 within embrasure clasp as reciprocation along with a shorter reciprocation clasp on DB, whereas the retentive clasp will go into ML dimple on #3 (C3PO Concept)
  - #2 is not very visible in patient's smile, hence will clasp around DB line angle.
- Cingulum rests located on #6 and #8.
- Major connector: Horseshoe







Locator abutments to be placed after completion/processing of final prosthesis

C3PO (CCCPO)

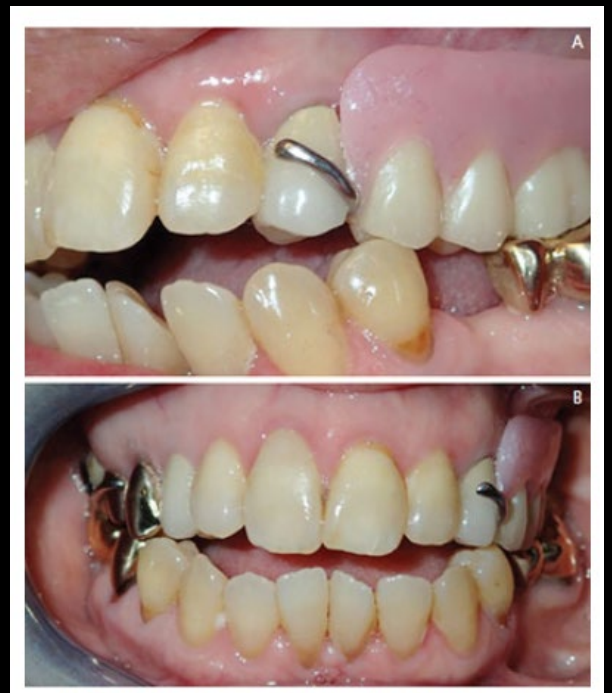
Cosmetic Circumferential Clasp for Premolars with Occlusal Rest

Introduced by Drs. Mark Booth, DDS, Chi Tran, DDS, MS and Warden Noble, DDS, MS, MSEd in a clinical report published July 23, 2019

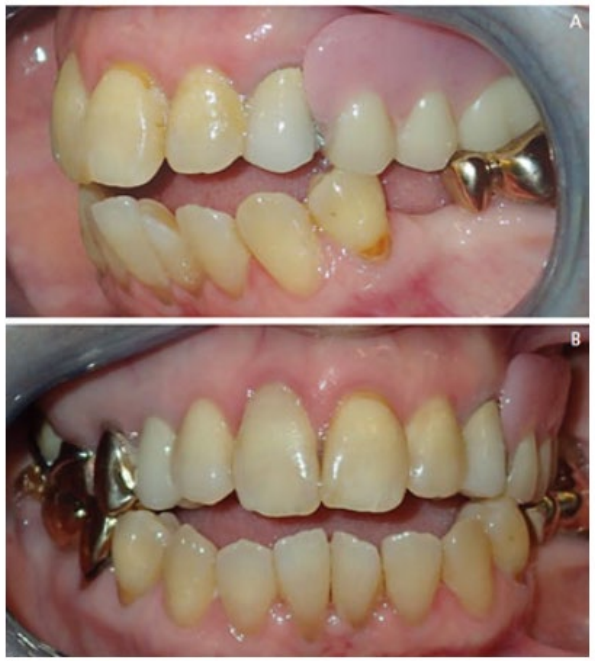
Achieves more than 180 degree encirclement of abutment

ML undercut for retention & short bracing arm

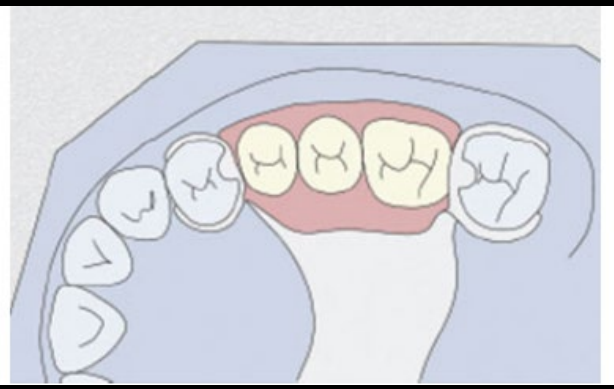
Satisfies criteria for retention, support, and stability for tooth-borne RPD while improving esthetics by eliminating the visible circumferential retentive clasp used for Akers clasps.

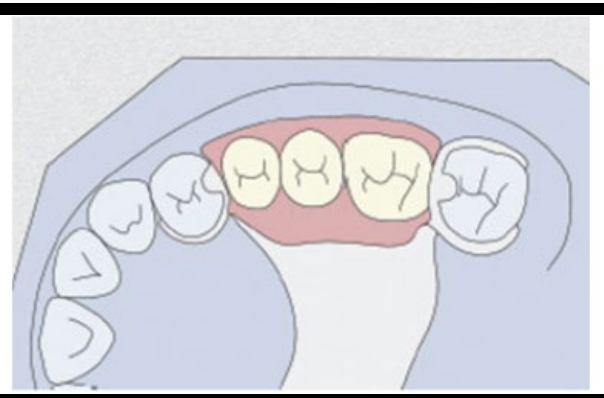


FIGURES 7A and 7B. *An Akers clasp RPD with metal display on the facial aspect of the abutment tooth (A and B).*



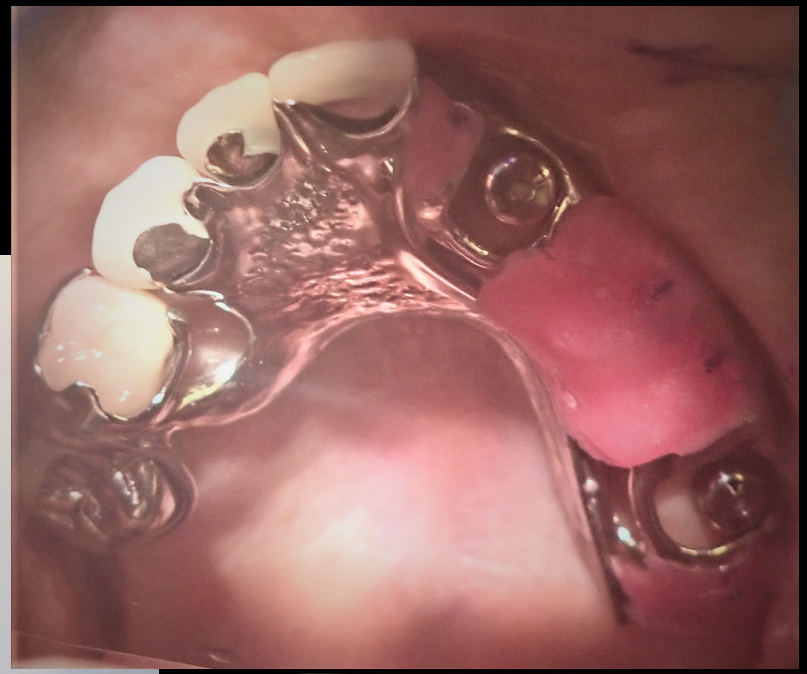
FIGURES 8A and 8B. *This is an esthetic C3PO clasp RPD with minimal metal display on the facial aspect of the abutment tooth (A and B).*





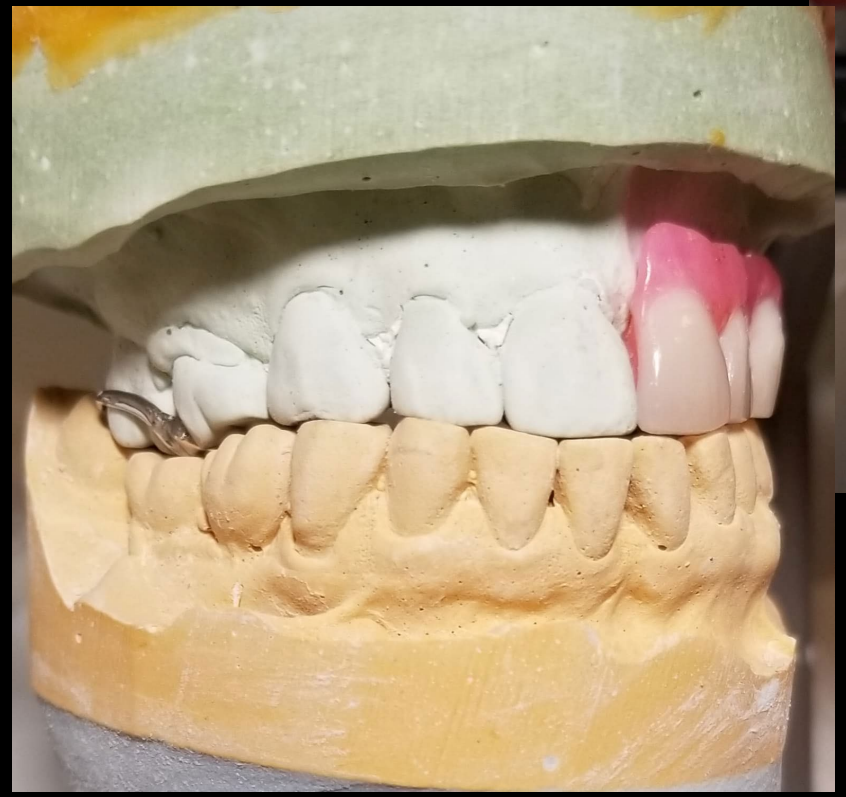
[5]Booth M, Tran C, Noble W. Esthetic Clasp Design for Removable Partial Dentures on Premolar Teeth. *The Journal of Multidisciplinary Care: Decisions in Dentistry.* 2019;5(7):36-39

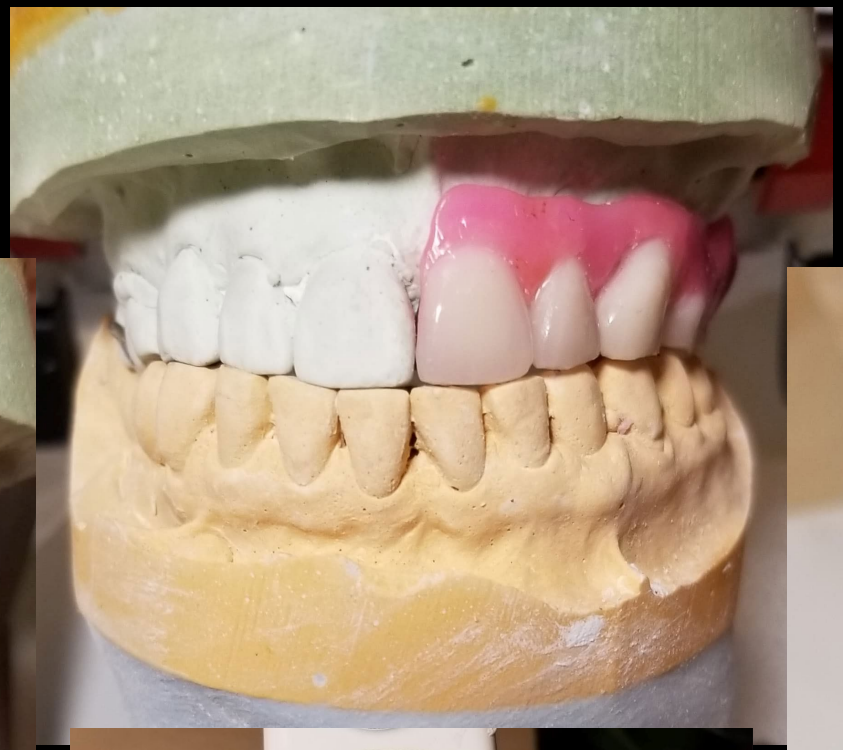
Framework try-in

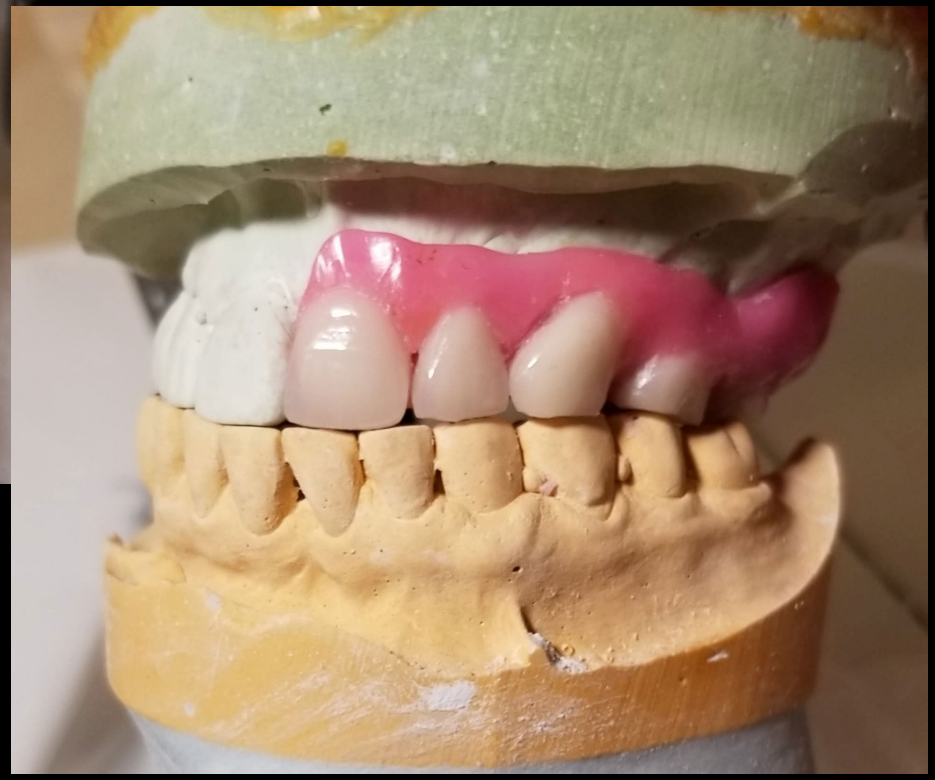


Updated Bite Record

Wax Try-in

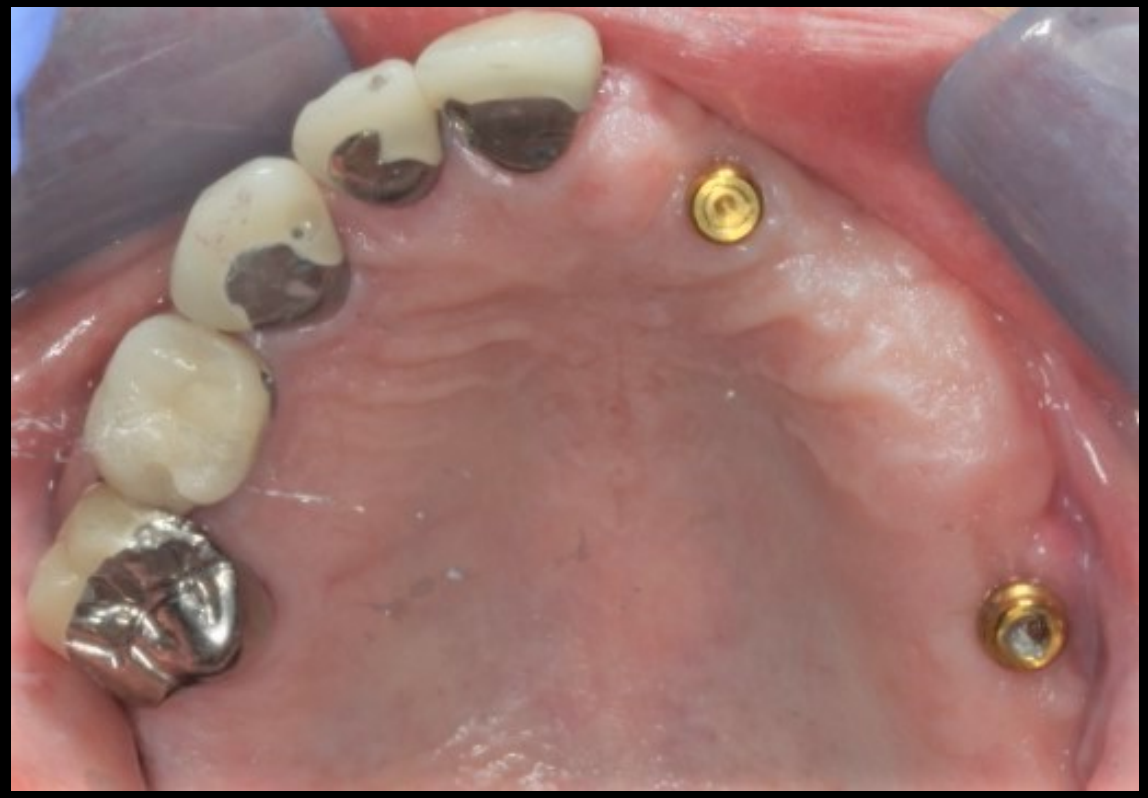






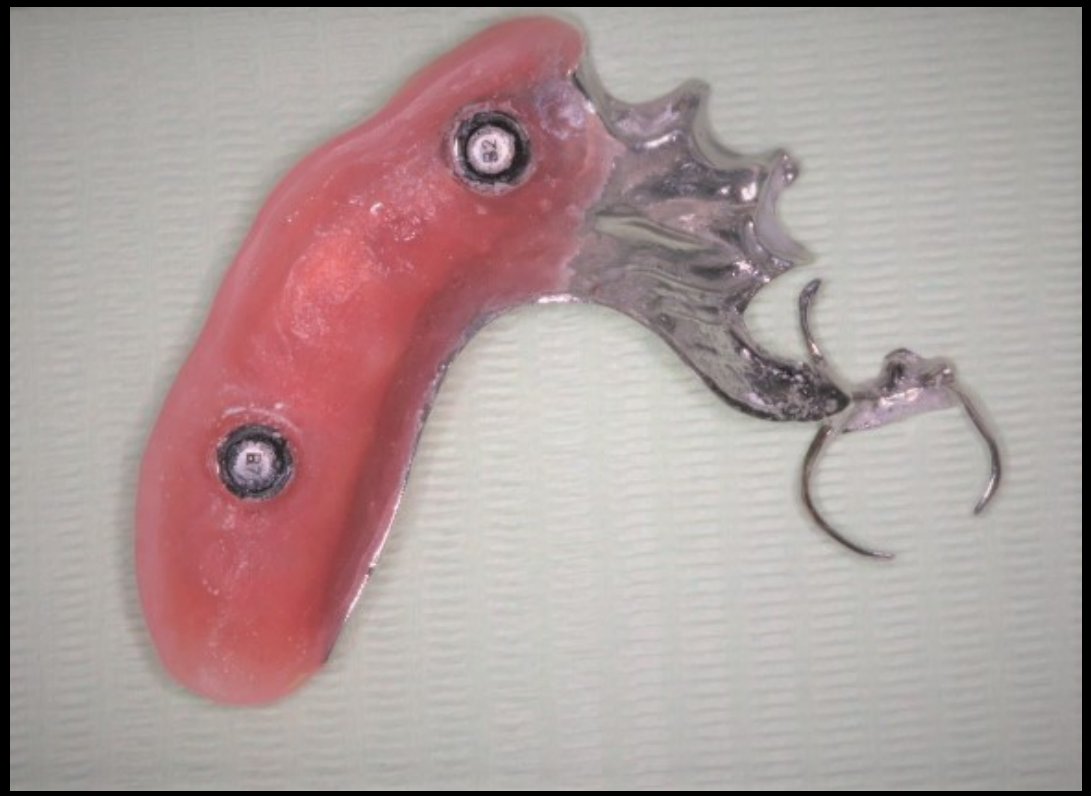
I set the teeth to imitate Pt UR side using given acrylic teeth.
Composite veneering added to D of 11 to close gap (not shown)

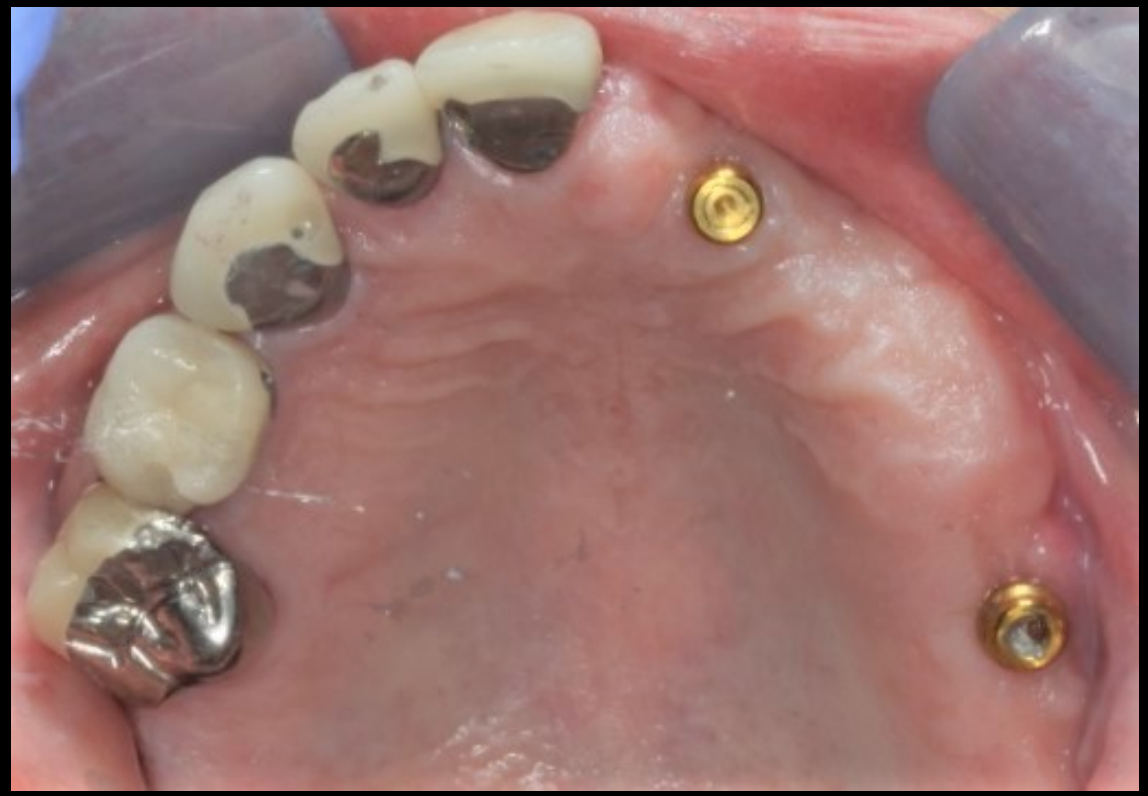
Locator Abutments & Metal Housings



Male locator abutment and female component metal housings
4.5/3 mm locator abutment on #14
3.5/3.5 mm locator abutment on #10

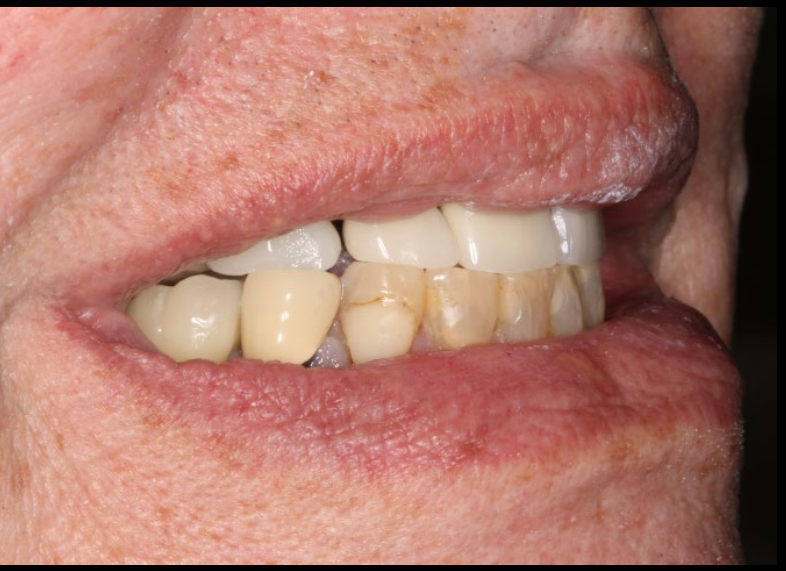
Metal Housing Pick-Up Rebase

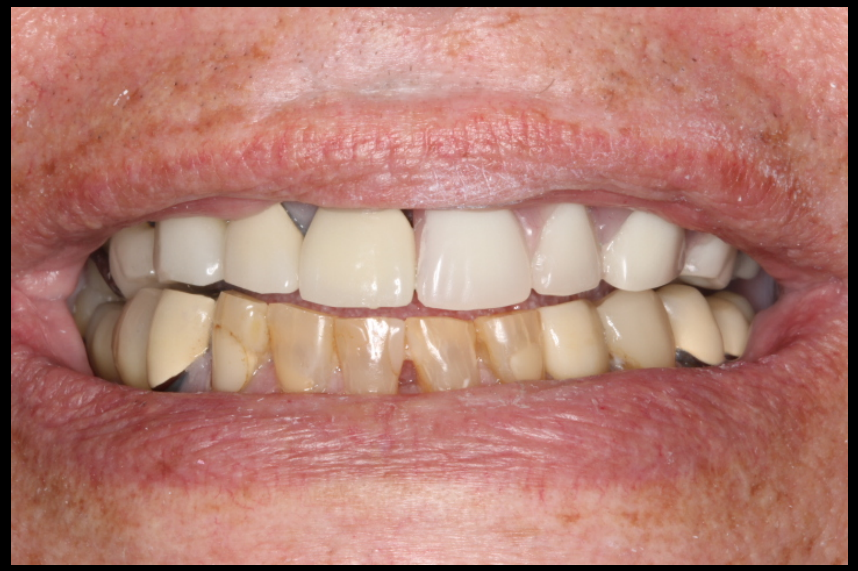


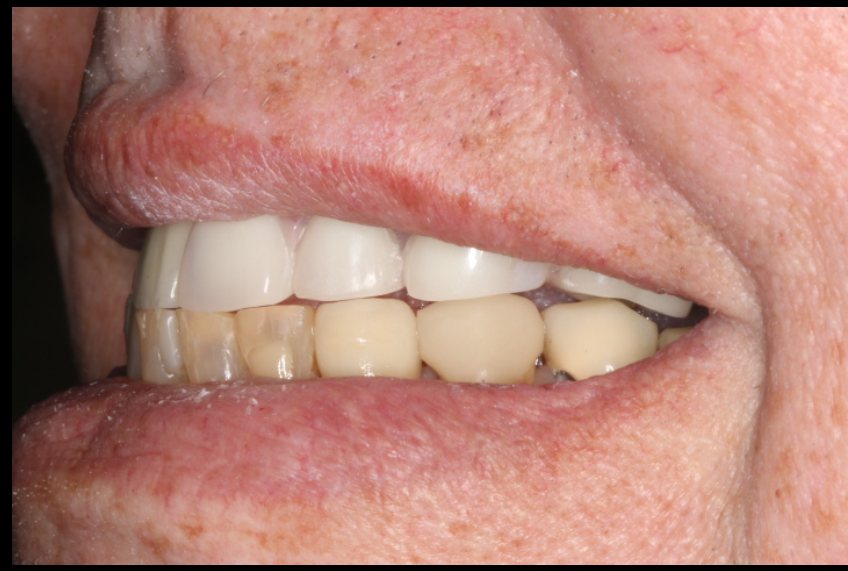


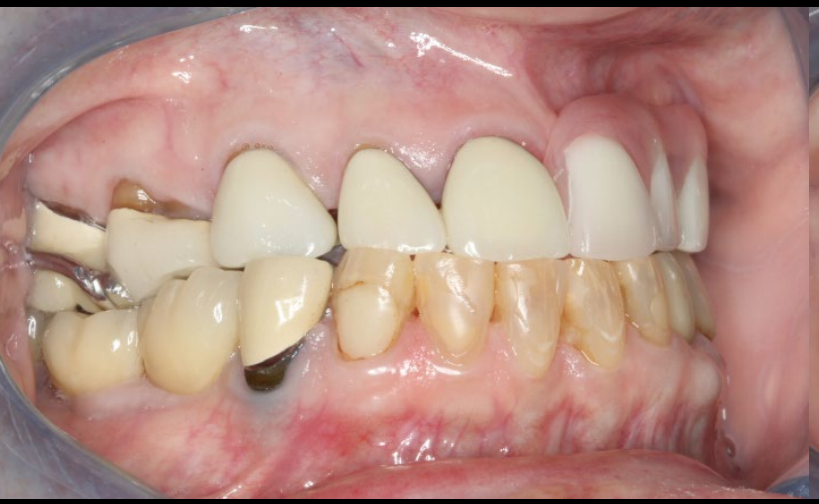
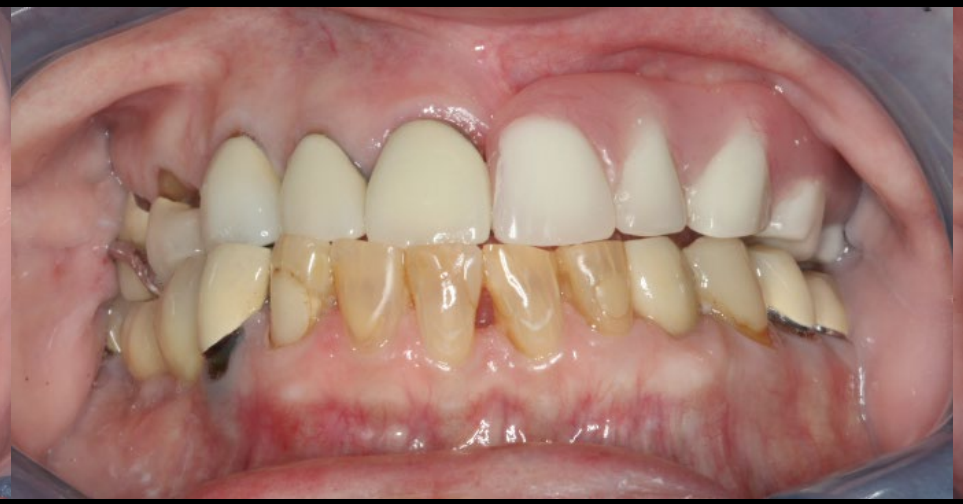
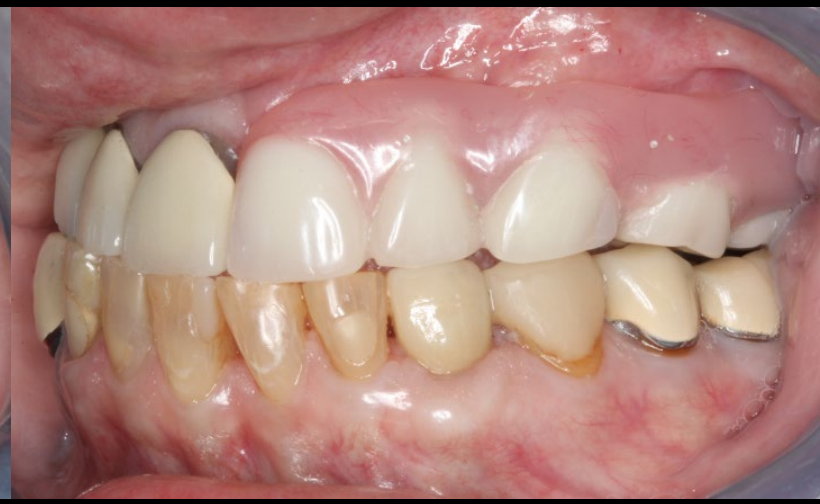
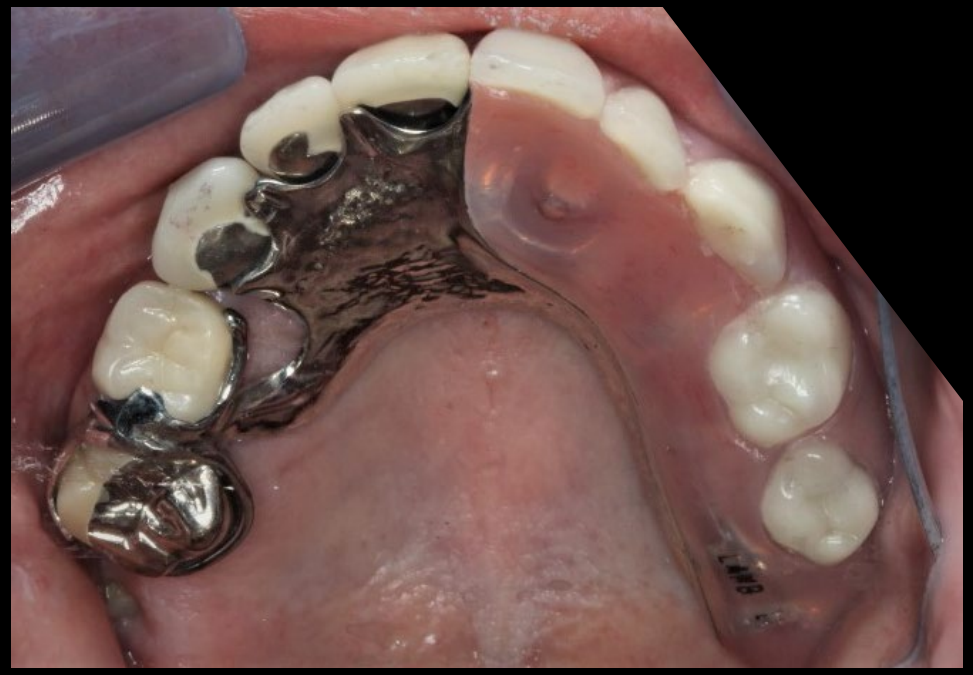
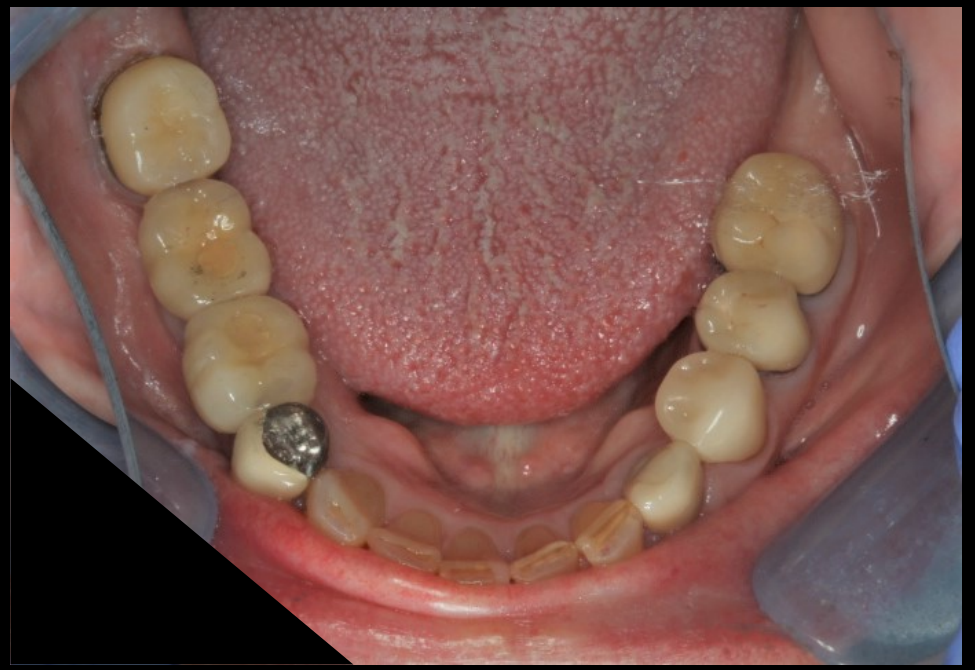
Tokuyama Rebase material used to pick up metal housing
Isolite rings and oro-seal to block out undercuts beneath metal housing

Maxillary Partial Overdenture Delivery



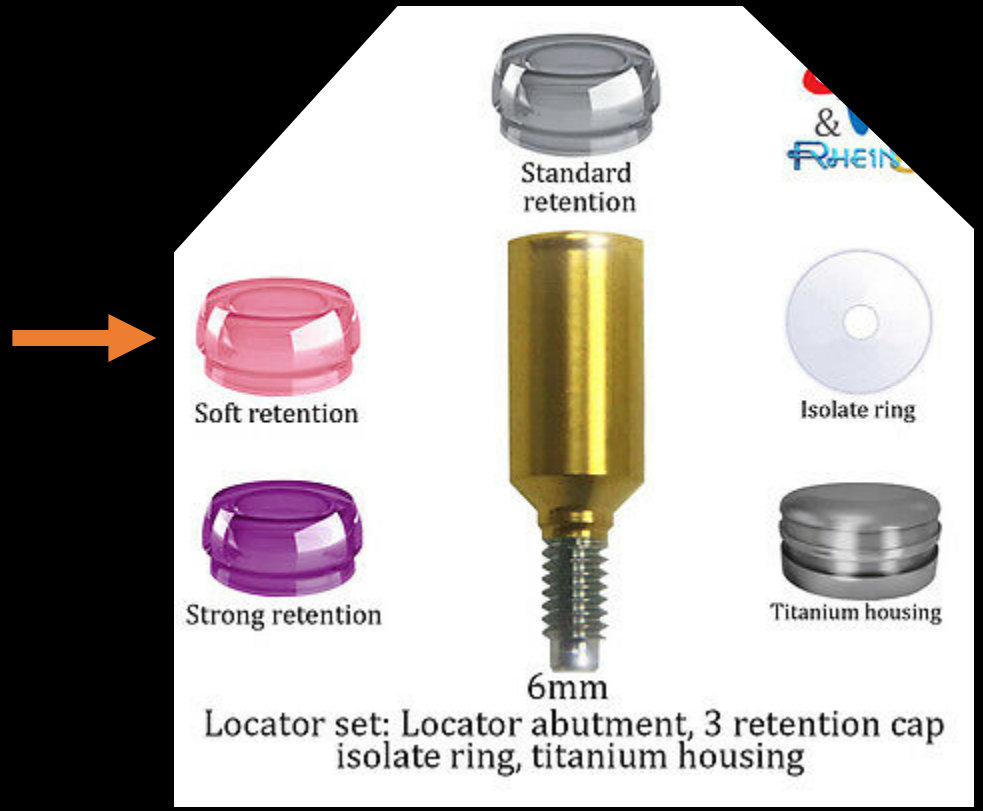




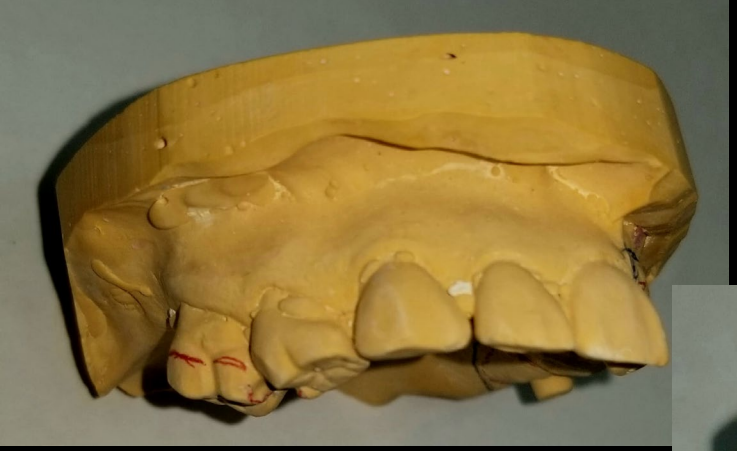
Allowing the Pt to Practice Removal/Insertion

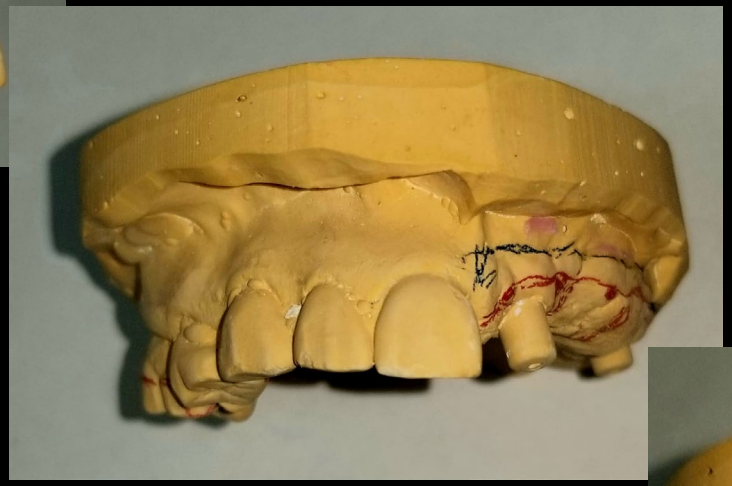
Next Visit: Post-Op and replacement of metal housing with soft retention (pink) cap

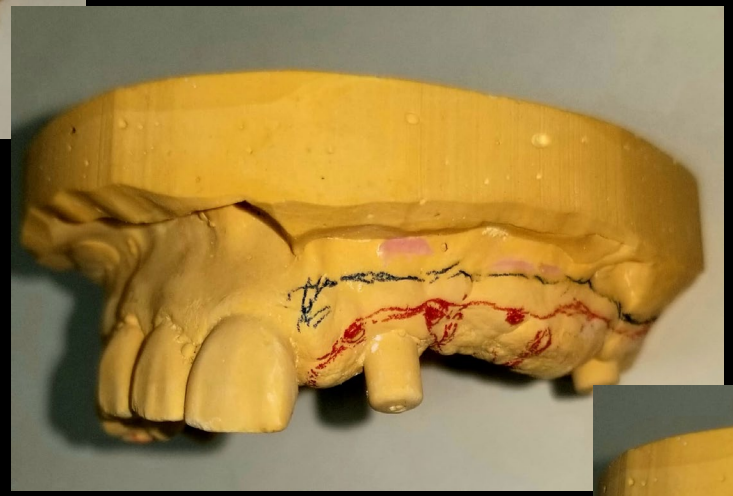


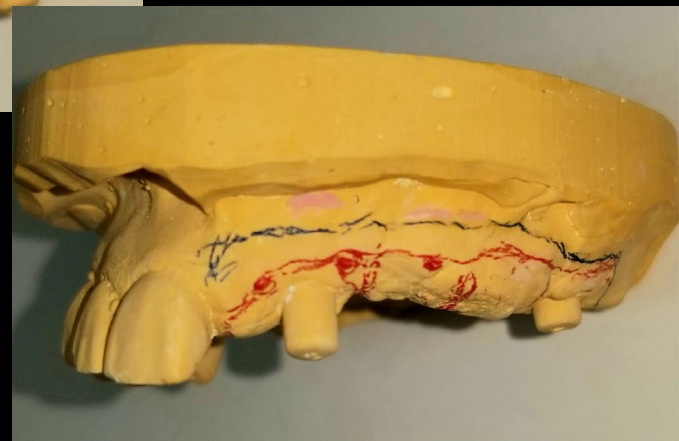
References

- Dr. Nattestad's Lecture, "Common Medical Conditions and Prescribed Drugs"
- [1]Mijiritsky E, Lorean A, Mazor Z, Levin L. Implant Tooth-Supported Removable Partial Denture with at Least 15-Year Long-Term Follow-Up. Clin Implant Dent Relat Res. 2015 Oct;17(5):917-22. doi: 10.1111/cid.12190. Epub 2013 Dec 27. PMID: 24373248.
- [2]Campos CH, Gonçalves TM, Garcia RC. Implant-Supported Removable Partial Denture Improves the Quality of Life of Patients with Extreme Tooth Loss. Braz Dent J. 2015 Oct;26(5):463-7. doi: 10.1590/0103-6440201300097. PMID: 26647929.
- [3]Carpentieri J, Greenstein G, Cavallaro J. Hierarchy of restorative space required for different types of dental implant prostheses. J Am Dent Assoc. 2019 Aug;150(8):695-706. doi: 10.1016/j.adaj.2019.04.015. PMID: 31352966.
- [4]Di Francesco F, De Marco G, Sommella A, Lanza A. Splinting vs Not Splinting Four Implants Supporting a Maxillary Overdenture: A Systematic Review. Int J Prosthodont. 2019 Nov/Dec;32(6):509-518. doi: 10.11607/ijp.6333. PMID: 31664267
- [5]Booth M, Tran C, Noble W. Esthetic Clasp Design for Removable Partial Dentures on Premolar Teeth. *The Journal of Multidisciplinary Care: Decisions in Dentistry.* 2019;5(7):36-39









Thank You