

Treatment of Loss of Vertical Dimension – A Case Presentation

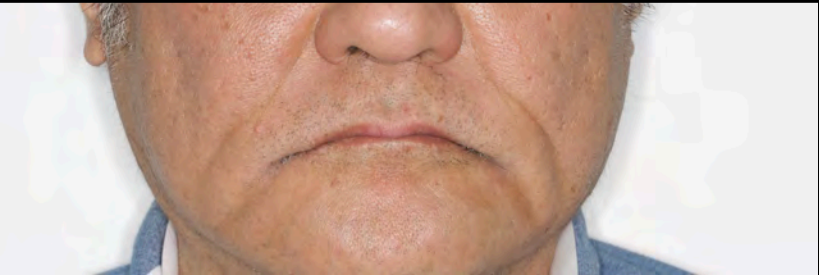
Leah Life

D20268

Patient Information

- 67 yo M
- CC: "My implant broke and I want new implants"
- Med Hx: Type 2 Diabetes, Chronic Kidney Disease, Neuropathies, HTN
- Allergies: Pollen, cats, dogs, jellyfish
- Heavily restored, excessive wear and erosion, implants on #3 and #19, #14 recently extracted due to vertical root fracture
- Bruxism

Pre-op Photos: Extraoral



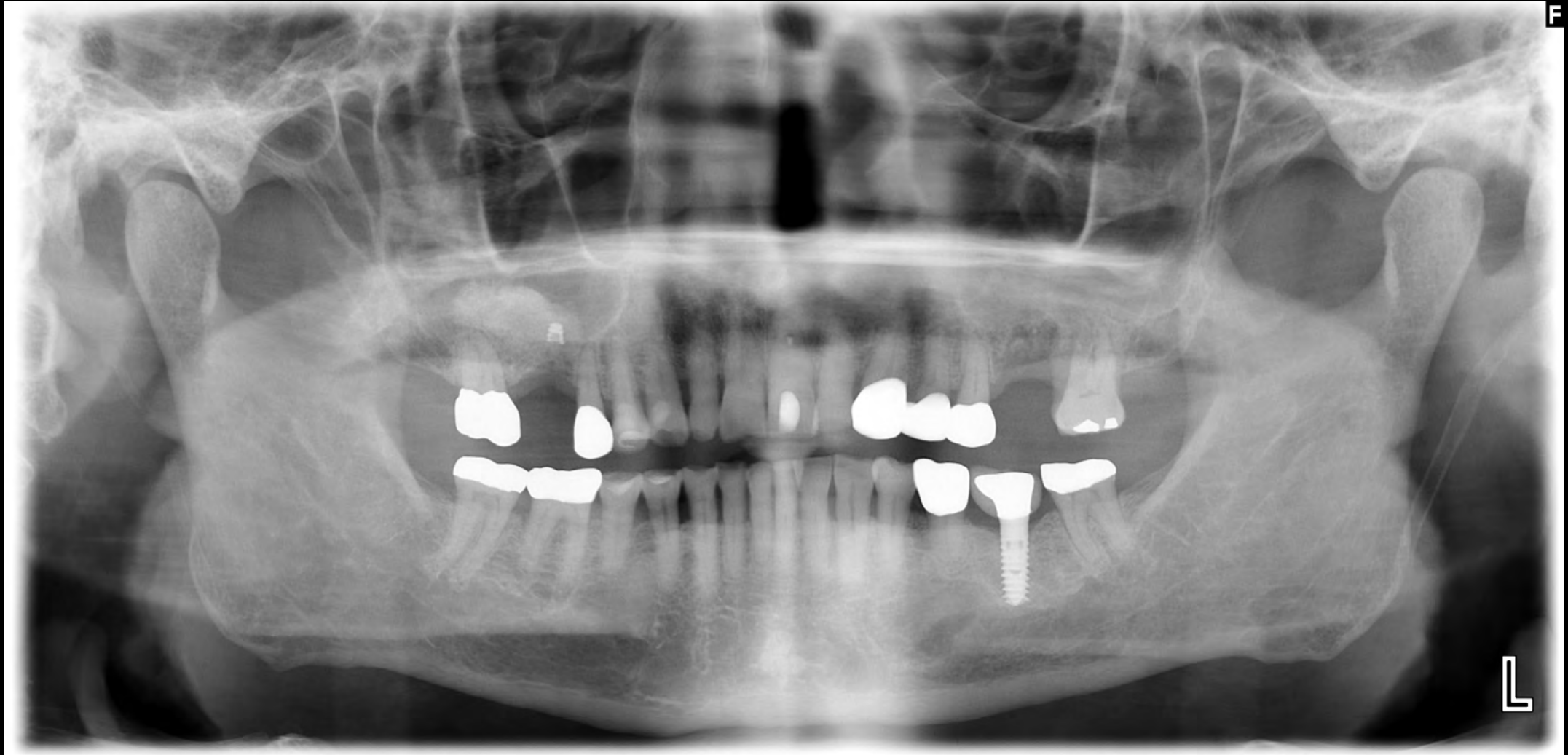
Pre-op Photos: Intraoral



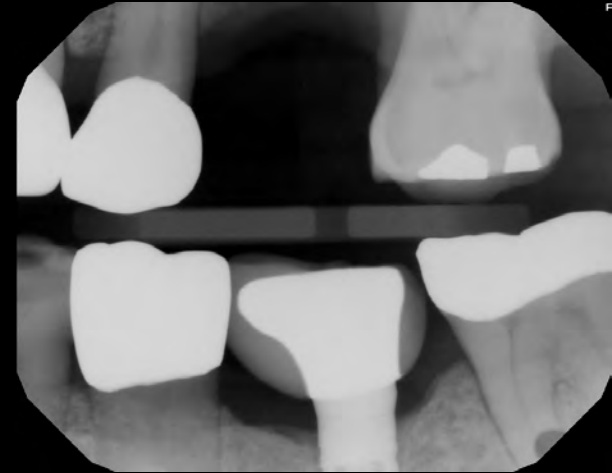
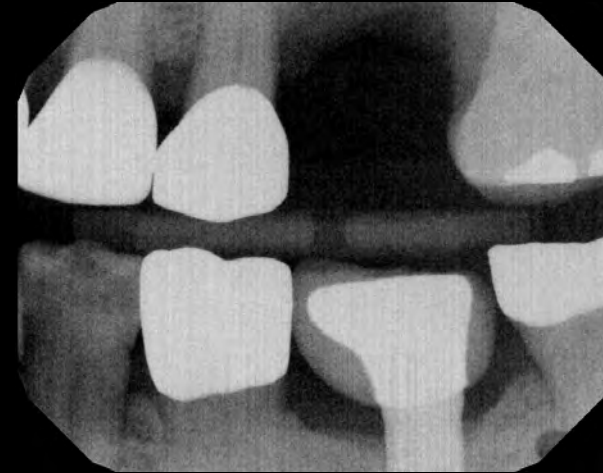
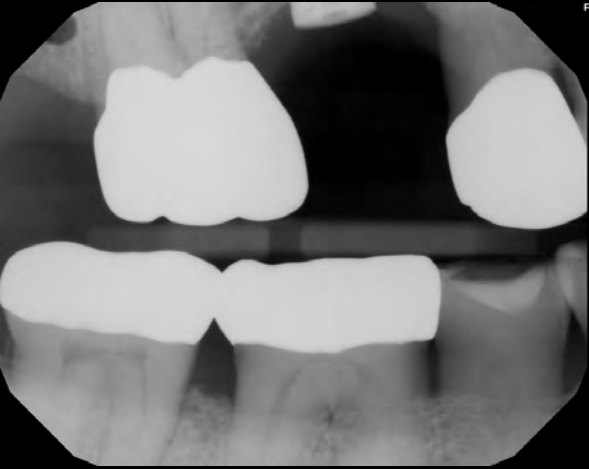
Pre-op Photos: Intraoral



Pre-op Radiographs



Pre-op Radiographs



Implant Placement #3



Before our first exam – this patient was transferred to me from my big to proceed with implant removal at site #3, then subsequent placement at #3 and #14. We did a sinus lift on 14 and implant removal and placement at time of removal on #3 before I did my first recall exam with this patient.

Hard Tissue Charting & CAMBRA

- Missing: 1, 3, 14, 16, 17, 19, 32
- Severe erosion: 5-10, 21-28
- 2: Gold crown
- 3: Implant, buried
- 4: Gold crown
- 5: B comp, O comp
- 6: F comp, leaking restoration
- 7: Peg lateral
- 8: Incisal chip
- 9: Endo access, but no root canal
- 10: Peg lateral
- 11: Zirconia crown
- 12: Zirconia crown
- 13: Gold crown
- 15: O amal, O comp
- 18: Gold crown
- 19: Implant, cemented retained PFM crown
- 20: Gold crown
- 21: B comp
- 22: B comp
- 27: B comp
- 29: O comp
- 30: gold crown
- 31: gold crown

Moderate Caries Risk

ATP: **2360**

Saliva pH: **5.5-6.9**

Etiology of Worn Dentition

Abrasion	Erosion	Attrition
<ul style="list-style-type: none">• Tooth wear by external agents• Examples:<ul style="list-style-type: none">• Toothbrush abrasion on the gingival portion of teeth• Occlusal abrasion via environmental factors or diet	<ul style="list-style-type: none">• “Cupped-out” appearance• Due to acidic diet, medications leading to dry mouth, patients with acid reflux, patients with chronic vomiting	<ul style="list-style-type: none">• Tooth to tooth wear• Flattening or thinning of teeth• Fractured teeth, loss of tooth anatomy

Treatment Plan Options

Ideal Plan

- D0120, D0011, D0012 – Exam, CAMBRA
- D4910 – SPT
- D0160 – Implant consult for #3 and #14
- D6100 – Implant removal #3
- D7953 – Bone graft ridge preserve, site without teeth #3
- D7951 – Sinus augmentation with bone via lateral window #14
- D6010 – Implant placement #3, #14
- D2950 – Core buildup (if needed): 2, 4-13, 15, 18, 20-31
- D2740 – Porcelain ceramic crown: 2, 4-13, 15, 18, 20-31
- D9460II – Osseointegration check
- D6065 – Porcelain implant crown: 3, 14, 19
- D9944 – Occlusal guard
- 4 mo recall, CAMBRA products and protocol

Target: A LOT of appointments, 9 Months

Cost: Approx. \$28,912

No Urgent Care

Disease Control/ Chief Concern

Reconstructive Phase

Maintenance Phase

Option 2

- D0120, D0011, D0012 – Exam, CAMBRA
- D4910 – SPT
- D0160 – Implant consult for #3 and #14
- D6100 – Implant removal for #3
- D7953 – Bone graft ridge preserve, site without teeth
- D7951 – Sinus augmentation with bone via lateral window
- D6010 – Implant placement #3, #14
- D9460II – Osseointegration check
- D6065 – Porcelain implant crown: 3, 14, 19
- D9944 – Occlusal guard
- 4 mo recall, CAMBRA products and protocol

Target: Not AS MANY appointments, 7 Months

Cost: Approx. \$7,290

Other Treatment Plan Options for Rehabilitation

More Conservative Option

- IA Meyers 2013 – Using adhesive restorative materials to avoid causing more harm to unaffected tooth structure
- Not an option for this patient by itself

No Tx

- Monitor and maintain current situation

NOTE: It was during the exam when I realized that there was a bigger problem here than one implant fracturing. He had lost VDO and was having excessive forces on his remaining dentition. If we wanted to move forward to restore his implants, we ideally would need to address the cause of the problem.

Turner Classifications

★ Category 1

- Excessive wear with loss of VDO
- Interocclusal space is greater than 4 mm
- Loss of facial contour and drooping of the corners of the mouth

Category 2

- Excessive wear without loss of VDO, but with space available
- Longer hx of wear
- VDO is maintained by continuous eruption
- Shorter crown length
- Perio surgery may be necessary to create enough restorative space

Category 3

- Excessive wear without loss of VDO, with limited space
- Excessive wear on anterior teeth, minor wear on posteriors
- Interocclusal distance around 2-3 mm
- Restorative space must be obtained

Occlusal Approach

Conformative Approach

- Occlusion is untouched prior to tooth preparation
- OR
- Local, minor occlusal adjustments to eliminate non-working side interferences

★ Reorganized Approach

- New occlusal scheme is established around a suitable condylar position

Indications for Reorganized Approach

- Loss of VDO
- Repeated fracture/failure of previous restorations
- Severe bruxism

Occlusal Schemes

Mutually Protected Occlusion:

★ Stuart and Stallard

- Natural dentition
- AKA canine protected occlusion
- Tripodization in centric
- Anterior teeth protect the posteriors by discluding the posterior on excursive movements
- Posterior teeth protect the anteriors by taking the forces during centric occlusion

Group Function:

The PMS Concept

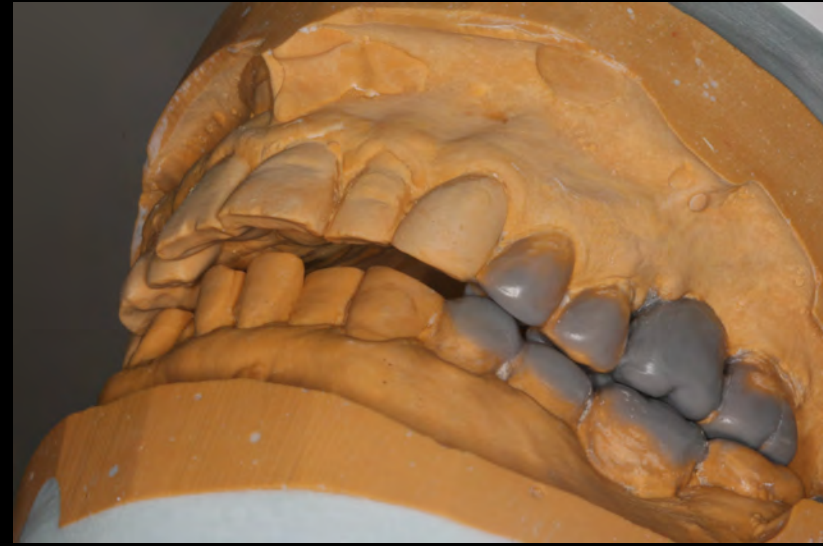
- Natural dentition
- Freedom in centric
- Lateral excursions guided off multiple teeth, such as canines, premolars and molars
- Not recommended in patients with periodontal disease

Balanced Occlusion:

The McCollum Concept

- Complete denture patients

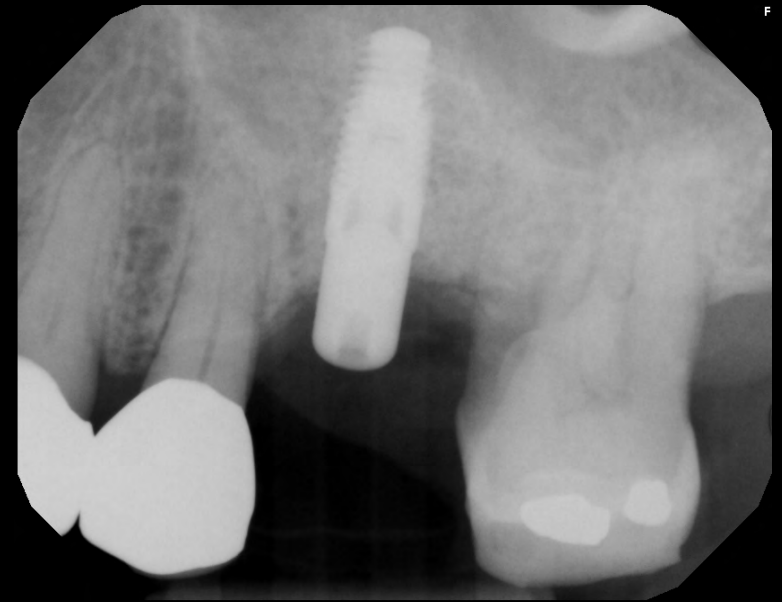
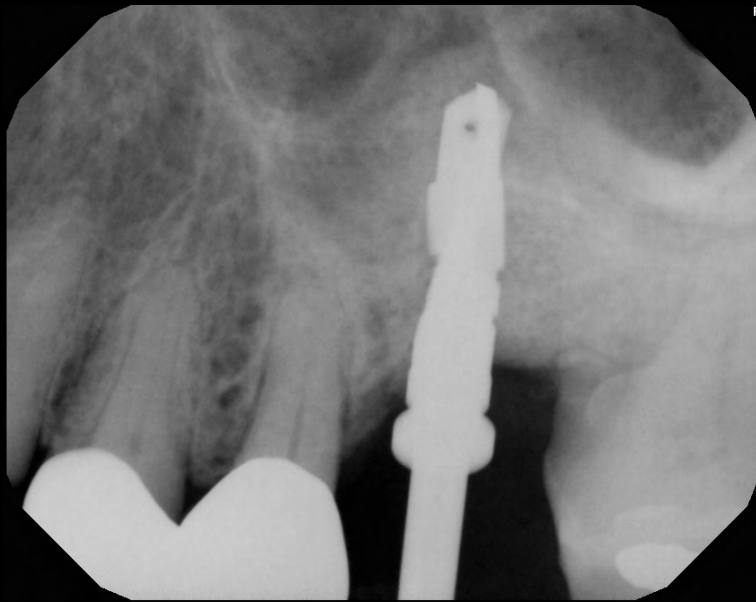
Posterior Wax Ups



Posterior Build Ups



Implant Placement #14



Anterior Wax Ups



Anterior Prep and Temp



So what material do we use?

- Question 1: **Ceramic** or metal?
 - Greater than a 90% success rate over six years
- Question 2: Lithium disilicate or **zirconia**?
 - High translucency zirconia
 - Flexural strength: 500– 900 MPa
- Question 3: **Monolithic** or **layered**?
 - Monolithic in posterior
 - Facial cutback in anterior

Considerations

- Zirconia is more opaque
- Lithium disilicate has more opposing wear on natural teeth and its own substrate in the presence of bruxism
- Biggest problem with zirconia is the chipping of veneered porcelain

Anterior Final Restorations



Anterior Final Restorations

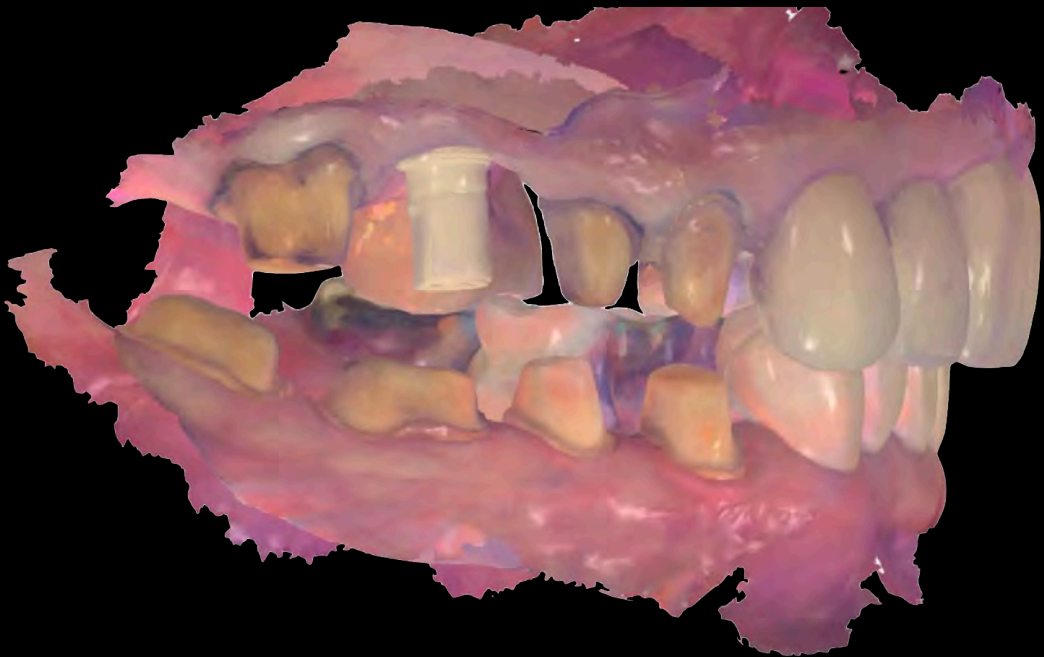
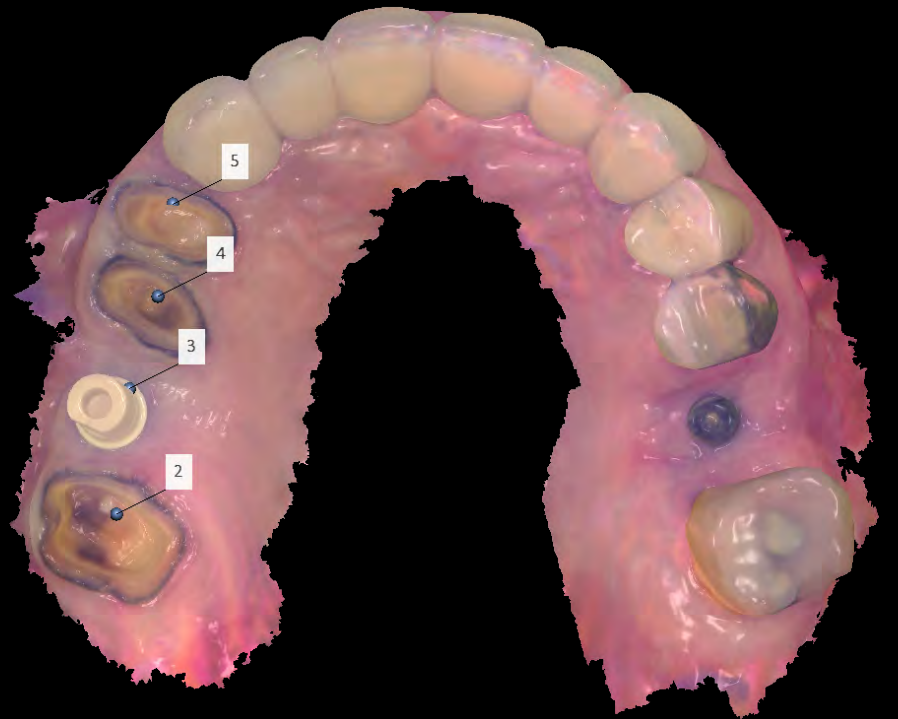


Split Mouth Study

I decided to do a split mouth study with this patient. After I restored the 12 anterior teeth, I had four quadrants remaining: UR, UL, LL, LR. The patient currently had build ups on all posterior teeth and final restorations on all anterior teeth, maintaining his VDO. I decided to restore the UR and LR quadrants digitally and the UL and LL quadrants conventionally. This way, I could compare the two methods.

Split Mouth Study: UR/LR

- Prepared #2, 4, 5, 28, 29, 30 & 31 for full coverage crowns in one appointment (#3 is a screw-retained implant restoration)
- Next appointment: Scanned all eight units for their final restorations and took a prep index to send to the lab for help mounting the case
- Worked with Carlos in the lab to deliver these units fully digital - we scanned them and the lab took it from there to mount the models and fabricate the units
- Tried to eliminate as much human error as possible by having a professional lab tech perform these steps
- Delivery day
 - All four lowers units were delivered without any interproximal reduction needed
 - #3 implant restoration was sent back to the lab to recontour the restoration to help with possible food impaction, but the interproximal contours were all adequate
 - Overall, the restorations in respect to adjacent hard tissue were excellent
 - However, there was a large palatal depression on the soft tissue lingual of #3 that was not picked up by the technician while fabricating the restoration, nor was it expressed by me to the lab to be aware of



Posterior UR/LR Final Restorations



Split Mouth Study: UL/LL

- Prepared 12, 13, 15, 18, 20 and 21 for full coverage crowns (#14 was an implant that needed another month until our osseointegration check and #19 was a previous implant placed at another dental office with a system we do not use)
 - I reached out to the company and they do not even fabricate implant parts for that system anymore. I then removed the old, fractured crown on #19 and lightly prepped the prefabricated abutment to define a margin line for the new cement-retained crown.
- Putty and light body technique to capture the impression for three teeth in the UL and all four units on the LL
 - Prep index with vanilla bite to help mount the models when I received them back from the lab.
- Received the master casts back from the lab and mounted them and sent them back for final restorations
- Delivery day
 - Needed to make more adjustments to the LL quadrant than I did any other quadrant
 - CIMOE 12, 13 and 15 with no adjustments, but the LL required a lot between 18, 19 and 20.
- Based on this split mouth study, there seems to be more accuracy with the completely digital fabrication method. This could be due to the human error I induced during impression or mounting. It seems in my hands that digital may be a better route.

Posterior UL/LL Final Restorations



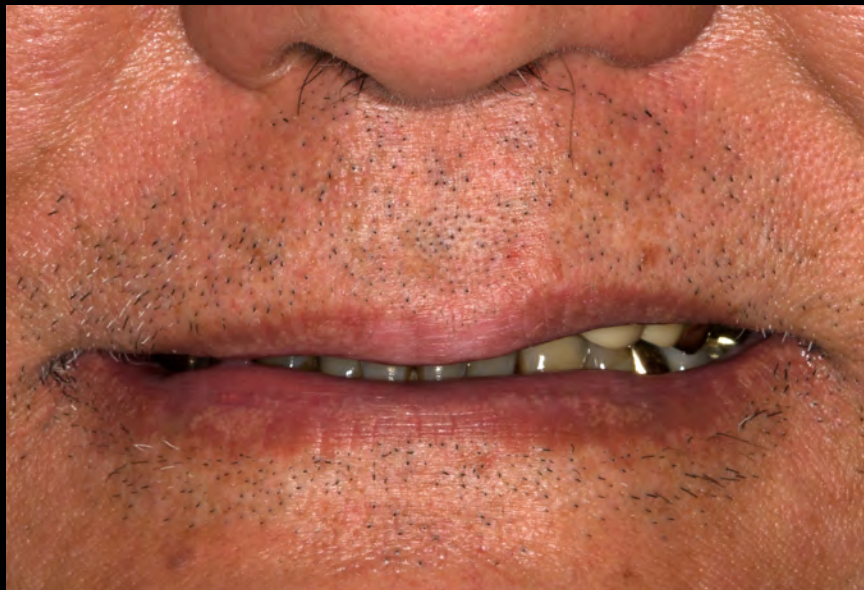
Final Restorations

NOTE: I have delivered every crown but #14 at this point. Was waiting to take final photos, but have not been able to under the current circumstances. The photos on the right are with the temporaries on the left side



Incisal Display

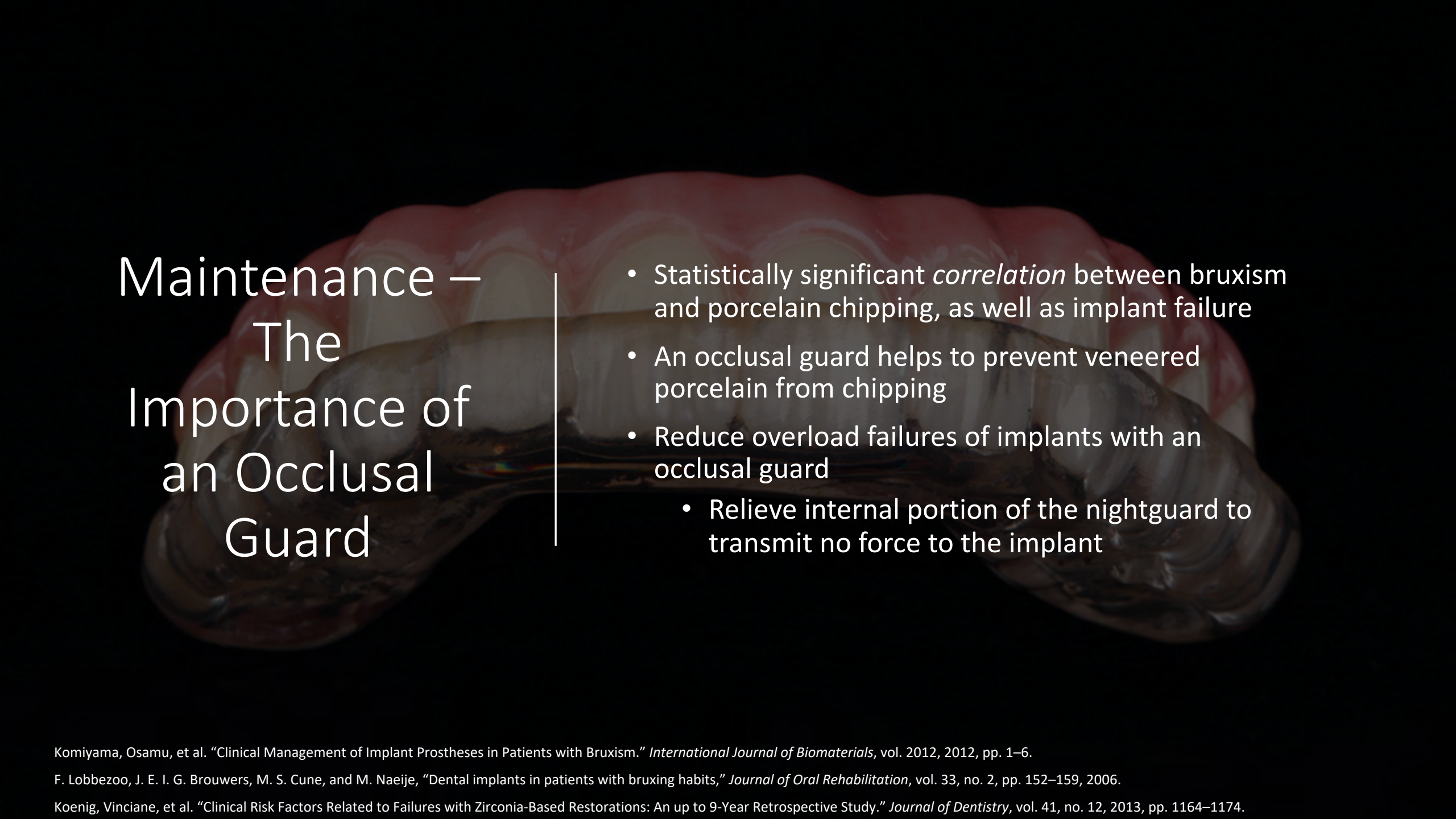
- Spear et al. 2006: Incisal display at 60 yo, on avg. 1 mm



Before



After



Maintenance – The Importance of an Occlusal Guard

- Statistically significant *correlation* between bruxism and porcelain chipping, as well as implant failure
- An occlusal guard helps to prevent veneered porcelain from chipping
- Reduce overload failures of implants with an occlusal guard
 - Relieve internal portion of the nightguard to transmit no force to the implant

Komiyama, Osamu, et al. "Clinical Management of Implant Prostheses in Patients with Bruxism." *International Journal of Biomaterials*, vol. 2012, 2012, pp. 1–6.

F. Lobbezoo, J. E. I. G. Brouwers, M. S. Cune, and M. Naeije, "Dental implants in patients with bruxing habits," *Journal of Oral Rehabilitation*, vol. 33, no. 2, pp. 152–159, 2006.

Koenig, Vinciane, et al. "Clinical Risk Factors Related to Failures with Zirconia-Based Restorations: An up to 9-Year Retrospective Study." *Journal of Dentistry*, vol. 41, no. 12, 2013, pp. 1164–1174.

References

- Meyers, IA. "Minimum Intervention Dentistry and the Management of Tooth Wear in General Practice." *Australian Dental Journal*, vol. 58, 2013, pp. 60–65., doi:10.1111/adj.12050.
- Turner KA, Missirlan DM. Restoration of the extremely worn dentition. *J Prosthet Dent*. 1984;52:467–474. doi: 10.1016/0022-3913(84)90326-3.
- Tiwari, Bhawana, et al. "Occlusal Concepts in Full Mouth Rehabilitation: An Overview." *The Journal of Indian Prosthodontic Society*, vol. 14, no. 4, 2014, pp. 344–351., doi:10.1007/s13191-014-0374-y.
- Miyazaki, Takashi, et al. "Current Status of Zirconia Restoration." *Journal of Prosthodontic Research*, vol. 57, no. 4, Oct. 2013, pp. 236–261.
- Bona, Alvaro Della, and J. Robert Kelly. "The Clinical Success Of All-Ceramic Restorations." *The Journal of the American Dental Association*, vol. 139, Sept. 2008.
- Zarone, F, et al. "Current Status on Lithium Disilicate and Zirconia: a Narrative Review." *BMC Oral Health*, vol. 19, no. 1, July 2019,.
- Spear, Frank M., et al. "Interdisciplinary Management of Anterior Dental Esthetics." *The Journal of the American Dental Association*, vol. 137, no. 2, 2006, pp. 160–169., doi:10.14219/jada.archive.2006.0140.
- Spear, Frank. "A Patient With Severe Wear on the Anterior Teeth and Minimal Wear on the Posterior Teeth." *The Journal of the American Dental Association*, vol. 139, no. 10, 2008, pp. 1399–1403., doi:10.14219/jada.archive.2008.0052.
- Komiyama, Osamu, et al. "Clinical Management of Implant Prostheses in Patients with Bruxism." *International Journal of Biomaterials*, vol. 2012, 2012, pp. 1–6.
- F. Lobbezoo, J. E. I. G. Brouwers, M. S. Cune, and M. Naeije, "Dental implants in patients with bruxing habits," *Journal of Oral Rehabilitation*, vol. 33, no. 2, pp. 152–159, 2006.
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