IMPLANTS VS. REMOVEABLE FOR A PATIENT WITH DIABETES

EVIDENCE BASED DENTISTRY ROUNDS

GERIATRIC DENTISTRY

GROUP 1A-1

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10/14/2020

ROUNDS TEAM

- **Group Leader: Dr. Smithy**
- **Specialty Leader: Dr. Hjertstedt**
- **Project Team Leader: Christine Bruno**
- **Project Team Participants: Ben Schlenker; Janelle Weinman; Allie Jones**

PATIENT

- 60 yr old male
- Chief complaint: “I want to replace my missing teeth”
- Patient has nearly full maxillary dentition (including thirds) but is missing several mandibular teeth. He has generalized chronic moderate periodontal disease.

MEDICAL HISTORY

- Medical conditions:

  -congestive heart failure

  -heart murmur

  -type II diabetes (not well controlled)- A1c = 9.5

  -Anemia

  -transient Ischemic attack

  -smoker 1 pack a day

  -sleep apnea

  -gout

  -myocardial infarction 2016 and triple bypass

MEDICATIONS

- Allopurinol (uric acid reducer)
- Aspirin (for acute heart attack)
- Atorvastatin-hyperlipidemia
- CoQ10
- Epoetin alfa-epbx injection – (used to combat anemia)
- Famotidine- (GERD)
- Ferrous sulfate- (also for anemia)
- Finasteride-urinary tract
- Fish oil
- Gabapentin- (for diabetic peripheral neuropathy)
- Regular human insulin 3x daily
- Liquid tears
- Losartan
- Metoprolol (beta blocker – high BP)
- Nitroglycerin tablet PRN
- Nystatin –topical for feet
- Sildenafil
- Spironolactone- diuretic
- Tamsulosin-prostate med
- Torsemide-loop diuretic
- Verapamil-calcium channel blocker high BP
- Vitamin D

DENTAL HISTORY

- Has been a patient of record at the North clinic since 2017

  -lost #24, #25 during intubating for bypass in 2016

  -emergency EXT of #29 #30 due to PARLs and gross decay

  -EXT of #26 and #23 because they were periodontally hopeless

  -underwent 2 rounds of SRP 2017-2019

  - #16 currently has mesial caries, have elected to extract at patient's convenience

1/10/2017

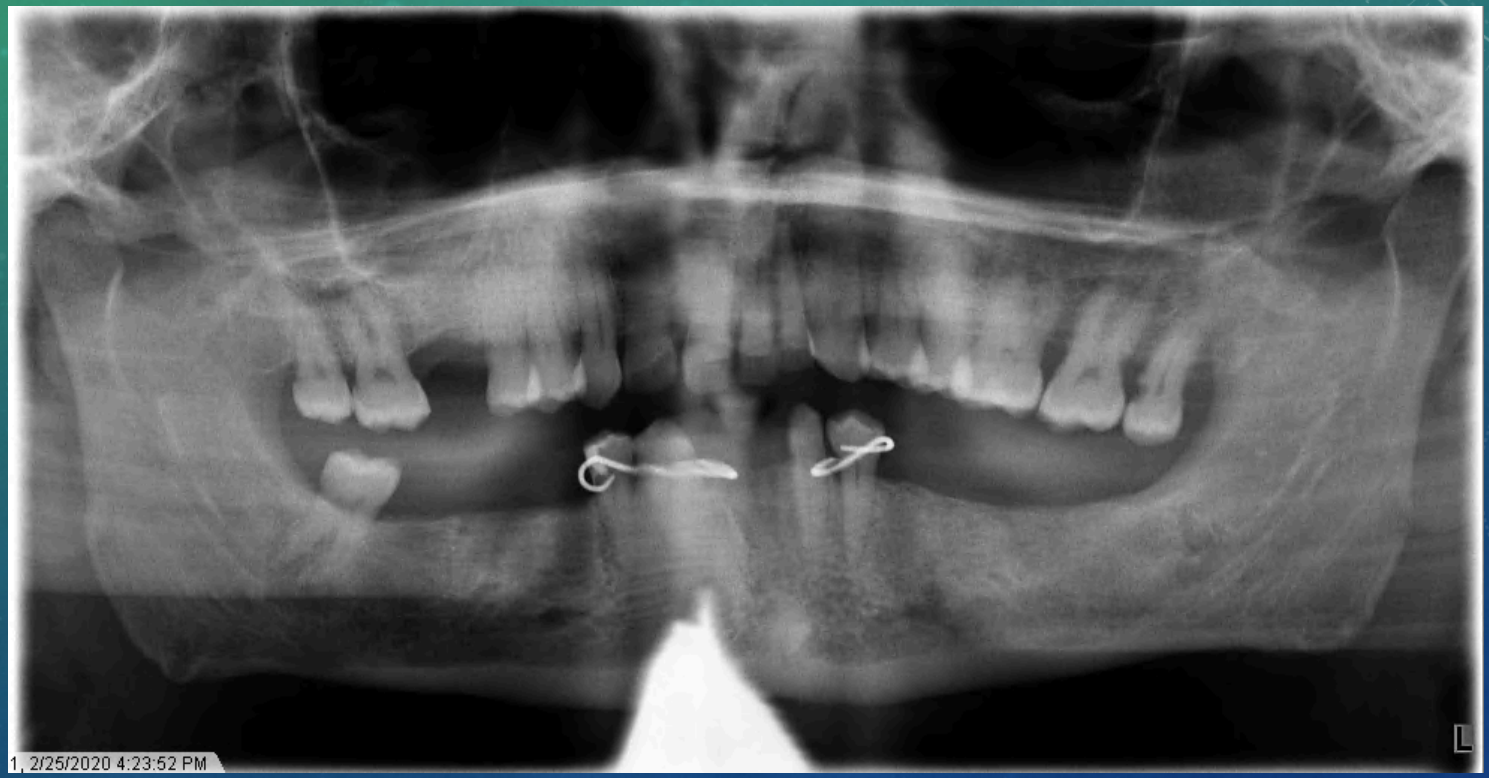
10/7/2019

10/16/2019

10/16/2019

RADIOGRAPHS 1/10/2017

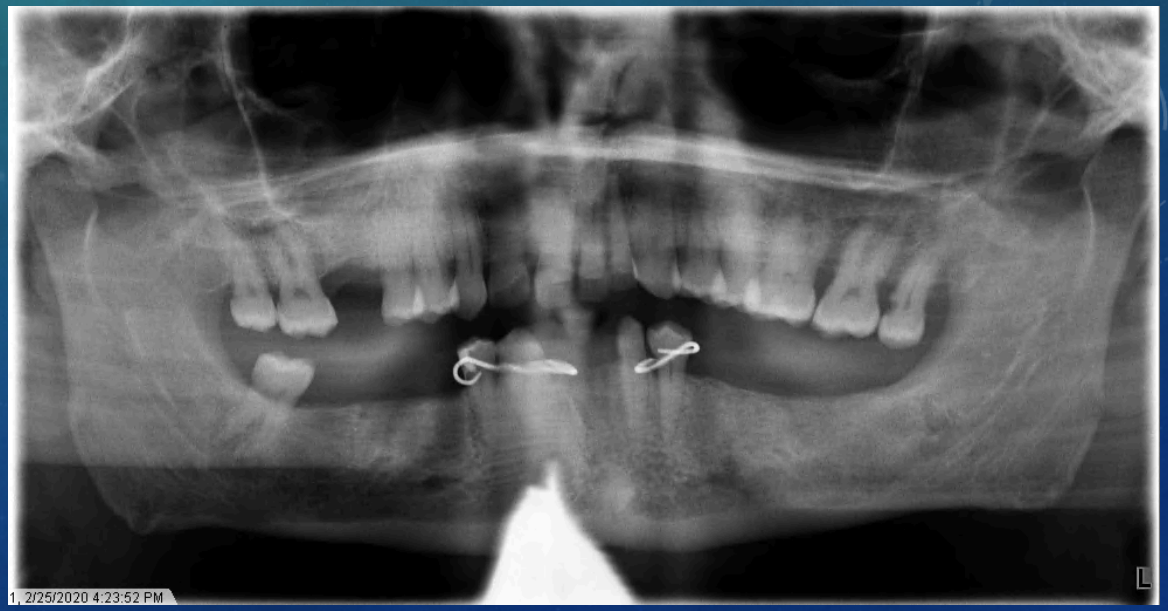
PAN 2/25/2020



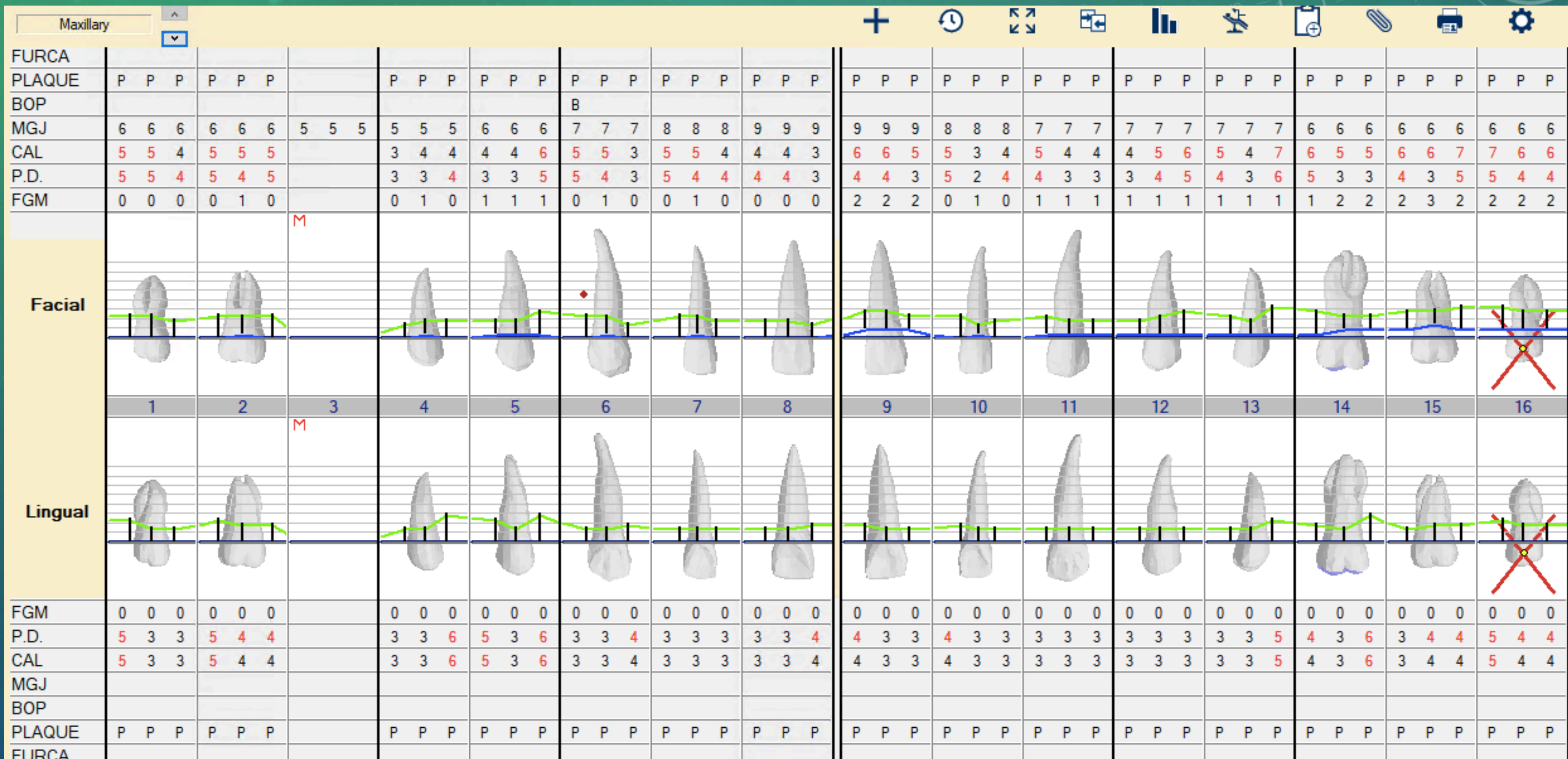
RADIOGRAPHIC FINDINGS

- Missing #3, #31, #25, #24,#20,#19,#18,#17
- Mesial caries #16
- Grossly decayed #30, #29
- Bad crown to root ratio #26 and #23
- Generalized 3-4mm horizontal bone loss

Patient does not appear to have severe alveolar ridge resorption



PERIODONTAL CHARTING



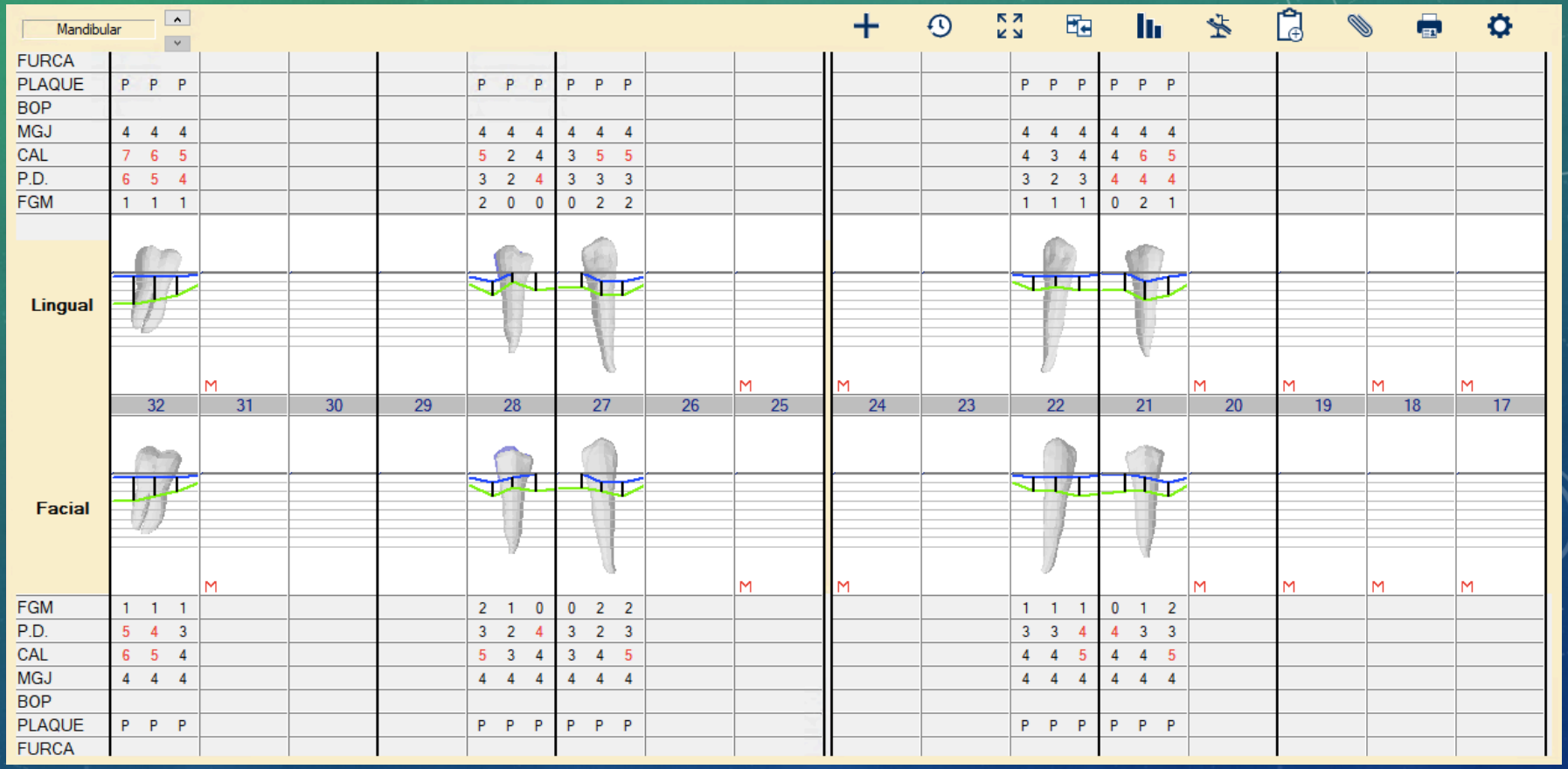
Facial

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
FURCA																
PLAQUE	P P P	P P P		P P P	P P P	P P P	P P P	P P P	P P P	P P P	P P P	P P P	P P P	P P P	P P P	P P P
BOP						B										
MGJ	6 6 6	6 6 6	5 5 5	5 5 5	6 6 6	7 7 7	8 8 8	9 9 9	9 9 9	8 8 8	7 7 7	7 7 7	7 7 7	6 6 6	6 6 6	6 6 6
CAL	5 5 4	5 5 5		3 4 4	4 4 6	5 5 3	5 5 4	4 4 3	6 6 5	5 3 4	5 4 4	4 5 6	5 4 7	6 5 5	6 6 7	7 6 6
P.D.	5 5 4	5 4 5		3 3 4	3 3 5	5 4 3	5 4 4	4 4 3	4 4 3	5 2 4	4 3 3	3 4 5	4 3 6	5 3 3	4 3 5	5 4 4
FGM	0 0 0	0 1 0		0 1 0	1 1 1	0 1 0	0 1 0	0 0 0	2 2 2	0 1 0	1 1 1	1 1 1	1 1 1	1 2 2	2 3 2	2 2 2

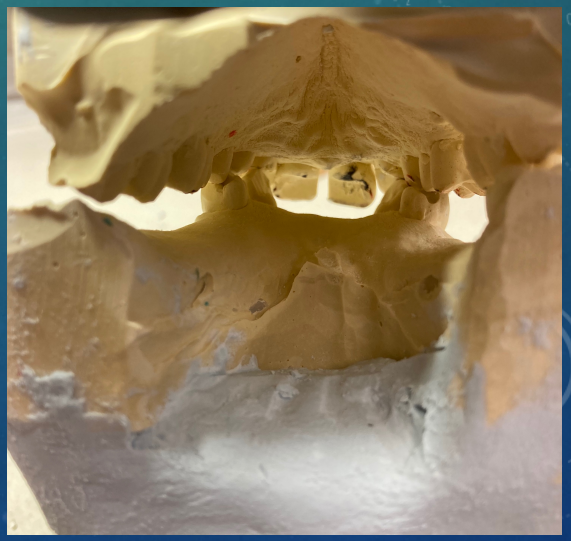
Lingual

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
FGM	0 0 0	0 0 0		0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0
P.D.	5 3 3	5 4 4		3 3 6	5 3 6	3 3 4	3 3 3	3 3 4	4 3 3	4 3 3	3 3 3	3 3 3	3 3 5	4 3 6	3 4 4	5 4 4
CAL	5 3 3	5 4 4		3 3 6	5 3 6	3 3 4	3 3 3	3 3 4	4 3 3	4 3 3	3 3 3	3 3 3	3 3 5	4 3 6	3 4 4	5 4 4
MGJ																
BOP																
PLAQUE	P P P	P P P		P P P	P P P	P P P	P P P	P P P	P P P	P P P	P P P	P P P	P P P	P P P	P P P	P P P
FURCA																

PERIODONTAL CHARTING



MOUNTED CASTS



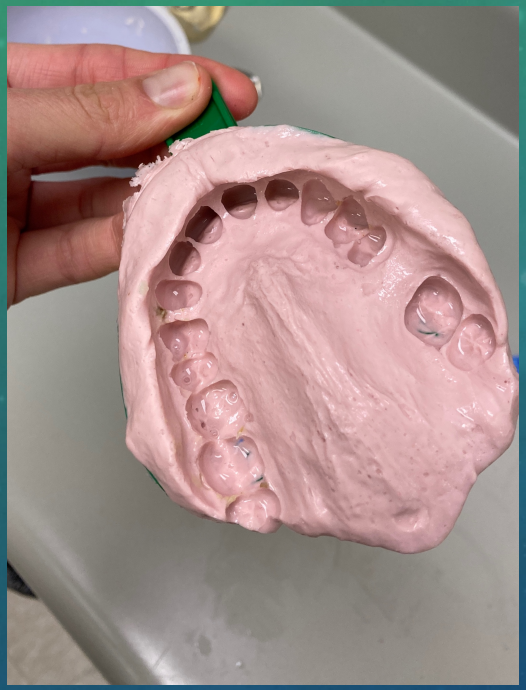
DIAGNOSIS

- Moderate Chronic Periodontitis, high caries risk.
- Non-restorable #30, #29, #26, #23, #16
- #30, #29 symptomatic apical periodontitis due to caries

PROBLEM LIST

- Missing #3, #31, #25, #24,#20,#19,#18,#17
- Mesial caries #16
- Grossly decayed, symptomatic apical periodontitis #30, #29
- Bad crown to root ratio #26 and #23
- Generalized 3-4mm horizontal bone loss with heavy calculus deposits

INTERIM PARTIAL MANDIBULAR DENTURE



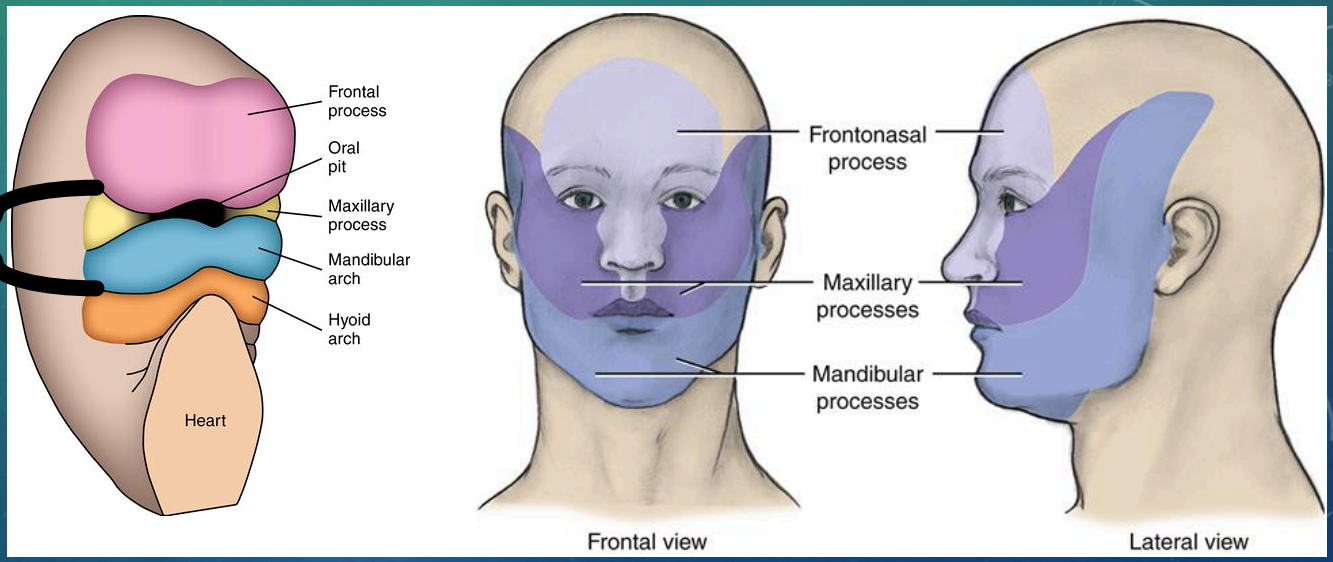
#26 and #23

Immediate delivery of interim partial

HOW DOES BONE DIFFER THROUGHOUT THE MANDIBLE AND MAXILLA?

GROWTH & DEVELOPMENT CONTEXT

Arch 1
“Mandibular Arch”



Differences in bone: mandible & maxilla

Misch in 1988

Bone density	Description	Tactile analogue	Typical anatomic location
D1	Dense cortical	Oak / maple wood	Anterior mandible
D2	Porous cortical and coarse trabecular	White pine or spruce wood	Anterior mandible Posterior mandible Anterior maxilla
D3	Porous cortical (thin) and fine	Balsa wood	Anterior maxilla Posterior maxilla Posterior mandible
D4	Fine trabecular	Styrofoam	Posterior maxilla

HOW DOES ALVEOLAR BONE CHANGE AS ONE AGES?

- Bone overall has impaired function
  - Depends on individual
- Decreased width and length of jaws
  - Age-associated, NOT age attributed
    - Poorer nutrition, changes in oral hygiene, hormonal changes
  - Local factors – chronic periodontitis
  - Systemic osteoporosis
  - Tooth loss

Avila-Ortiz, G, et al. "Effect of alveolar ridge preservatoin after tooth extraction: a systematic review and meta-analysis." *Journal of Dental Research* (2014).
Boskey, A L and R Coleman. "Aging and Bone." *Journal of Dental Research* (2010).

D3 PICO

Clinical Question:

- Should I plan implants or a removable prosthesis for my patient who is a smoker and has diabetes?

PICO FORMAT

P: Elderly patients with missing teeth and diabetes

I: Placing dental implants

C: Placing dental implants in healthy elderly patients with missing teeth

O: Best long-term prognosis

PICO FORMATTED QUESTION

- In elderly patients with missing teeth and diabetes, does placing dental implants have a better or worse long-term prognosis compared to placing dental implants in healthy elderly patients with missing teeth?

CLINICAL BOTTOM LINE

- As long as an elderly patient's diabetes is controlled and properly monitored, there is equal long term success of placing dental implants compared to elderly patients without diabetes.
- Age alone shouldn't be a major factor in determining whether to place dental implants or not.
- Controlled systemic diseases such as diabetes does not stand as a significant contraindication to placing dental implants as long as the disease stays controlled.

SEARCH BACKGROUND

- **Date(s) of Search:** 10/6/2020
- **Database(s) Used:** PubMed
- **Search Strategy/Keywords:**
  - Dental implants, elderly patients, diabetes, systemic disease, long term prognosis, success

SEARCH BACKGROUND

- **MESH terms used:**
  - Age factors, dental implants, diabetes complications, humans, risk factors, survival analysis, smoking, risk factors, dental restoration failure, treatment outcome

ARTICLE 1

-EFFECT OF ADVANCED AGE AND/OR SYSTEMIC MEDICAL CONDITIONS ON DENTAL IMPLANT SURVIVAL: A SYSTEMIC REVIEW AND META-ANALYSIS

- Study Design: Systematic Review and meta-analysis

- Study Need / Purpose: The purpose of this article was to review implant survival in geriatric patients 75 years or older with contributing systemic medical conditions such as diabetes.

Schimmel, M., Srinivasan, M., McKenna, G., & Müller, F. (2018). Effect of advanced age and/or systemic medical conditions on dental implant survival: A systematic review and meta-analysis. *Clinical oral implants research*, *29 Suppl 16*, 311–330. https://0-doi-org.libus.csd.mu.edu/10.1111/clr.13288

ARTICLE 1 SYNOPSIS

- 60 human studies were included
- Recognized the most common chronic conditions in elderly:
  - Cardiovascular disease, cancer, respiratory diseases, diabetes mellitus, cirrhosis of the liver, osteoarthritis and neurocognitive impairments.
- Overall implant survival rate of 97.3% for 1 year and 96.1% for 5 years (solid screw type implants)
- Implant failure defined as loss or removal of implant for any reason
- Peri-implant bone loss ranged from 0.1mm-0.51mm during the first year post loading

Schimmel, M., Srinivasan, M., McKenna, G., & Müller, F. (2018). Effect of advanced age and/or systemic medical conditions on dental implant survival: A systematic review and meta-analysis. *Clinical oral implants research*, *29 Suppl 16*, 311–330. https://0-doi-org.libus.csd.mu.edu/10.1111/clr.13288

ARTICLE 1 CONCLUSIONS

- Advanced age does not seem to negatively affect osseointegration
- Diabetic patients may experience microvascular damage and impaired wound healing. They are at a greater risk to periodontitis and tooth loss.
- HbA1c levels above 8% may result in reduced implant survival
- Placing implants in elderly patients with controlled metabolic disease is a predictable treatment option with a high rate of implant success

Schimmel, M., Srinivasan, M., McKenna, G., & Müller, F. (2018). Effect of advanced age and/or systemic medical conditions on dental implant survival: A systematic review and meta-analysis. *Clinical oral implants research*, *29 Suppl 16*, 311–330. https://0-doi-org.libus.csd.mu.edu/10.1111/clr.13288

ARTICLE 1 SELECTION

- High level of evidence
- Large population in analysis
- Related directly to the case looking at implant prognosis in elderly patients with diabetes

Schimmel, M., Srinivasan, M., McKenna, G., & Müller, F. (2018). Effect of advanced age and/or systemic medical conditions on dental implant survival: A systematic review and meta-analysis. *Clinical oral implants research*, *29 Suppl 16*, 311–330. https://0-doi-org.libus.csd.mu.edu/10.1111/clr.13288

ARTICLE 2

DENTAL IMPLANTS IN THE ELDERLY POPULATION: A SYSTEMATIC REVIEW AND META-ANALYSIS

- Study Design: Systematic review and meta-analysis

- Study Need / Purpose: The purpose of this study was to evaluate the prognosis of placing dental implants in elderly patients 65 and older.

Srinivasan, M., Meyer, S., Mombelli, A., & Müller, F. (2017). Dental implants in the elderly population: a systematic review and meta-analysis. *Clinical oral implants research*, *28*(8), 920–930. https://0-doi-org.libus.csd.mu.edu/10.1111/clr.12898

ARTICLE 2 SYNOPSIS

- Article included studies of dental implants placed in both partially and fully edentulous jaws of elderly patients.
- Implants placed were regular diameter (>3mm) and micro-rough surface implants
- Systematic search yielded 2221 publications, 11 studies were included for analysis

Srinivasan, M., Meyer, S., Mombelli, A., & Müller, F. (2017). Dental implants in the elderly population: a systematic review and meta-analysis. *Clinical oral implants research*, *28*(8), 920–930. https://0-doi-org.libus.csd.mu.edu/10.1111/clr.12898

ARTICLE 2 CONCLUSIONS

- Mandibular two-implant overdenture therapy is considered a first-choice standard of care in the rehabilitation of completely edentulous patients.
- Dental implants should be a recommended treatment option for edentulous elderly patients to improve their oral function and quality of life.
- Implant survival rates
  - 1 year = 97.7%
  - 3 years = 96.3%
  - 5 years = 96.2%
  - 10 years = 91.2%

Srinivasan, M., Meyer, S., Mombelli, A., & Müller, F. (2017). Dental implants in the elderly population: a systematic review and meta-analysis. *Clinical oral implants research*, *28*(8), 920–930. https://0-doi-org.libus.csd.mu.edu/10.1111/clr.12898

ARTICLE 2 SELECTION

- Moderate level of evidence
- High quality articles, low quantity
- Answered part of the PICO in relation to the case of placing dental implants in healthy elderly patients who are edentulous.

Srinivasan, M., Meyer, S., Mombelli, A., & Müller, F. (2017). Dental implants in the elderly population: a systematic review and meta-analysis. *Clinical oral implants research*, *28*(8), 920–930. https://0-doi-org.libus.csd.mu.edu/10.1111/clr.12898

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

Article 1 – A
Article 2 -- B

CONCLUSIONS: D3

- Overall, the research indicates that there is not a significant difference in survival rates of placing implants in elderly patients with or without diabetes.
- Controlled diabetes has no contraindication to including implants as a potential treatment option in elderly patients.
- Had the prognosis been poor in placing the implants, it would indicate leaning on placing a RPD as a treatment option. The research was inconclusive comparing RPDs and implants together.

- For this patient specifically, because the diabetes is not controlled and the patient is a smoker, I would not recommend placing dental implants and go with the removable treatment option to restore the missing teeth.

D3- EXTRA STUDIES

- DENTAL IMPLANTS AND DIABETES MELLITUS – A SYSTEMATIC REVIEW
- Naujokat, H., Kunzendorf, B., & Wiltfang, J. (2016). Dental implants and diabetes mellitus-a systematic review. *International journal of implant dentistry*, *2*(1), 5. https://0-doi-org.libus.csd.mu.edu/10.1186/s40729-016-0038-2
    - Study contributed to conclusions of great prognosis of dental implants as long as the diabetes is controlled.

D3- EXTRA STUDIES

- SMOKING, RADIOTHERAPY, DIABETES AND OSTEOPOROSIS AS RISK FACTORS FOR DENTAL IMPLANT FAILURE: A META-ANALYSIS
- Chen, H., Liu, N., Xu, X., Qu, X., & Lu, E. (2013). Smoking, radiotherapy, diabetes and osteoporosis as risk factors for dental implant failure: a meta-analysis. *PloS one*, *8*(8), e71955. https://0-doi-org.libus.csd.mu.edu/10.1371/journal.pone.0071955
    - This study was added as a reference as to why smoking is a contraindication to placing dental implants.

CONCLUSIONS: D4

Based on your D3's bottom line recommendations, how will you ***advise*** your patient? I will advise my patient that his particular health situation and dental health history will be better served with a removable prosthesis than an implant supported prosthesis.

How will you ***help*** your patient? My patient is very esthetically driven. He felt that he was unemployable with missing teeth. Giving him an interim partial as quickly as possible enabled him to find a job. I will help him by giving him realistic expectations as to how much function he will get out of his removeable prosthesis and by designing the partial with his esthetic preferences in mind.

DISCUSSION QUESTIONS

Discussion Question
In cases where implants failed in diabetic patients, were they early or late failures?
How does diabetes affect implant prognosis?
Is there a significant difference in implant survival when you compare a controlled vs an uncontrolled diabetic?
How does smoking affect bone healing?
Does a diabetic patients HbA1c directly correlate to implant failure?
Does a person who currently doesnrsquot smoke, but has a history of smoking, affect implant prognosis?
How does implant success vary between the maxilla and mandible in patients who smoke?
If a patients bone is considered not healthydense enough to receive an implant is there a way to remineralize the bone in order to make an implant possible?
Does implant success in a diabetic andor smoker differ between anterior or posterior arch placement?
Is the failure rate of implant osteointegration higher in smokers? If so, are there protocols in place to lower the rates?
What are the effects of age on implant success?
Are elderly diabetic patients with controlled HbA1C levels candidates for bone grafting procedures in areas of bone loss to improve likelihood of implant osseointegration?
How long does it take to become a viable option for implants after smoking cessation?
How does diabetes affect the healing of bone?
What is the failure rate if a patient starts to smoke again a year after a successful implant?
In general, are there any benefits of choosing one option over the other? If so, what are they?
Is there a difference in choice of implant or removable prosthesis for this patient versus a patient who is only a diabetic or only a smoker?

THANK YOU