Fall 2020 Rounds
Treating Patients with Limited VDO

Evidence Based Dentistry Rounds
Specialty: Prosthodontics
Group: 3B-4
11/11/2020

Rounds Team

Group Leader: Dr. Grady

Specialty Leader: Dr. Velasquez

Project Team Leader: Sylvana Blanco

Project Team Participants:

D1: Kiwon Lee

D2: Amin Malaki

D3: Annalise Avers

Patient

- Has been a patient of record since 2011, but left for a period of 8 years, only coming back twice for emergency treatment.
- Came back in 2019 seeking comprehensive care.
- She was assigned to me in June, 2019 and we completed a Comprehensive Exam on July 22, 2019.
- Age: 75
- Gender: Female
- Ethnicity: Caucasian
- CC: “I want to be able to smile again”

Medical History

Condition	Medication
HBP	Lisinopril
High Cholesterol	Pravastatin
COPD/Emphysema	Albuterol sulfate inhaler, PRN
Lupus	Ibuprofen PRN for pain Temazepam - for sleep disturbances due to Fibromyalgia and Lupus
Osteoarthritis	
Fibromyalgia	

Other pertinent Med Hx:

- Severe xerostomia - Pt was on a much longer list of medications in January 2020, but list has since become a lot shorter, by PCP, to reduce xerostomia
- Past smoker

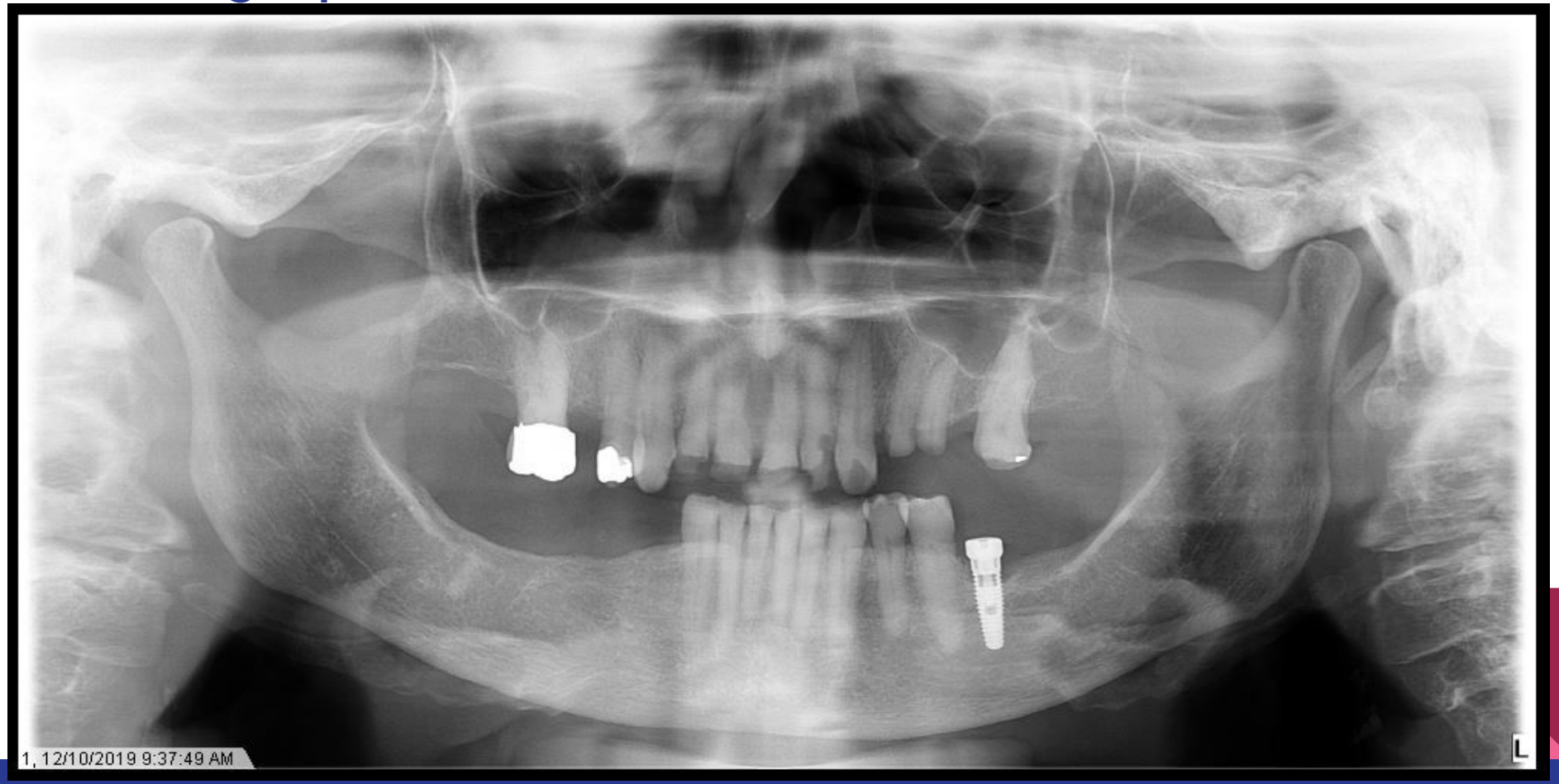
Allergies:

- Cymbalta, Elavil, Sulfonamide antibiotics, Topamax, Vicodin, Vytorin, Zetia, and Gabapentin.

Dental History

- Hx of: EXT’s, restorations, RCT’s, crowns, implant placement, mandibular tori removal
- Dental Problems: Anterior teeth sensitivity, trouble chewing with remaining teeth, caries
- OH: Brushes twice a day, flosses more than once a day
- Esthetic concerns: Unhappy with smile, particularly max anteriors
- CORAH Score: 5, overall relaxed during dental visits

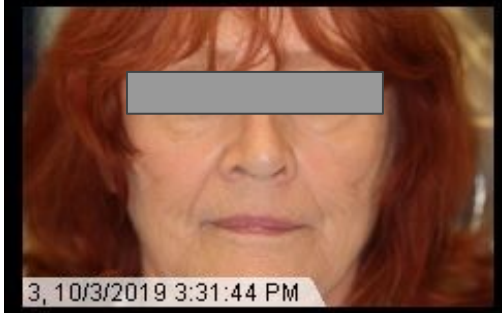
Radiographs

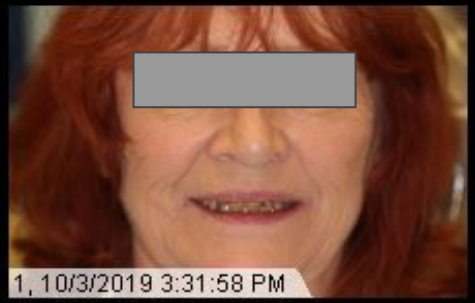


Radiographic Findings

- Teeth #3, 12, 13, 15 have since been extracted
  - #3 and #15: Supra-eruption would limit space for RPD designs, #15 also no longer had a crown and recurrent decay
  - #12 and #13: only root tips were left, deemed non-restorable
- #7-11: Will all be extracted
  - Severe attrition, dentin exposure, sensitivity and compromised esthetics
  - #10 clinical crown was broken off at last appointment
- Bone loss around implant #19
  - The bone loss has been present and not changed much since 2011
  - Was never restored due to finances
  - RPD can be designed around the implant, as per Dr. Ahmed, and can be cleaned with regular maintenance

Clinical Photos





L side

R side

Clinical Photos

Specific Findings

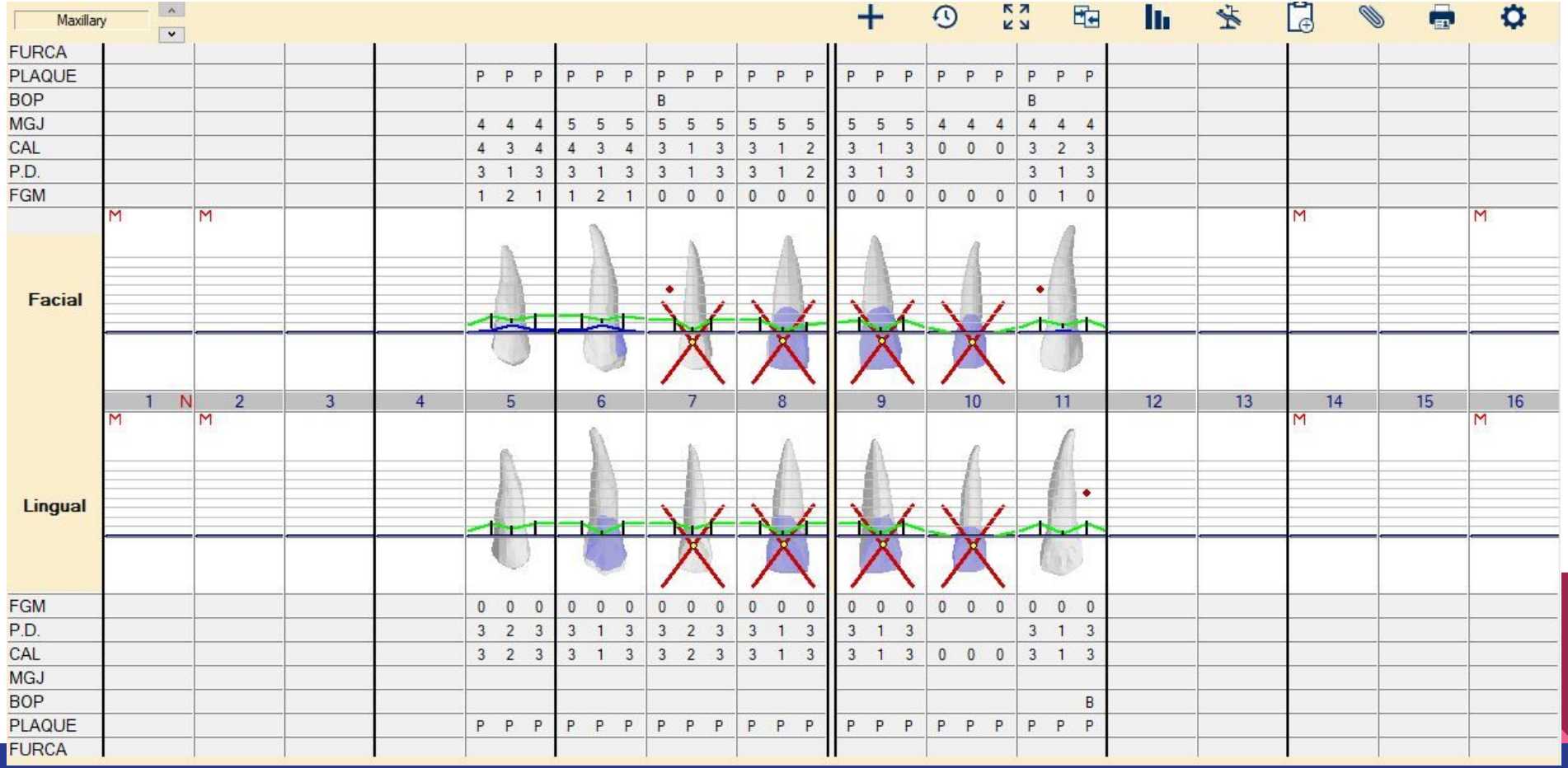
Palatal and Mandibular tori:

- Palatal tori: no need for removal
- Mandidular tori: was removed recently in the OS department

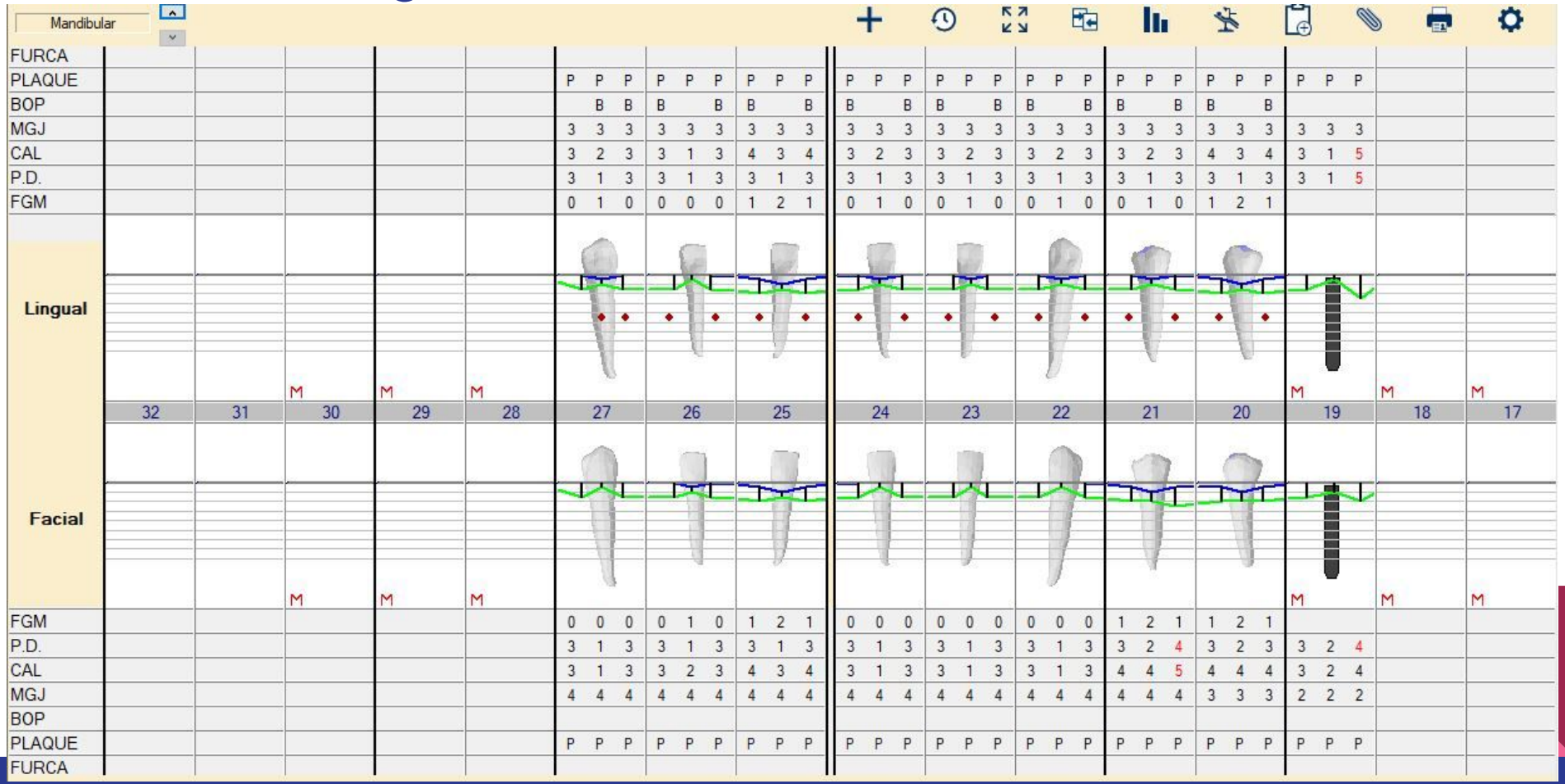
Xerostomia:

- Has improved much, and pt carries with a water bottle at all times
- Fluoride use is important - pt uses Prevident toothpaste

Perio Charting: Maxillary



Perio Charting: Mandibular



Diagnosis

Perio: Early Chronic Periodontitis (10/20/2020)

- Minimal, generalized bone loss
- Localized peri-implantitis that has not changed since 2011, to be maintained with recall

Prosthodontic: Loss of VDO that can be restored by 2.5mm

- Was found clinically with Dr. Imp using tongue depressor as a measuring tool, marking the tip of nose and chin
- Analyzing the patients resting space, speaking space

Problem List

- Caries
- Fractured teeth
- Missing Teeth
- Loss of Vertical Dimension
- Xerostomia (has improved)

D1 Basic Science Question

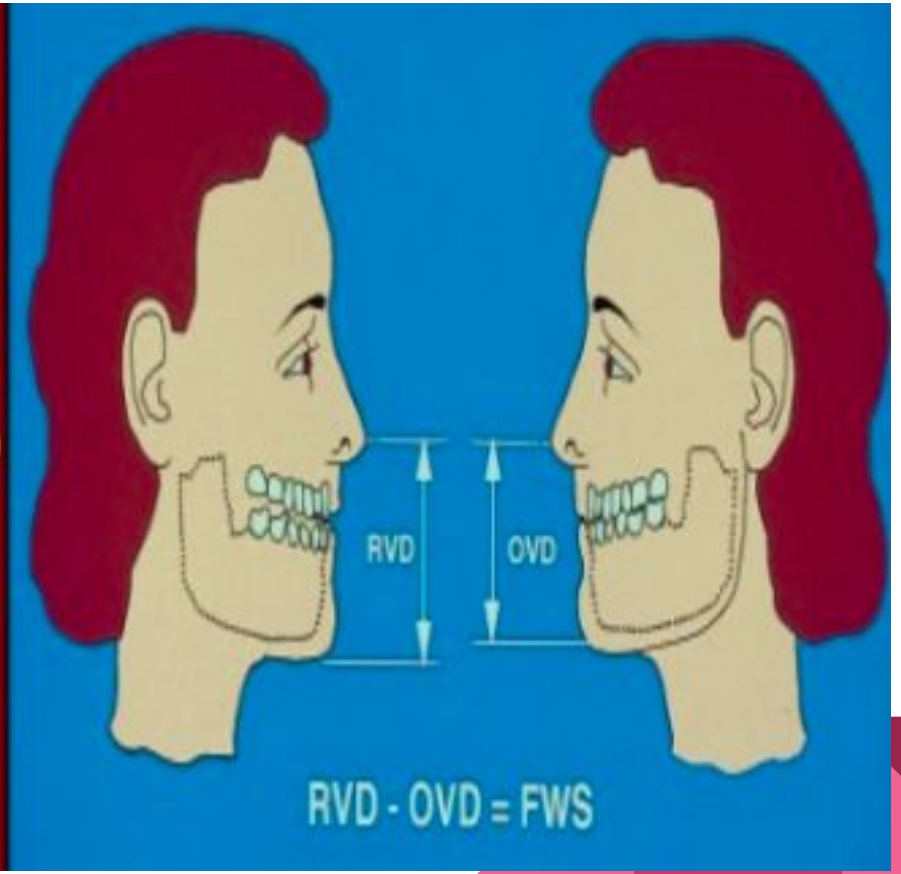
What is VDO?

- Vertical Distance Occlusion (VDO) is measured as the distance between the occluding maxillary and mandibular teeth at maximum intercuspation.
- It is measured from the tip of the nose to the tip of the chin
- Anatomic features, physiologic needs, craniofacial growth, neuromuscular control, and environmental factors contribute in establishing VDO
- The clinical consequences of not properly noting VDO may result in compromised esthetics, diminished masticatory functions, and altered phonetics.

Ref: Vinnakota DN, Kanneganti KC, Pulagam M, Keerthi GK. Determination of vertical dimension of occlusion using lateral profile photographs: A pilot study. *J Indian Prosthodont Soc*. 2016;16(4):323-327. doi:10.4103/0972-4052.176531

D1 Basic Science Question

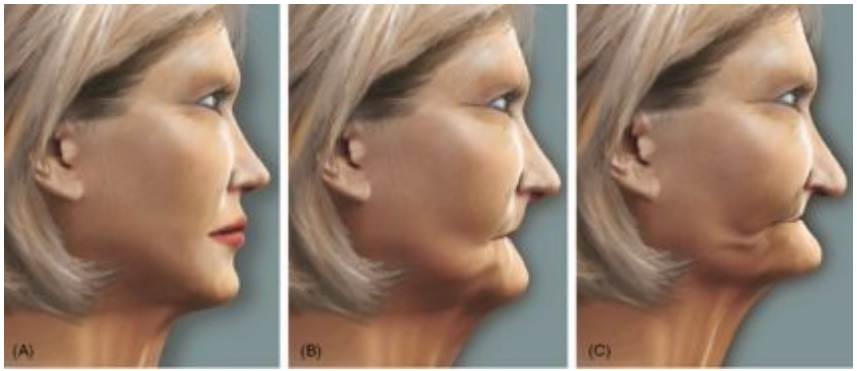
- Vertical dimension at Rest (RVD)
- Vertical dimension at Occlusion (OVD)
- Free Way Space (FWS)

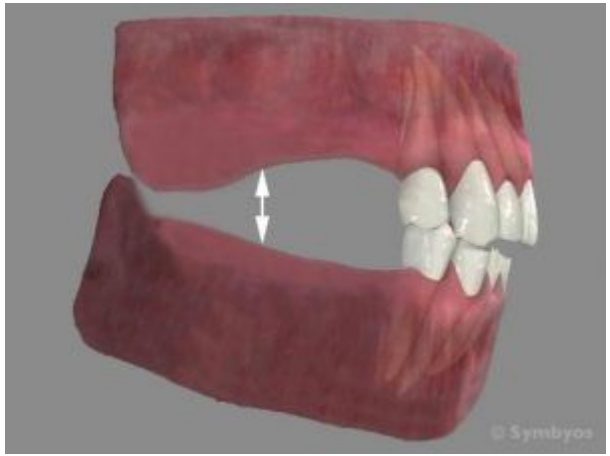


https://www.slideshare.net/UDDent/jaw-relation-new4-4-4

D2 Pathology: Loss of Vertical Dimension of Occlusion

Loss of Posterior Support
Loss of alveolar bone
Wear of Teeth





Amini-Luther, Danielle. *Teeth and Aging*, Amini and Associates, 13 Mar. 2018.

Dahl, Bjorn L, et al. “Occlusal Wear of Teeth and Restorative Materials.” *Taylor & Francis*, 2 July 2009.

Schopper, Arthur F. “Loss of Vertical Dimension: Causes and Effects: Diagnosis and Various Recommended Treatments.” *The Journal of Prosthetic Dentistry*, Mosby Inc., 21 Oct. 2006.

Types of Wear

Erosion chemical wear of teeth such as GERD, Acidic foods

Abrasion wear of teeth by a foreign object such as a toothbrush

Attrition tooth to tooth contact such as bruxism

Verrett, R.G. (2001), Analyzing the etiology of an extremely worn dentition. Journal of Prosthodontics, 10: 224-233.

Kinzer, Greggory. “Options for Determining Vertical Dimension: Part II.” *Spear Review RSS*, Spear, 15 Sept. 2020.

D3 PICO

Clinical Question: What are possible treatment options for patients with limited arch space?

PICO Format

P: Patients with limited interarch space and possible loss of VDO

I: Restoring anterior VDO with crowns

C: Restoring anterior VDO with incisal composite resin

O: Better long term success with crowns

PICO Formatted Question

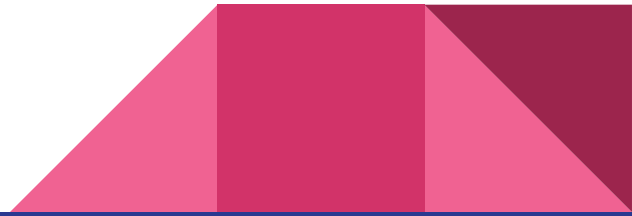
In patients with limited interarch space and possible loss of anterior VDO, is the long term prognosis better with use of crowns as compared to the use of incisal composite restorations?

Search Background

- **Date(s) of Search:** 10/18/20, 11/1/20, 11/2/20
- **Database(s) Used:** PubMed
- **Search Strategy/Keywords:** Anterior restorations, Etiology of tooth wear, Composite resin restorations, Fixed restorations, Occlusal Vertical Dimension, Loss of interocclusal space

Search Background

- **MESH terms used:**
  - Vertical dimension
  - Tooth abrasion
  - Tooth attrition
  - Tooth erosion
  - Crowns
  - Composite resin
  - Dental occlusion
  - Adult
  - Incisor



Article 1:
Restoration of the extremely worn dentition

- **Citation:** Turner, K. A., & Missirlian, D. M. (1984). Restoration of the extremely worn dentition. *The Journal of prosthetic dentistry*, *52*(4), 467–474. https://doi.org/10.1016/0022-3913(84)90326-3
- **Study Design:** A Review
- **Study Need/Purpose:**
  - To look at different restorative strategies in patients with worn dentition
  - Categorizing patients and establishing the best treatment rationale

Article 1 Summary

- Tooth wear is multifactorial; most often attributed to attrition
- Problems/concerns with increased OVD:
  - Symptoms of clenching teeth, muscle fatigue, soreness of teeth/muscles/joints, headaches, and continued tooth wear
- Loss of posterior support is the most common cause of decreased OVD
- Tooth wear is typically a gradual process, over the course of many years and generally compensated by continuous eruption
- 3 categories → and possible treatment options

Article 1 Summary Continued

Category 1	Category 2	Category 3
Excessive wear with loss of OVD	Excessive wear without loss of OVD but with space available	Excessive wear without loss of OVD but limited space

Article 1 Synopsis

- Conclusions:
  - Restorations of extremely worn dentition is a challenge for dentists
  - There is no one treatment plan for patients who present with anterior worn dentition
  - Need to carefully evaluate all the factors present (etiology, history, etc.)
    - Important to determine the main etiology of the worn dentition
  - There are various modalities that are successful in treating these patients
- Limitations:
  - No actual clinical trials used in this review
  - There may not be a ‘perfect’ fit for all patients to fall into one of the three categories

Article 1 Selection

- Reason for selection:
  - Clinically relevant to the patient, who presents with an extremely worn anterior dentition
  - Considerations for treatment of extremely worn dentition with rationale
- Applicability to your pt:
  - Patient would fall under category one due to -
    - Loss of posterior teeth (unstable posterior occlusion) with extremely worn anterior dentition
- Implications
  - Regardless of which restorative technique is used to restore the anterior dentition, trial restorations will be important when changing the VDO
  - Need to give patient time to adjust and find a certain level of comfort before any final restorations are placed

Article 2:
Identification and management of tooth wear

- **Citation:** Johansson, A., & Omar, R. (1994). Identification and management of tooth wear. *The International journal of prosthodontics*, *7*(6), 506–516.
- **Study Design:** A Review
- **Study Need/Purpose:**
  - Process of identifying tooth wear and clinical considerations
  - Identification of main source of tooth wear and its ability to affect restorative options

Article 2 Summary

- Progressive tooth wear is multifactorial
- Tooth wear more commonly seen in anterior teeth compared to posterior
- Important during clinical exam to:
  - Analysis of static and dynamic occlusal relationships (TMD should also be analyzed)
  - Salivary analysis
- Once you have a differential diagnosis, treatment planning can begin
- Treatment is focused initially on *eliminating the main etiologic factors* of tooth wear for the patient
- When esthetics or function are substantially compromised, prosthodontic therapy is indicated
- Fixed restorations should be designed as single units when possible & should be of minimal extension

Article 2 Synopsis

- **Conclusions:**
  - Management should be first directed toward elimination of etiologic factors
  - Important to have a complete clinical examination to narrow in on a differential diagnosis
  - Regardless of restorative decision, regular recall of these patients is essential
- **Limitations:**
  - Patient is not a bruxer, but because of posterior tooth loss → anterior teeth have been compromised

Article 2 Selection

- Reason for selection:
  - Important to identify the main cause of tooth wear prior to initiating treatment
  - Diagnosis and proper treatment planning will help improve the effectiveness of preventive and restorative care
- Applicability to your pt:
  - “Increasing the vertical dimension is only necessary for patients in whom interocclusal space problems or esthetic considerations are critical”
- Implications:
  - Treatment needs to be focused on the source of the issue

Article 3:

Tooth wear treated with direct composite restorations at an increased vertical dimension: Results at 30 months

- **Citation:** Hemmings, K. W., Darbar, U. R., & Vaughan, S. (2000). Tooth wear treated with direct composite restorations at an increased vertical dimension: results at 30 months. *The Journal of prosthetic dentistry*, *83*(3), 287–293. https://doi.org/10.1016/s0022-3913(00)70130-2
- **Study Design:** Individual Cohort Study
- **Study Need/Purpose:**
  - Direct composite restorations are being considered for our patient
  - The purpose is to look at 2 different types of composite used with their respective bonding agents and analyze levels of success

Article 3 Summary

Method: 30-month prospective clinical trial using direct composite restorations for the treatment of localized anterior tooth wear

- **Group A =** restored with Durafill composite and scotchbond multipurpose dentine adhesive system
- **Group B =** Herculite XRV composite and Optibond dentine bonding agent
- Specific Inclusion Criteria
  - 1. Tooth wear localized to max/mand anterior teeth with loss of interocclusal space
  - 2. At least 4 teeth were in need of restorations
  - 3. Tooth wear was clinically significant with dentine exposure, usually with a reduction in crown height
  - 4. Patients had intact dentitions with no fixed partial/removable dentures
  - 5. Stable periodontal conditions, good oral hygiene, no probing depths over 3 mm

Article 3 Summary Continued

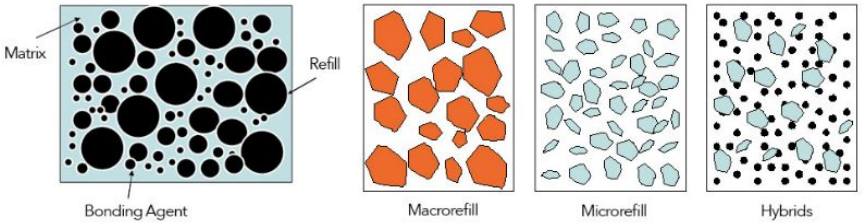
- Results:
  - Success/failure was documented with any adverse event affecting the restoration
    - Fracture, marginal discoloration, loss of marginal integrity, noticeable wear, pain/sensitivity, endodontic failure, and esthetic failure

Table III. Table showing mode of failure and action taken after failure. In group B, 2 failures were not repaired as they were clinically insignificant

Group	Fracture	Stain	Lost	(Repair)	(Replace)	Total failures
A	18	10	5	(24)	(9)	33
B	2	2	2	(2)	(2)	6

Article 3 Synopsis

- **Conclusions:**
  - Hybrid composites were shown to perform better than the microfilled composites
    - Durafill = microfiller
    - Herculite XRV = microhybrid
  - Direct composite restorations placed at an increased OVD can provide short term restorative solutions with localized anterior tooth wear
  - With repeated failure, one patient was given 6 anterior PFM crowns
- **Limitations:**
  - Time of the study (only 30 months)
  - Limited number of patients (16)
  - Patient has slight perio involvement and will have an RPD (does not fit into criteria)



https://www.dentaltix.com/en/blog/dental-composites-frequently-asked-questions

Article 3 Selection

- Reason for selection:
  - Patient would prefer cost-effective method (financial limitation)
  - This method is considered a good possible treatment option for patient
- Applicability to your pt:
  - This ‘temporary’ treatment option is being highly considered
  - Want to preserve as much remaining tooth structure (more conservative)
- Implications:
  - Composite resin restorations can be used to restore anterior worn dentition → they have proven to be successful
  - This is also a good trial restoration to see if the change in VDO is accepted by the patient
  - If necessary, can choose to do crowns in the future

Levels of Evidence

☐ **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)

☐ **1b** – Individual RCT

☐ **2a** – Systematic Review of Cohort Studies

☒ **2b** – Individual Cohort Study

☐ **3** – Cross-sectional Studies, Ecologic Studies, "Outcomes" Research

☐ **4a** – Systematic Review of Case Control Studies

☐ **4b** – Individual Case Control Study

☐ **5** – Case Series, Case Reports

☒ **6** – Expert Opinion without explicit critical appraisal, Narrative Review

☐ **7** – Animal Research

☐ **8** – In Vitro Research

Strength of Recommendation Taxonomy (SORT)

☐	**A** – Consistent, good quality patient oriented evidence
☒	**B** – Inconsistent or limited quality patient oriented evidence
☐	**C** – Consensus, disease oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening

Clinical Bottom Line

- Although evidence and clinical trials remain limited, there are advantages and indications for both crowns and incisal composite restorations
- Any time you alter a patient's occlusal vertical dimension, it is important to allow the patient to have trial restorations to assess level of comfort and acceptance
- Based on the main etiology of tooth wear there may be limited clinical crowns remaining (height), thus, requiring more extensive periodontal surgery in order to properly restore these teeth with crowns
    - Fixed crowns, although may be more favorable long term, they are much more invasive, expensive, and complex in treatment of anterior worn dentition
- Composite restorations are a more conservative and cost effective approach

Conclusions: D3

How does the evidence apply to this patient?

Consider/Weigh:

- Literature
- Group leader and Specialist experience
- Pt circumstances and preferences

Based on the above considerations, how will you advise your D4?

Conclusions: D4

How will I advise my patient towards the next steps in her treatment?

- The plan is to restore edentulous spans with a **Removable Partial Denture**. Replacing the edentulous areas with the RPD will play the largest role in establishing the **new VDO of 2.5mm**.
- Once 7-11 are extracted, in replacing these teeth with the RPD, creating an anterior open bite would be beneficial. Teeth **#5 and #11** will have **survey crowns**, which is the next step in this pt's treatment plan.
- Then, the lower anterior teeth would be restored with direct composite resin
- This would prevent anterior tooth wear and create bilateral balanced contacts → reducing anterior tooth contact and thus, prevent fracture and continued wear
- Because we are establishing a new VDO, it is important to make the patient an **interim RPD** -- this is important, as the articles showed: need patient acceptance whenever you alter the vertical dimension of occlusion
- Want to start with a more conservative approach and see if the patient accepts and the restorations are successful

If in the future, the direct composite restorations are unsuccessful → **crowns can be considered**

- Need to look at clinical crown height
- Might require surgery

Discussion Questions

1. Is wear resistance a factor when determining if crowns or composites are a better choice?
2. Is there a certain age where it is important to look out for loss of VDO and/or any prevention for this loss?
3. Do pts w/ excessive VDO loss corrected need to modify the way they eat, much like denture patients?
4. Does a loss in VDO increase the risk of a pt developing TMD?
5. How long should provisionals be used?
6. Correlation between diminished VDO and wear facets?
7. Are there any methods to help the patient stop bruxing, other than mouthguards?
8. What tx options would be available to restore the patient's posterior VDO? Ideal? Efficient?
9. Can VDO limit a patient's diet, how?

Thank you!