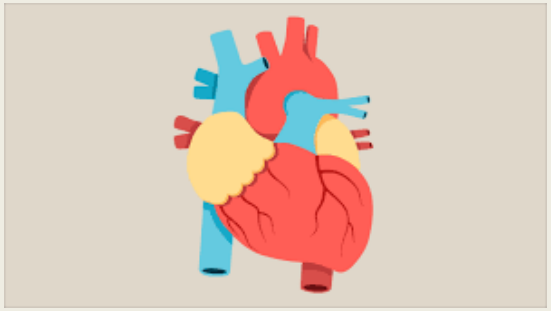
CALCIUM CHANNEL BLOCKERS VS. PERIO HEALTH

EVIDENCE BASED DENTISTRY ROUNDS
PHARMACOLOGY/ ORAL MEDICINE
6A-3

JUSTYNA CHOJNOWSKI, CHRIS COULTER, DEVON BLOB, AND GRIGORY TOKAREV



9/30/2020

Rounds Team

- Group Leader: Dr. Cimrmancic
- Specialty Leader: Dr. Khaled
- Project Team Leader: Justyna Chojnowski (D4)
- Project Team Participants:
  - *Christopher Coulter (D3)*
  - *Devon Blob (D2)*
  - *Grigory Tokarev (D1)*

Patient: NLM

- 74-year-old
- Female
- Caucasian
- Chief Complaint: “I want to get my teeth taken care of, because I can’t take it anymore.”
- Pt had a fall in December of 2019 and damaged maxillary anterior teeth. → had multiple consults to decide on best course of treatment

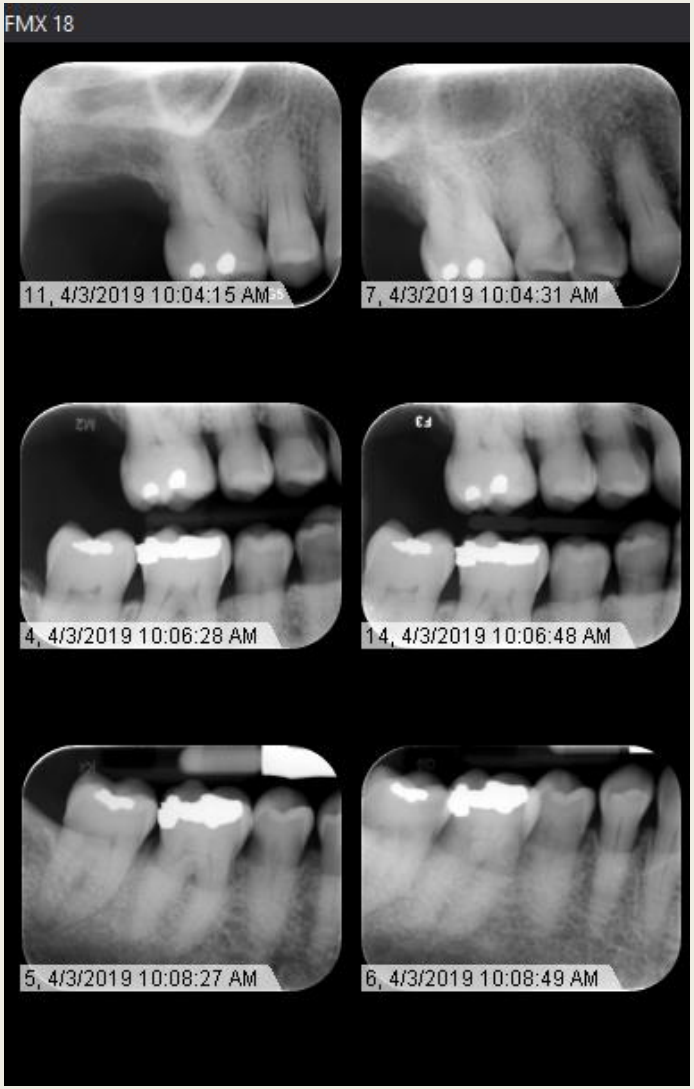
Medical History

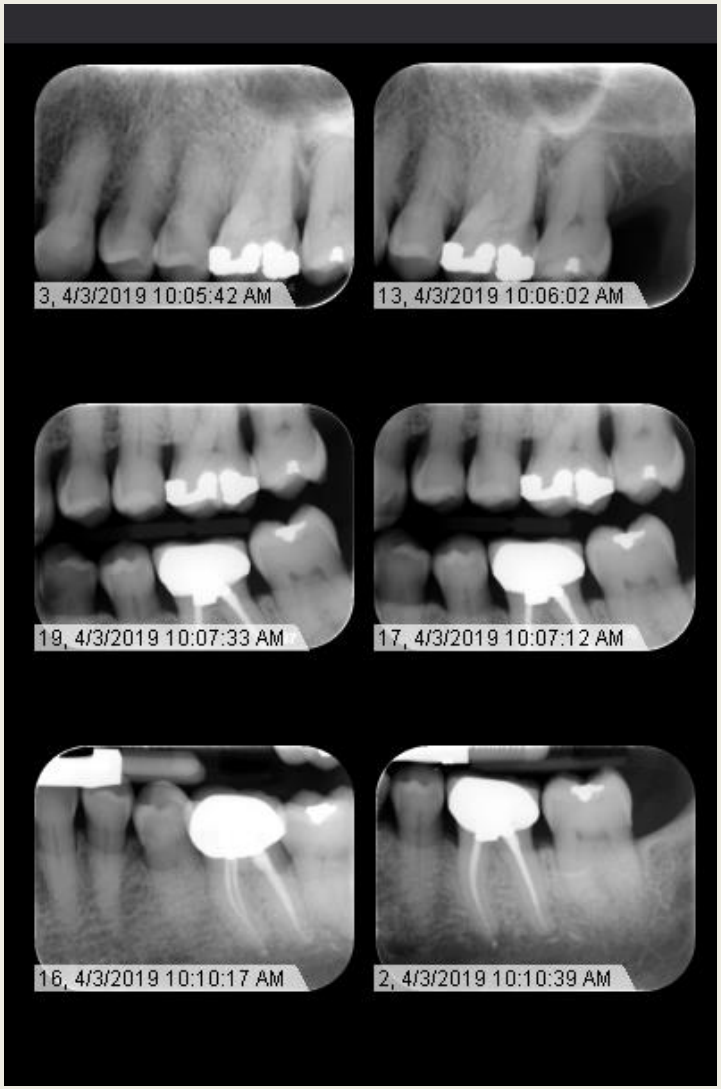
- Current & past:
  - *Conditions: high blood pressure, cardiac arrhythmia (paroxysmal a fib), hypothyroidism, Stage III renal insufficiency, total left hip replacement in 2015*
  - *Medications: aspirin, lisinopril, cholecalciferol, amiodarone, levothyroxine, amlodipine, refresh ophthalmic solution*
  - *Allergies: codeine*
  - *Medical Consults*
    - Consult sent out in May 2019 – no premed needed for hip replacement done in 2015 (longer than 2 years post-op)
  - *Treatment considerations*
    - Pt is taking calcium channel blocker → gingival hyperplasia → esthetics/oral hygiene of anterior bridge planned?

Dental History

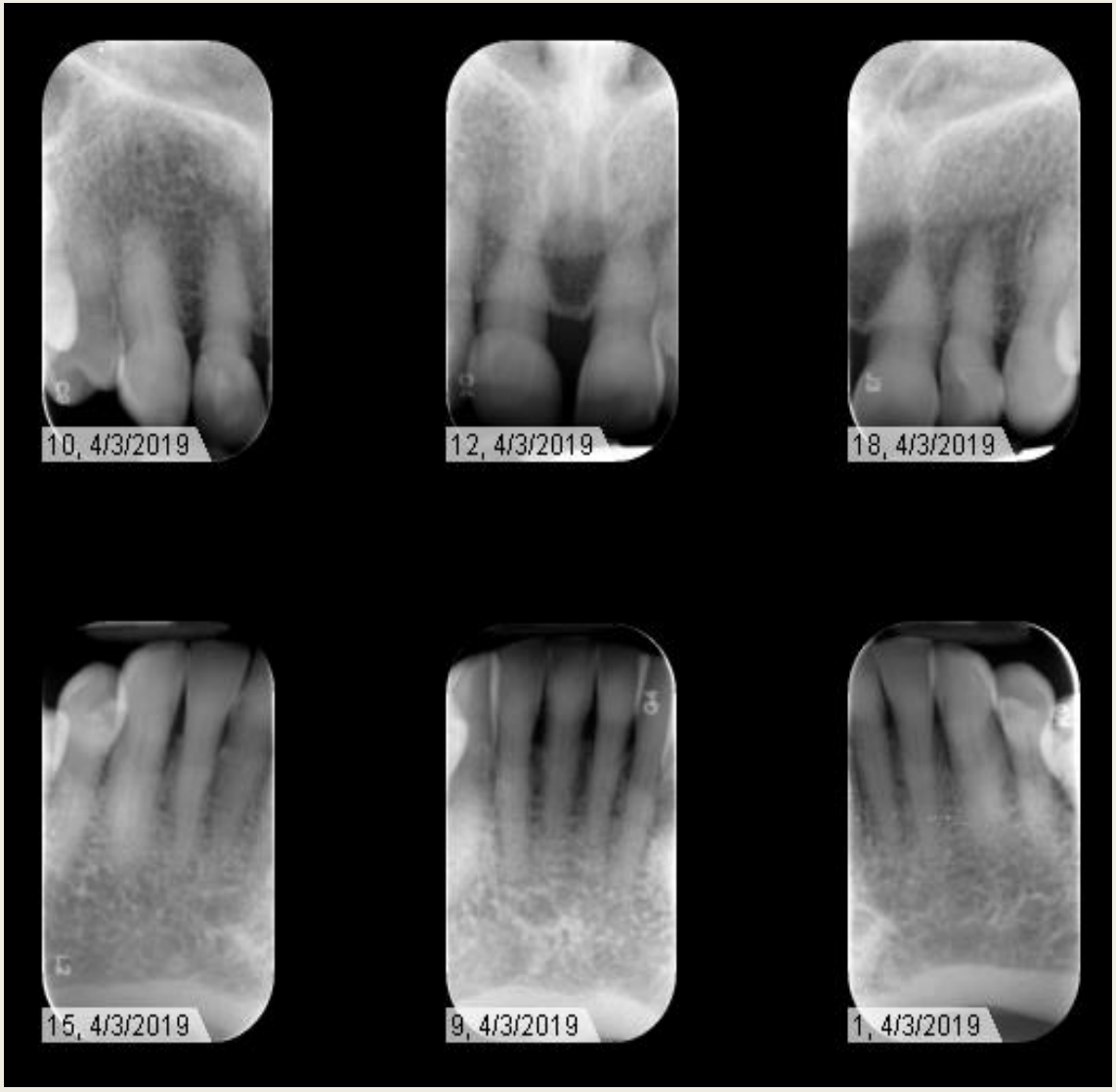
- History of extractions, root canal, and crowns; future crown planned (FCC on #30)
- Fixed prosthodontic work: anterior bridge spanning from #6-11
- Pt brushes twice a day and flosses once a day. Pt uses an electric toothbrush and utilizes a water pick

Radiographs: FMX

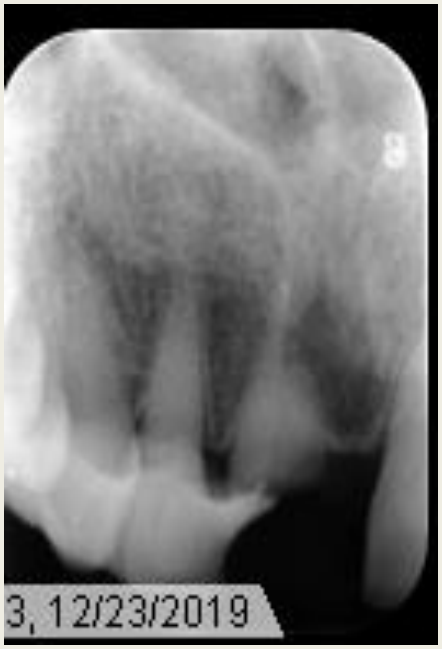


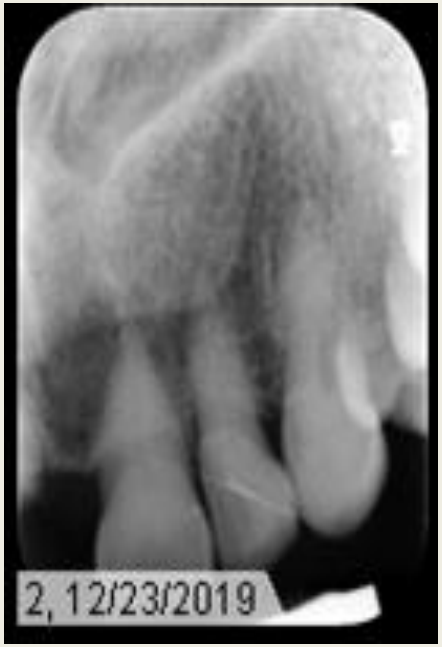


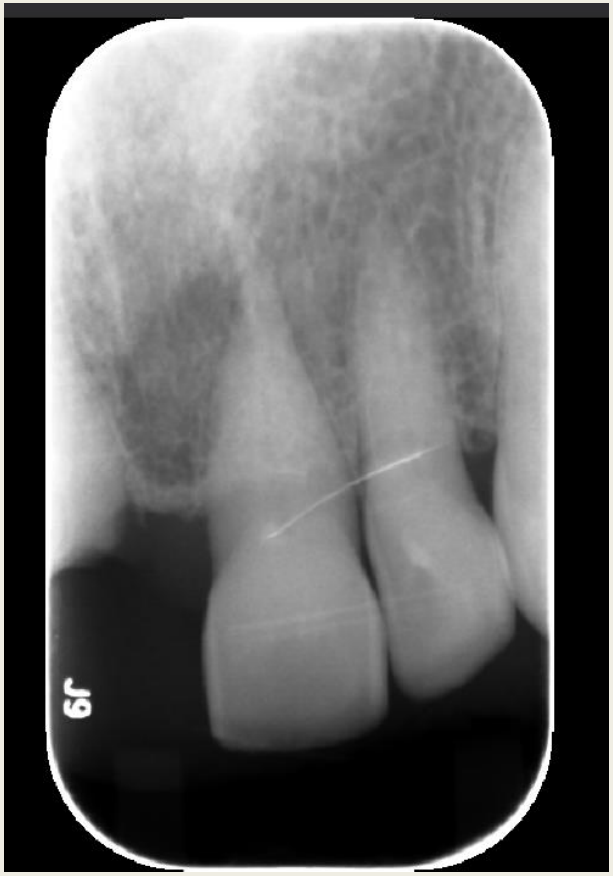
Radiographs: FMX (SPRING 2019)

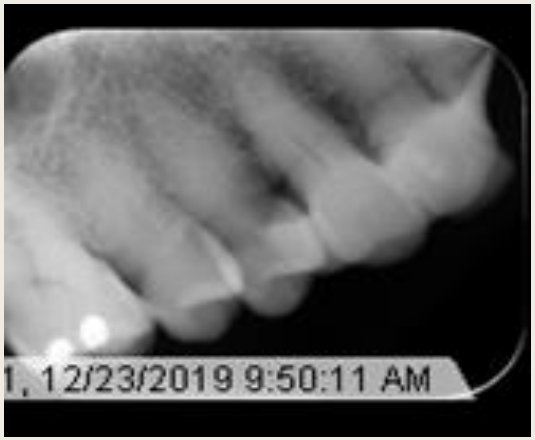


Radiographs – Winter 19-20





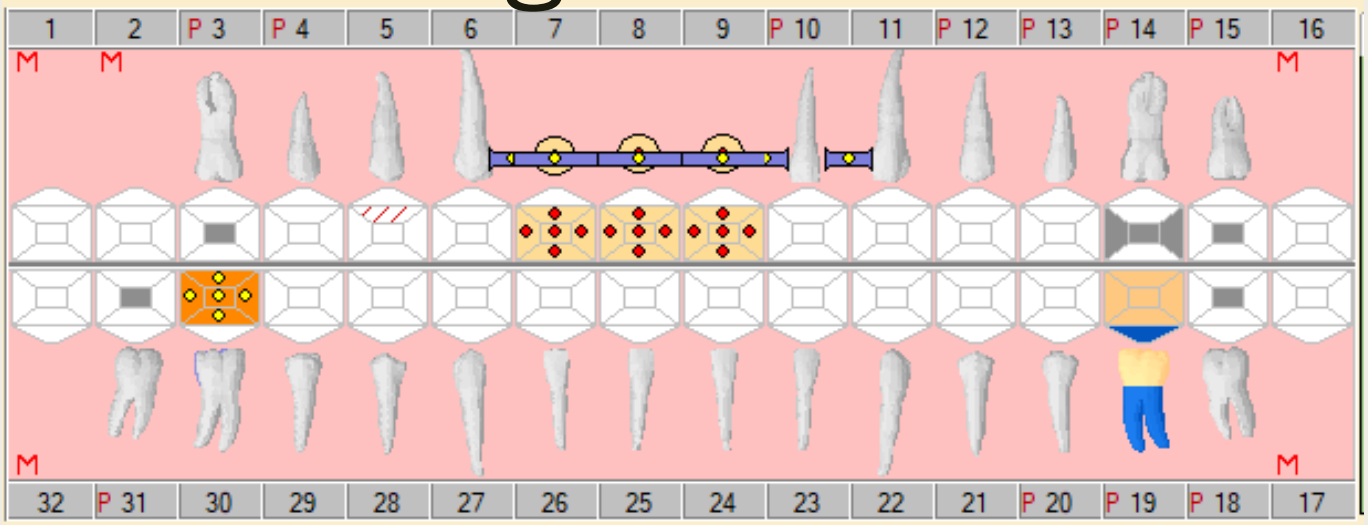




Radiographic Findings

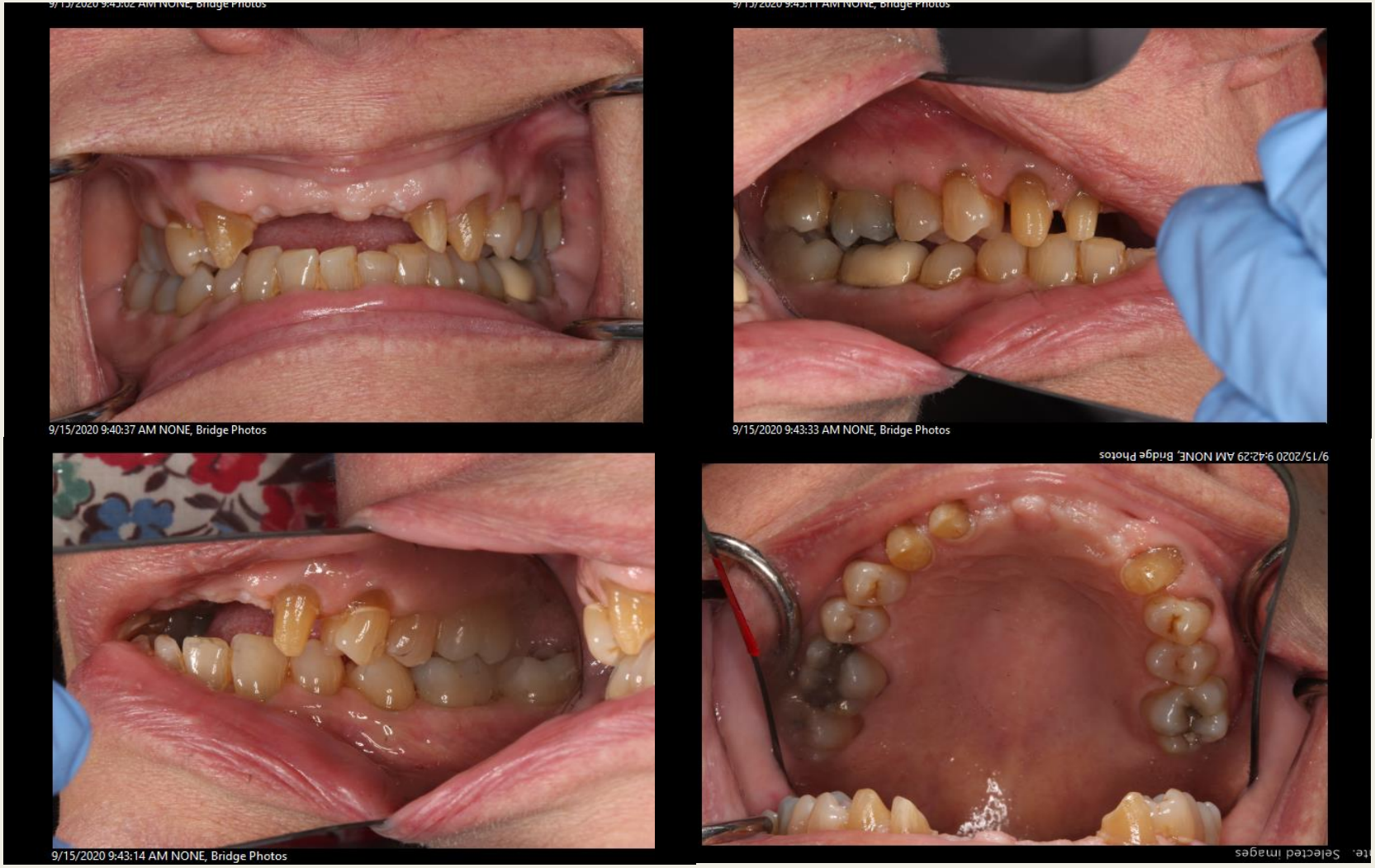
- Missing #1, #2, #7, #8, #9, #16, #17, #32
- #3 – occlusal amalgam
- #6 – PFM crown, abutment for anterior bridge
- #7 – PFM pontic
- #8 – PFM pontic
- #9 – PFM pontic
- #10 – PFM crown, abutment for anterior bridge
- #11 – PFM crown abutment for anterior bridge
- #14 – MO, DO amalgam
- #15 – occlusal amalgam
- #18 – occlusal amalgam
- #19 – PFM crown and RCT
- #30 – DO amalgam
- #31 – occlusal amalgam

Clinical Findings



- Extracted #7-9 in OS
- Maxillary treatment partial - fabricated by previous student.
- Missing #1, #2, #7, #8, #9, #16, #17, #32
- #3 – occlusal amalgam
- #6 – PFM crown, retainer for anterior bridge
- #7 – PFM pontic
- #8 – PFM pontic
- #9 – PFM pontic
- #10 – PFM crown, retainer for anterior bridge
- #11 – PFM crown, retainer for anterior bridge
- #14 – MO, DO amalgam
- #15 – occlusal amalgam
- #18 – occlusal amalgam
- #19 – PFM crown and RCT
- #30 – DO amalgam; defective restoration - FCC crown planned
- #31 – occlusal amalgam

Clinical Findings



Clinical Findings

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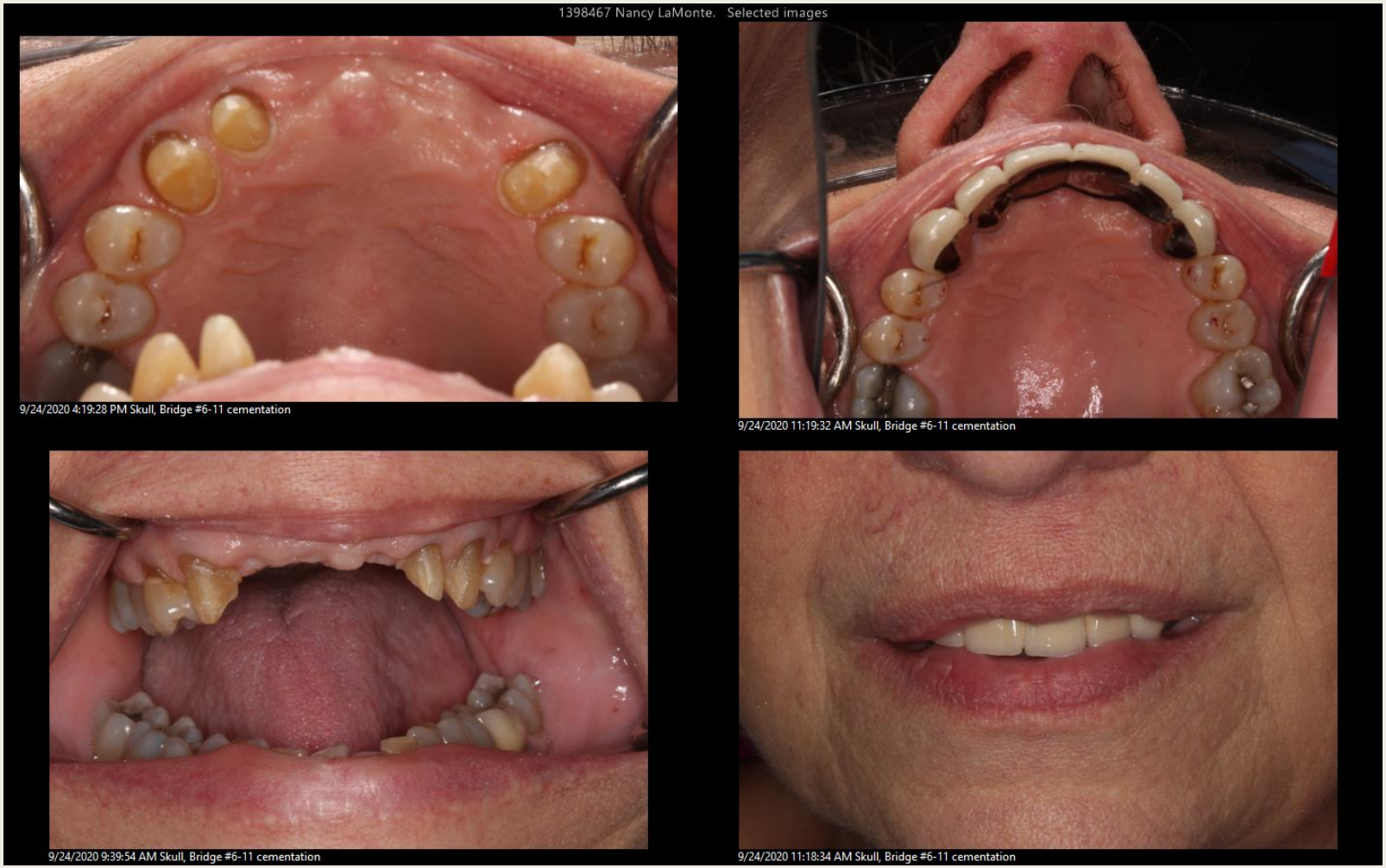
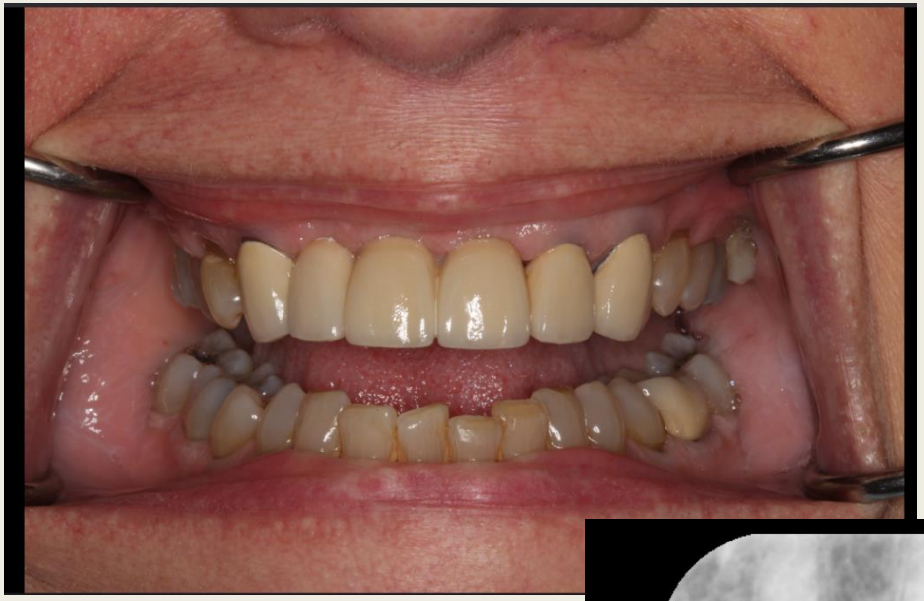
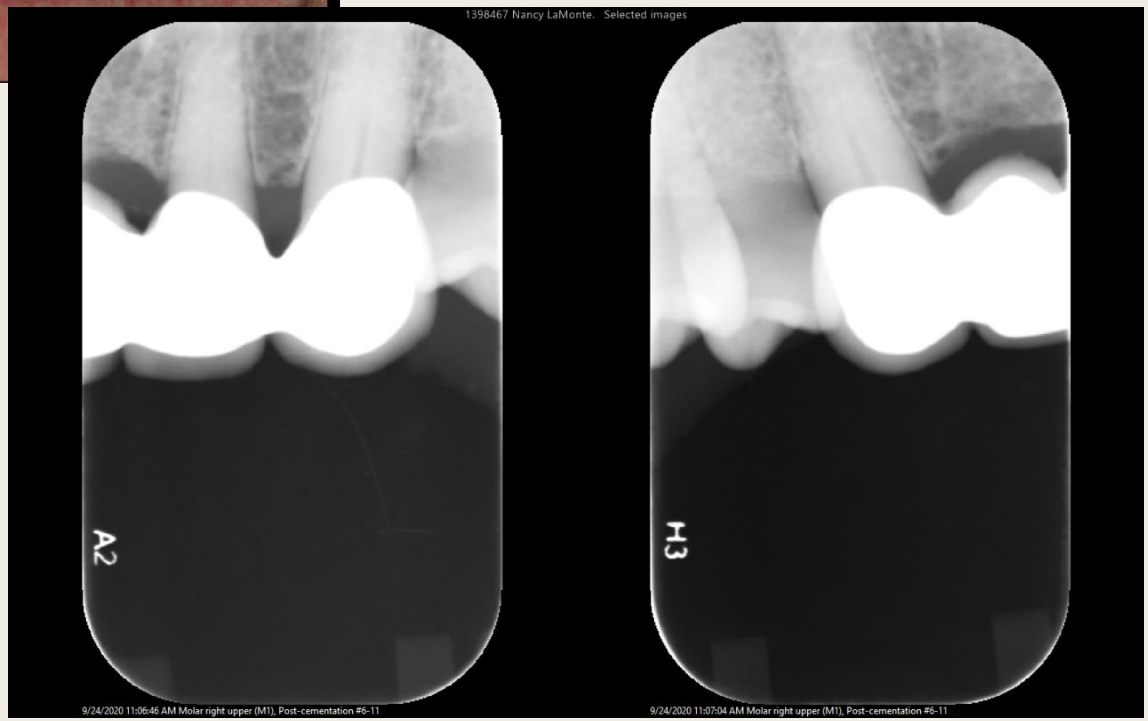
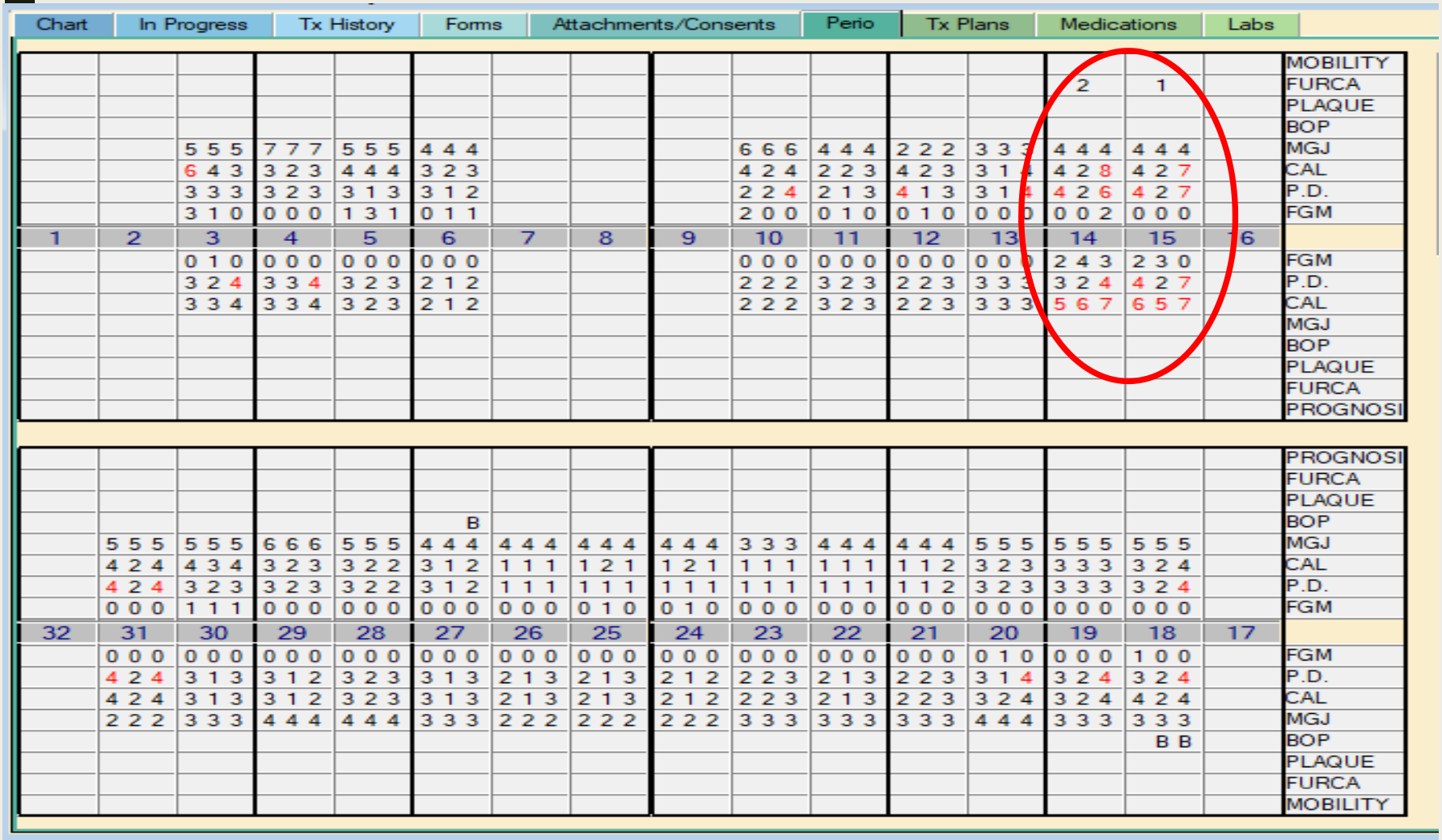


Clinical Findings





Periodontal Charting



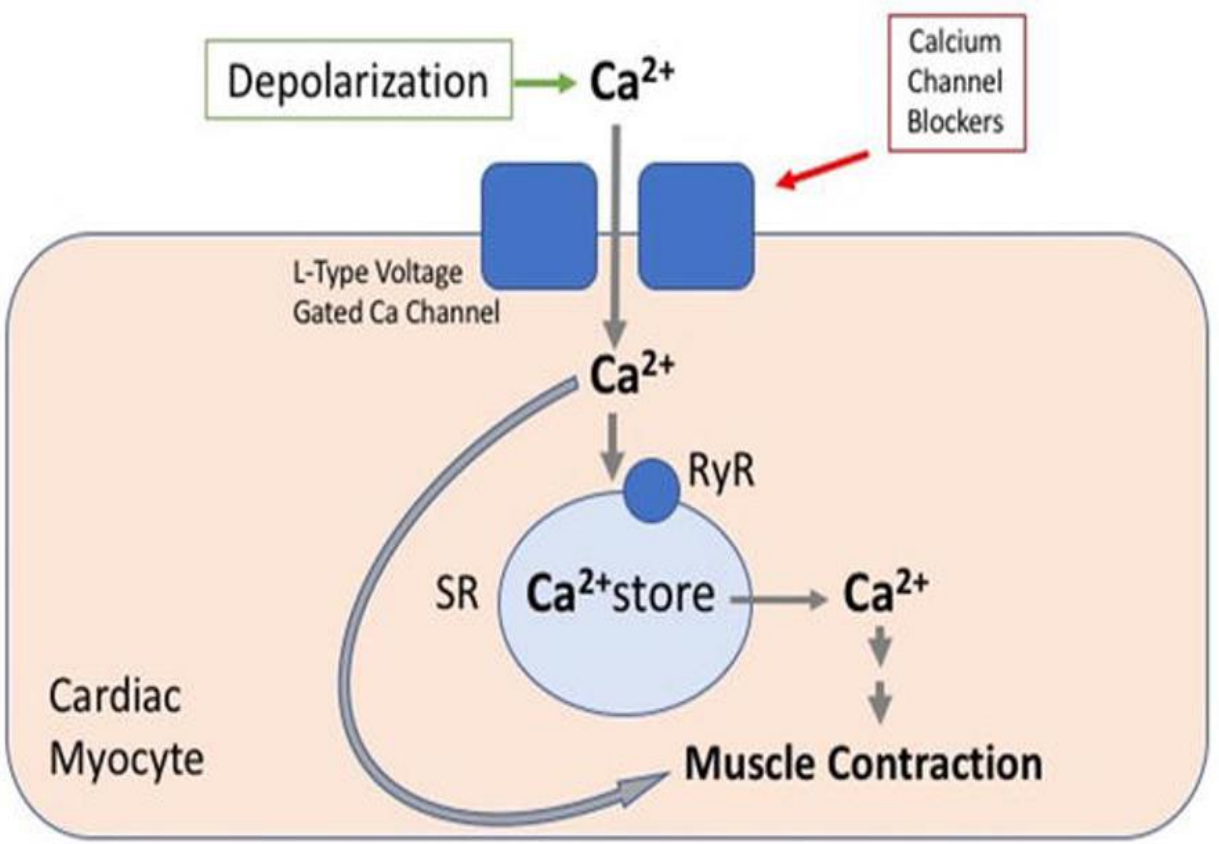
Diagnosis

- Perio:
  - *Localized Stage III severe periodontitis (#14 and #15); Grade B (no modifiers of smoking or diabetes).*
  - *Unstable*
  - *ADA Designation: III – Moderate Chronic Periodontitis*
- Pt is taking a calcium channel blocker (amlodipine); they are taking a daily dosage of 5 mg and have started taking it recently.
  - *Perio on maxillary anterior teeth is good, some isolated 4s. No gingival overgrowth seen anywhere*

Problem List

- Missing teeth
- Caries
- Defective restoration
- Fractured teeth

D1 Basic Science

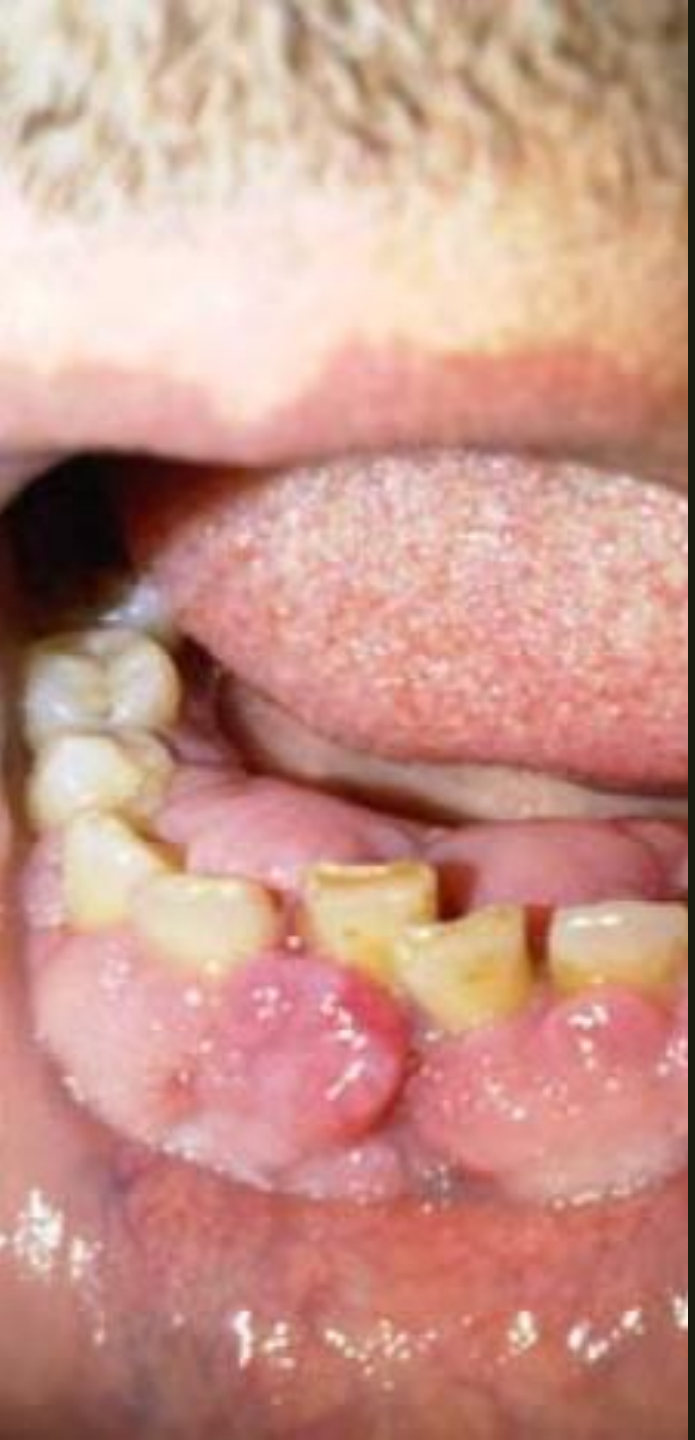


- Calcium channel blockers bind to the L-type calcium channel and prevent the movement of calcium
- Non-dyhydropyridines vs dihydropyridines

D1 References

- McKeever, R. (2020, July 10). Calcium Channel Blockers. Retrieved September 26, 2020, from https://www.ncbi.nlm.nih.gov/books/NBK482473

- Alahamd, Y., Swehli, H., Rahhal, A., Sardar, S., Elhassan, M., Alsamel, S., & Ibrahim, O. (2020, May 13). Calcium Channel Blockers. Retrieved September 26, 2020, from https://www.intechopen.com/books/new-insight-into-cerebrovascular-diseases-an-updated-comprehensive-review/calcium-channel-blockers



D2 Pathology: Oral Manifestations of Calcium Channel Blockers

- Amlodipine is a calcium channel blocker used to treat hypertension and angina
- Amlodipine causes gingival hyperplasia is 1.3-3% of people
  - Non-inflammatory reaction
    - Decreased collagenase activity due to localized folic acid deficiency
    - Aldosterone synthesis blockage leading to upregulation of ACTH levels
    - Upregulation of keratinocyte growth factor (KGF)
  - Inflammatory reaction
    - Direct toxic effects of concentrated drug deposition in crevicular gingival fluid (CGF)
    - Deposition of drug in bacterial plaque
  - Consequences of drug-induced gingival hyperplasia
    - Difficulty eating, speaking, maintaining good oral hygiene, and esthetics

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3598305/

D2 Pathology: Gingival Hyperplasia and Periodontal Health

- How does gingival hyperplasia increase periodontal risk?
  - *Gingival overgrowth results in more areas for plaque to accumulate and harden*
    - Subgingival calculus accumulates and destroys the periodontal structures
- How to manage periodontal health for these patients?
  - *Drug options*
    - Cease drug administration
    - Switch to an alternative drug class to treat underlying primary disease
  - *Early focus on good oral hygiene*
    - Instruct patient in proper and effective brushing and flossing techniques
  - *Frequent prophy*
    - Encourage patient to come into the office to remove accumulated subgingival plaque
  - *Surgery*
    - Gingivectomy or periodontal flap as last resort option

D3 PICO

- **Clinical Question:** Can periodontal disease (gingival overgrowth) be well controlled in patients taking calcium channel blockers?

PICO Format

- **P:** patients with hypertension
- **I:** using calcium channel blockers to control hypertension
- **C:** switching medications to control hypertension
- **O:** periodontal health (controlling gingival overgrowth)

PICO Formatted Question

- Can gingival hyperplasia be well controlled in patients who are taking calcium channel blockers for hypertension compared to those not taking calcium channel blockers?

Search Background

- **Date(s) of Search: 9/20/2020**
- **Database(s) Used: PubMed**
- **MESH terms:**
  - *Calcium channel blockers*
  - *Gingival overgrowth*
  - *Hyperplasia*
  - *Dental*

Article 1: Is dental plaque the only etiological factor in amlodipine induced gingival growth? A systematic review of evidence

- Gaur S and Agnihotri R. IS dental plaque the only etiological factor in amlodipine induced gingival overgrowth? A systematic review of evidence. 2018. *Journal of exp dent.* Doi: 10(6): e610-61
- Study Design:
  - *Used pubmed and keywords "amlodipine/gingiva/gingival overgrowth/hyperplasia"*
  - *Eliminated all animal studies, in vitro, pediatric, and any studies published in another language besides English*
  - *Assessed the remaining articles and assigned them a score 0-8*
  - *Resulted in 13 articles used*

Article 1 Synopsis

- Calcium channel blockers (CCBs) are prescribed 37% of the time as a choice for antihypertensive therapy
- Amlodipine is a CCB but has the lowest chance of gingival overgrowth as a side effect
  - *1.7-3.3%*
- Age, genetics, drug variables, and pre-existing gingival inflammation all influence response of gingiva to CCBs
- Results of the 13 articles
  - *2 studies had a dosage of 2.5mg/day of amlodipine and 50% had gingival overgrowth*
  - *The remaining studies had 5mg/day and 10mg/day dosage*
    - They all had gingival overgrowth
  - *Found no correlation between dosage and duration of the drug and gingival overgrowth*

Article 1 Synopsis

- Discussion:
  - *2 main risk factors that lead to gingival overgrowth for patients on amlodipine were plaque index and poor oral hygiene*
    - Other associations found included: pocket depth and clinical attachment loss
  - *While amlodipine has a history of low gingiva overgrowth (1.7-3.3%) this study suggests a higher percentage of 26.7%*
  - *Gingival overgrowth was not related to dosage of amlodipine, rather oral hygiene and control of plaque index*

Article 2: The efficacy of three different surgical techniques in the management of drug induced gingival overgrowth

- Study Design:
  - *2 part study*
    - Part 1: compared conventional flap surgery to scalpel gingivectomy
    - Part 2: compared conventional flap surgery to laser gingivectomy
  - *All patients had gingival overgrowth in excess of 30%*
    - Affecting at least 8 upper or lower anterior teeth
  - *In each patient half of the gingival overgrowth was treated using conventional flap surgery and the other half treated with either the scalpel gingivectomy or laser gingivectomy*
  - *The allocation of the treatment was randomized*
  - *Each procedure was done with 4ml of 2% 1:80,000 epi and by the same operator*
  - *Periodontal variables were controlled by measuring pocket depths and charting plaque index to establish a baseline 1-week post treatment.*
  - *Alginate impressions were taken 1-week post surgery and the plaster models were scored by one assessor who was blinded to the surgical procedures*
- Study Need / Purpose: No study has been done yet comparing the methods of conventional flap surgery, scalpel gingivectomy, and laser gingivectomy

Article 2 Synopsis

- Surgical intervention is the most frequent management strategy for drug induced gingival overgrowth
- Recurrence is 34%
- Scalpel gingivectomy is considered standard treatment of choice
- Outcome was primarily measured on recurrence of gingival overgrowth
- Results
  - *No difference of gingival overgrowth for flap and scalpel at 6 months*
  - *Recurrence was higher in scalpel than laser*
  - *Laser surgery had less of a gingival change than scalpel in the first 3 months but the following 3 they were equal*
  - *6-month plaque index was higher in flap than scalpel*

Clinical Bottom Line

- A hypertensive patient on CCBs can control gingival overgrowth through
  - *1 – prevention*
    - Control plaque index
    - Good oral hygiene
  - *2- surgically*
    - Through conventional flap surgery or laser
    - Recurrence is still high
  - *3- medical consult with physician to switch medications from CCB to ACE inhibitor*

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

D3 References

- Article 1
  - *Gaur S and Agnihotri R. IS dental plaque the only etiological factor in amlodipine induced gingival overgrowth? A systematic review of evidence. 2018. Journal of exp dent. Doi: 10(6): e610-61*
- Article 2
  - *Mavrogiannis M, Ellis J.S, Seymour R.A., and Thomason J.M. The efficacy of three different surgical techniques in the management of drug induced gingival overgrowth. Journal of Clinical Periodontology. 20 July 2006. doi: 10.1111/j/1600-051x*

Conclusions: D4

- As providers, you must be aware of the side effects certain medications have.
- Duration and dosage not related to hyperplasia; more dependent on oral hygiene and plaque index
- Reinforce good oral hygiene (both for fixed prosthodontic work and because of CCB)
- If gingival hyperplasia is observed in the future, contact MD and see if CCB can be changed to another antihypertensive drug like an ACE inhibitor (seeing as gingival hyperplasia recurrence is high)

QUESTIONS??