Rounds Case:
Maxillary Sinus Augmentation for Endosteal Implant Placement
3A-5

October 7, 2020

Rounds Team

- Group Leader: Dr. Grady
- Specialty Leader: Dr. Guentsch
- Project Leader: Nolan Frisch
- D3- Jiovannah Campbell
- D2- Tyler Grisar
- D1- Ine Suh

Patient: A. Hardy

- 64 y/o African American Male
- Presented to clinic for Comprehensive Exam
- Chief Complaint: “I’ve had a partial denture for a few years now and I hate it.”
- Works as a social worker in Milwaukee County
- Very adamant on treatment and very flexible

Medical History

- Allergies: Codeine
- Open heart bypass surgery 10+ years ago
- Past tobacco use
- Coronary Heart Disease, High blood pressure, Sinusitis, Type II Diabetic, Vision and Hearing impairment
  - Last reported HbA1c: 6.9
- Medications: Lantis, Humalog, Lisinopril, Coreg, Amlodipine

Dental History

- Seen regularly at an outside office before MUSoD, favored the price at Marquette
- Fillings, Crowns, Endo, Extractions, Removable Partial
- Implant - #12 – Peri-Implant Mucositis
- #24 and #25 mobility due to position

Problems

- Failing bridge - #30-32
- Abfraction/abrasion
- Missing teeth
- Mobility - #23, 24, 25, 26

Stage I

- Prophy, Diagnostic casts
- Fixed Partial denture 30-32 sectioning with caries excavation
- #32 EXT.
- #28B and #29B 1 surf. posterior resin
- #8 and #9 MF 2 surf. Anterior resin

Stage II

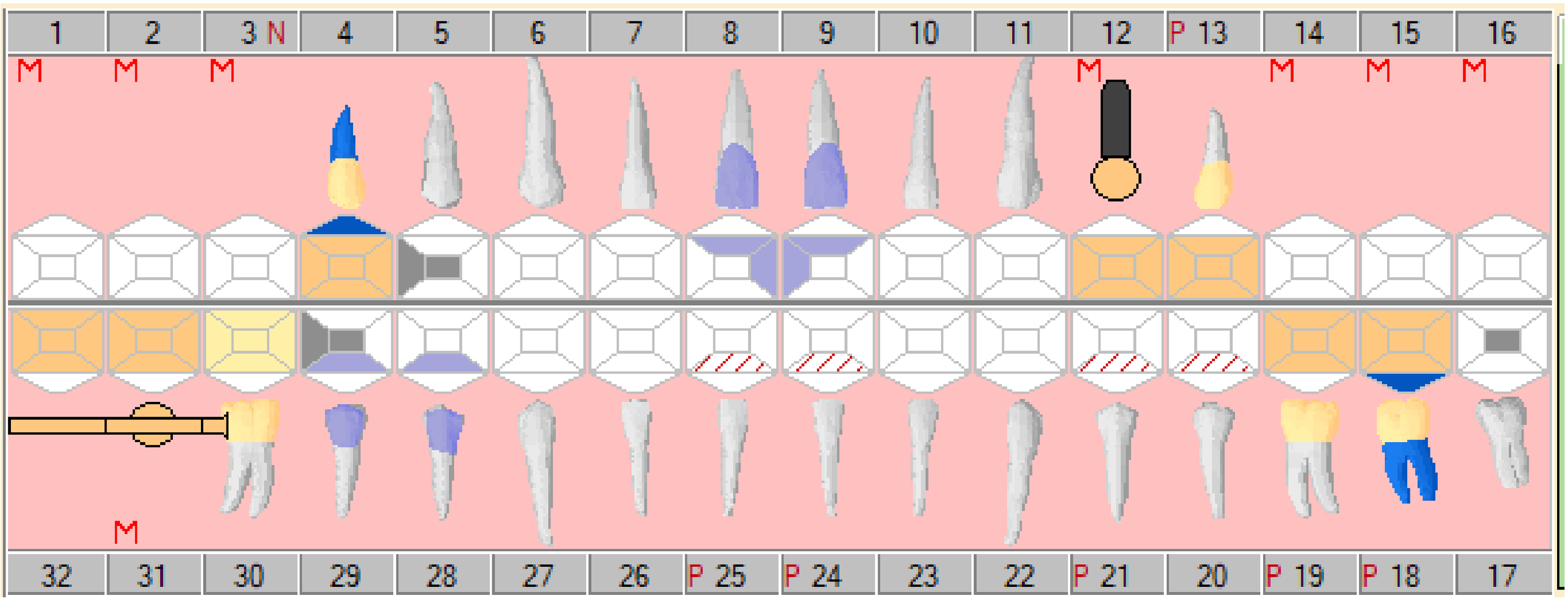
- #30 PFM
- #3 and #14 Endosteal implant placement with custom abutment and PFM crown

Clinical Photos

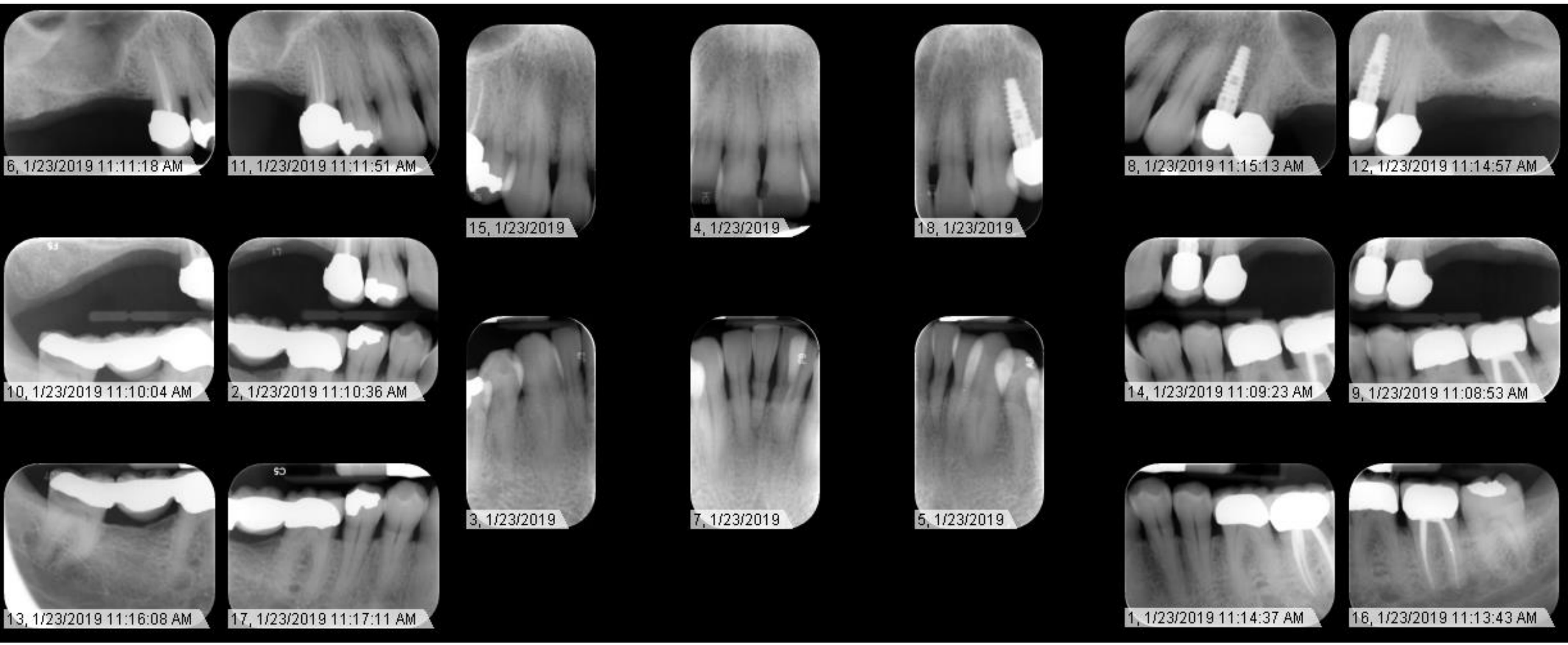
R

L

Odontogram

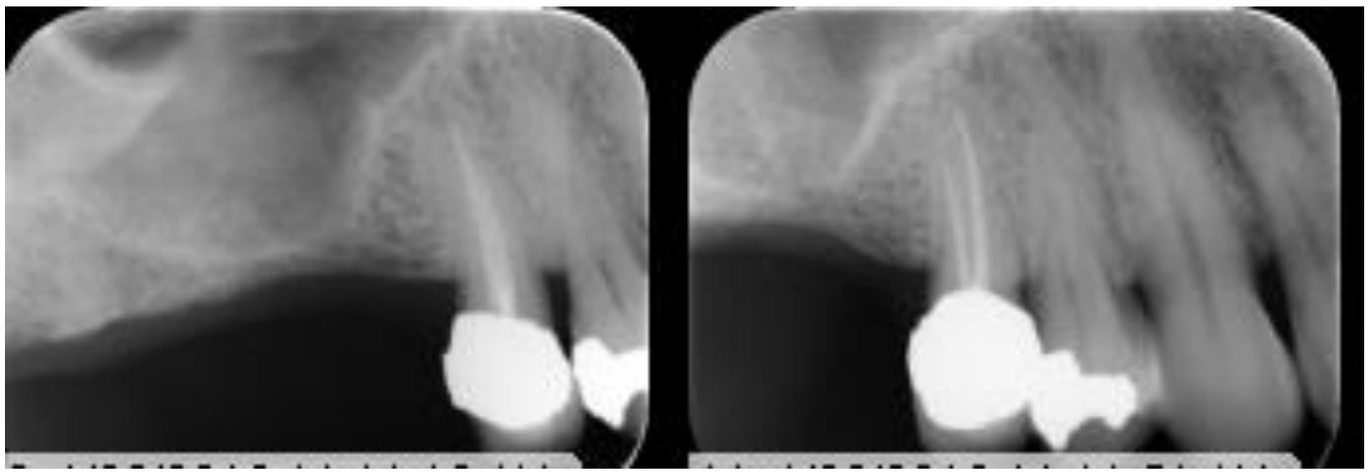

1 2 3 N 4 5 6 7 8 9 10 11 12 P 13 14 15 16
M M M M M M M
32 31 30 29 28 27 26 P 25 P 24 23 22 P 21 20 P 19 P 18 17
M

Radiographic findings



Radiographs

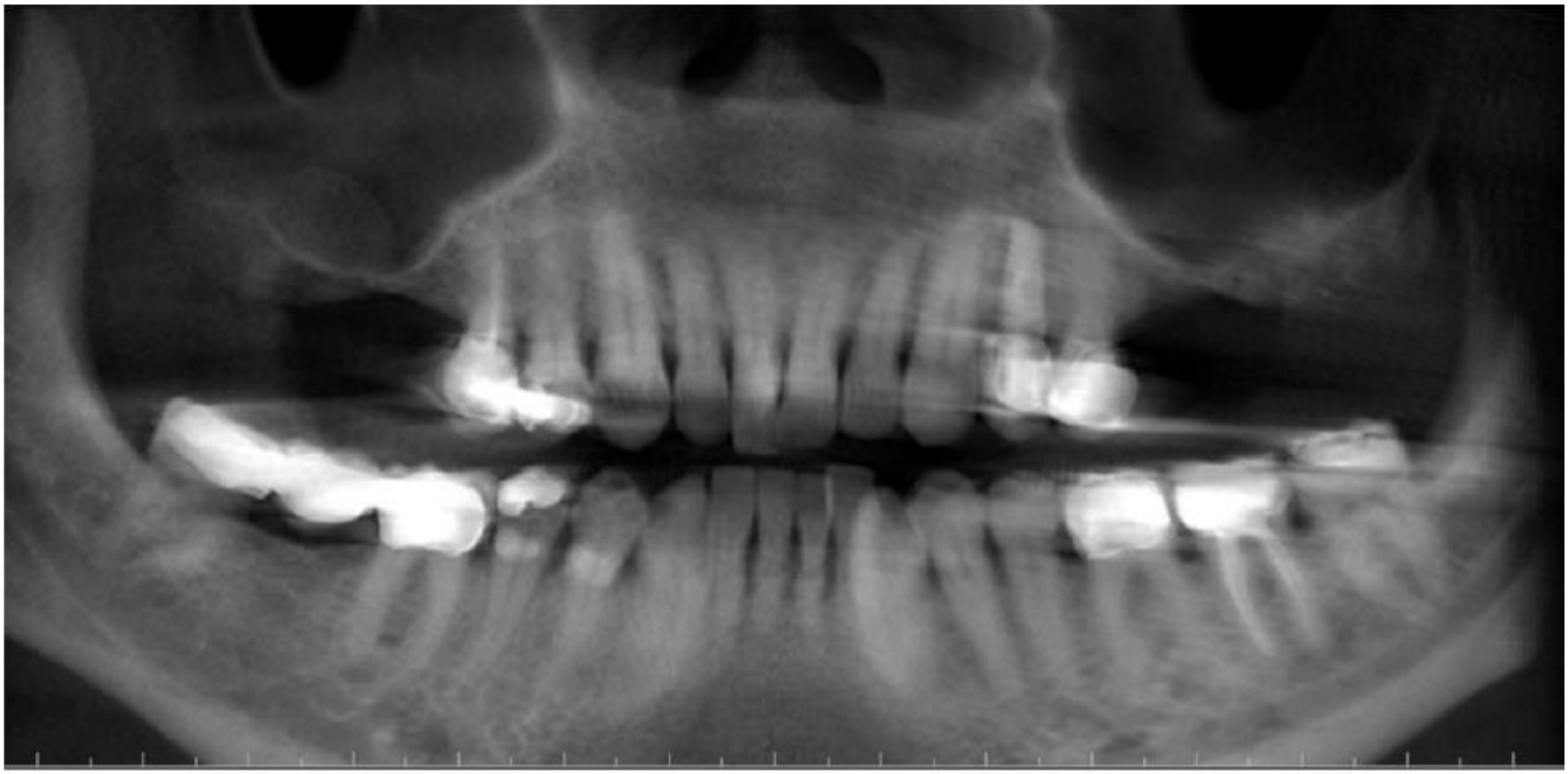
How many mm needed for implant placement?



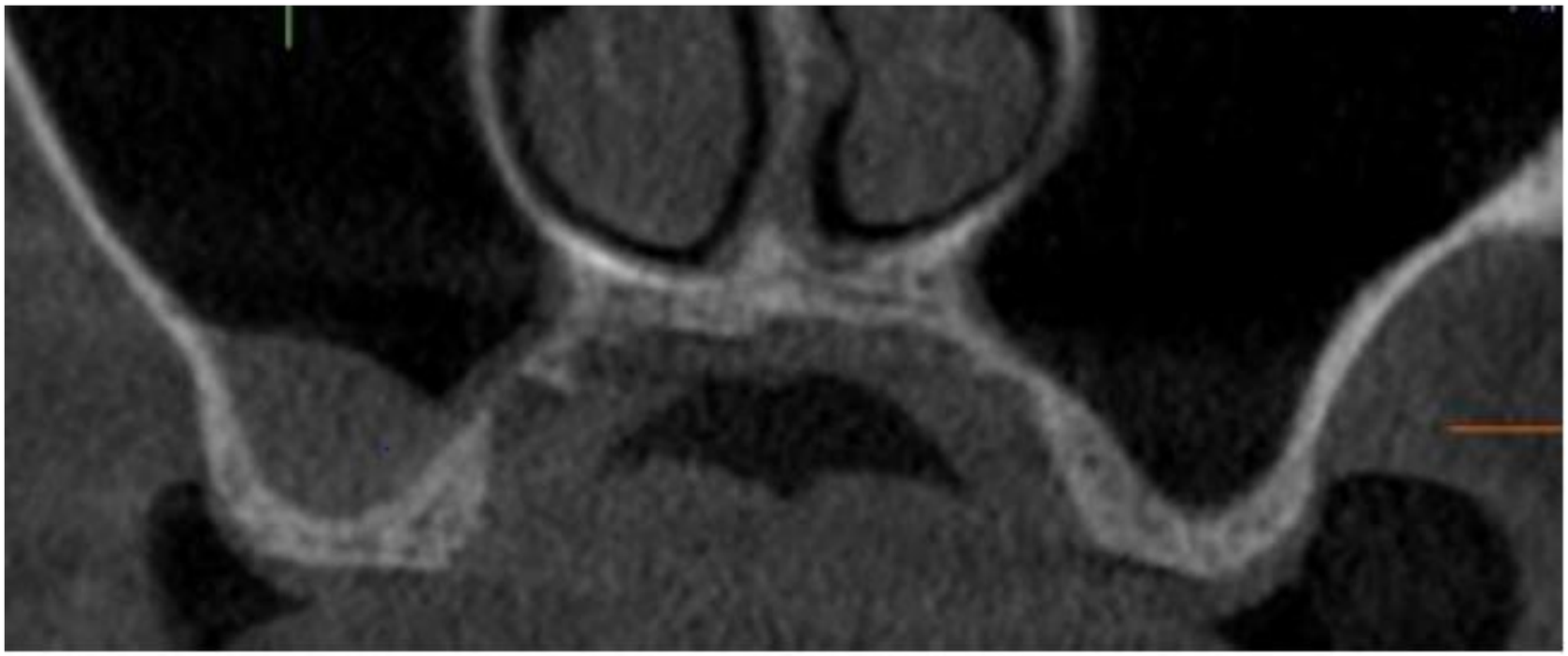
What are other options to view bone quality and quantity?

CBCT

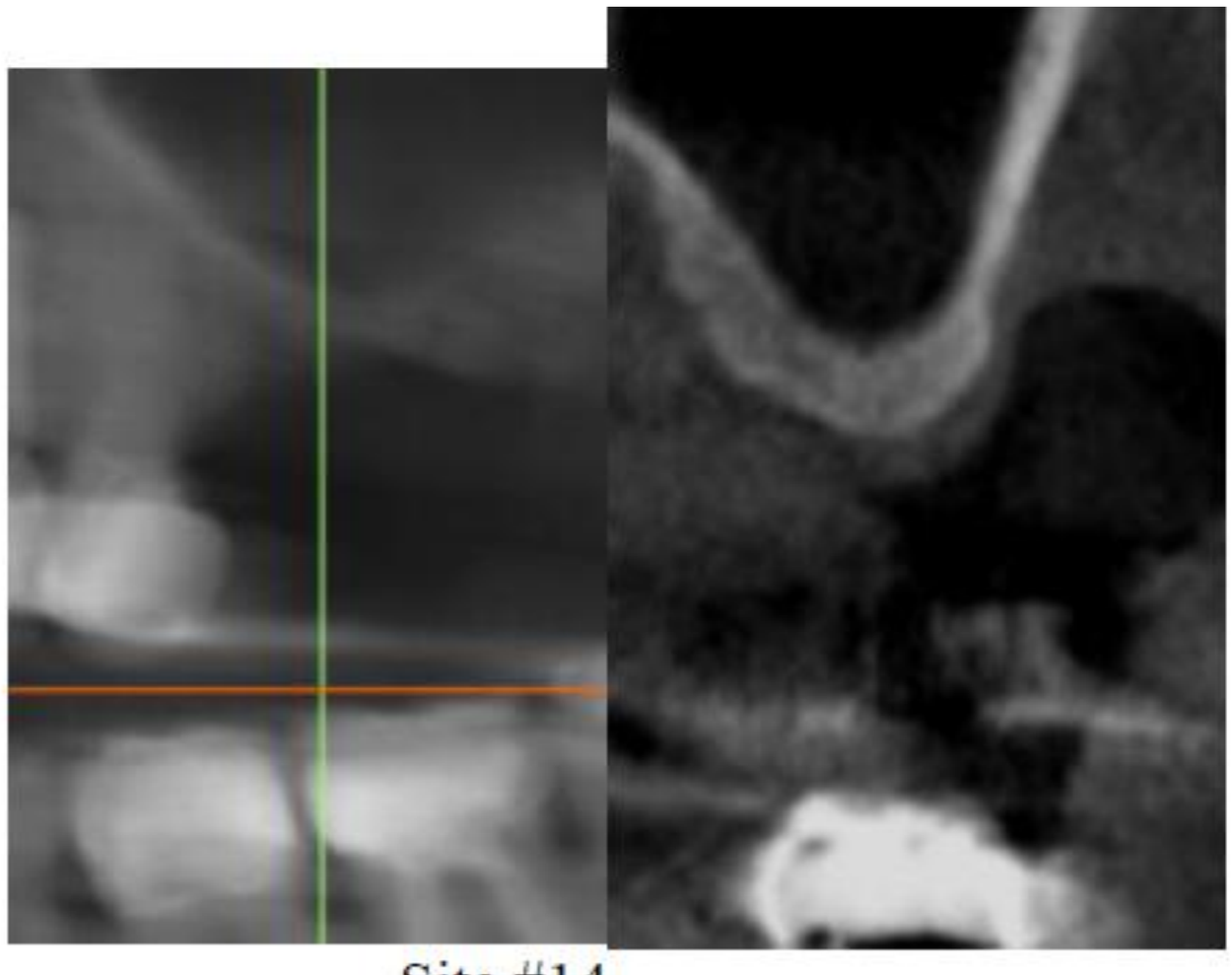
CBCT with review from Dr. Demirturk



Right maxillary sinus mucous retention cyst



Site #3



Site #14

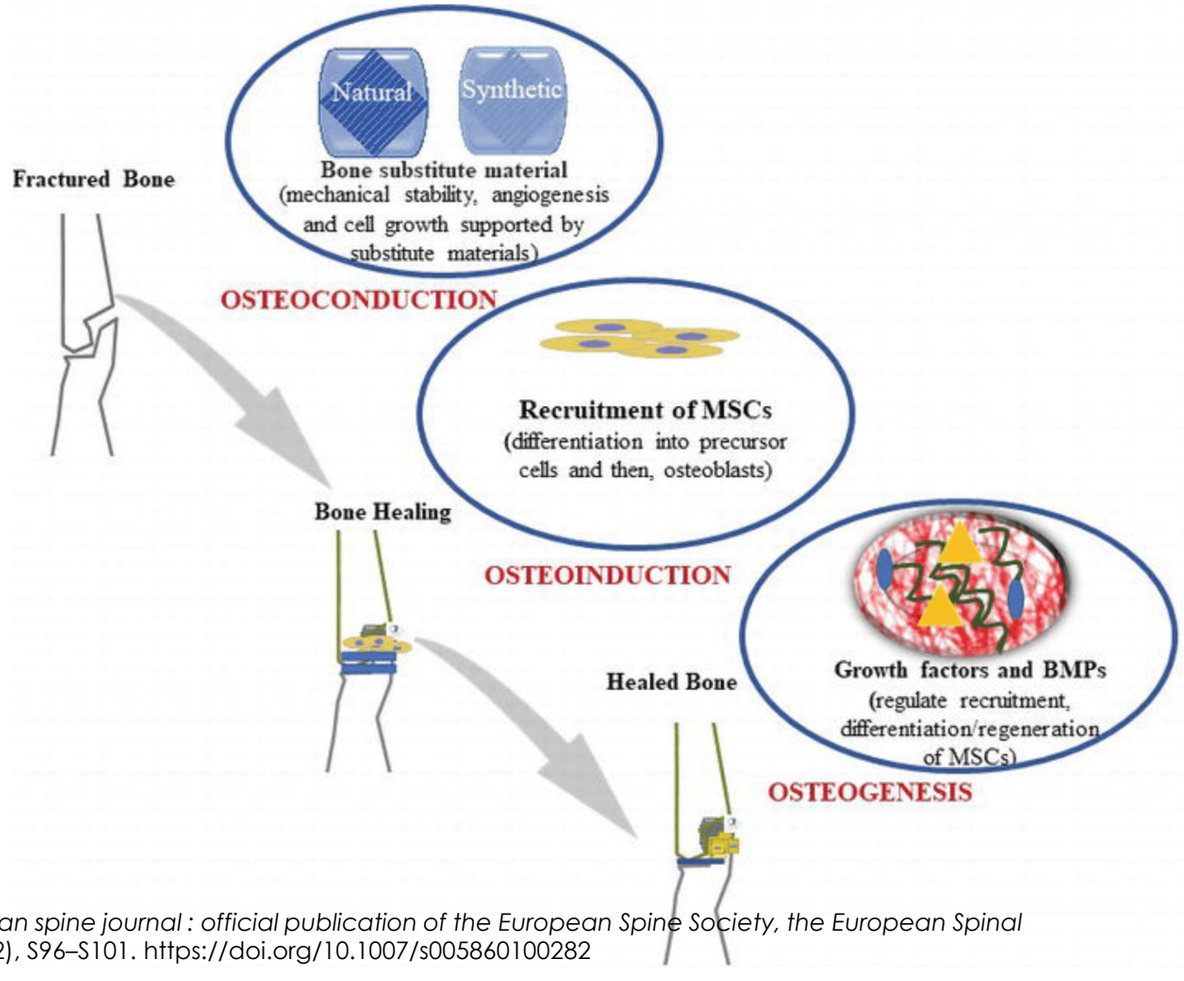
What are the options to fill an edentulous space?

- **Fixed partial denture**
  - For short edentulous span, healthy supportive tissues
  - Requires tooth reduction of abutments
- **Removable partial denture**
  - For multiple edentulous areas, severe periodontitis, excessive bone loss
  - Can lead to trauma to gingiva, plaque buildup
- **Implant-supported crown**
  - Conserves tooth structure
  - May require bone graft

Al-Quran, F. A., Al-Ghalayini, R. F., & Al-Zu'bi, B. N. (2011). Single-tooth replacement: factors affecting different prosthetic treatment modalities. BMC oral health, 11, 34. https://doi.org/10.1186/1472-6831-11-34
Fugazzotto P. A. (2009). Evidence-based decision making: replacement of the single missing tooth. Dental clinics of North America, 53(1), 97–ix. https://doi.org/10.1016/j.cden.2008.10.001

Bone Graft: Mechanisms of Bone Regeneration

- **Osteoconduction**
  - Provides the matrix for bone growth
- **Osteoinduction**
  - Growth factors and BMPs stimulate MSCs to differentiate into osteoblasts
- **Osteogenesis**
  - New bone produced by proliferation, osteoid production and mineralization



Albrektsson, T., & Johansson, C. (2001). Osteoinduction, osteoconduction and osseointegration. *European spine journal : official publication of the European Spine Society, the European Spinal Deformity Society, and the European Section of the Cervical Spine Research Society*, *10 Suppl 2*(Suppl 2), S96–S101. https://doi.org/10.1007/s005860100282

D2 Pathology Question

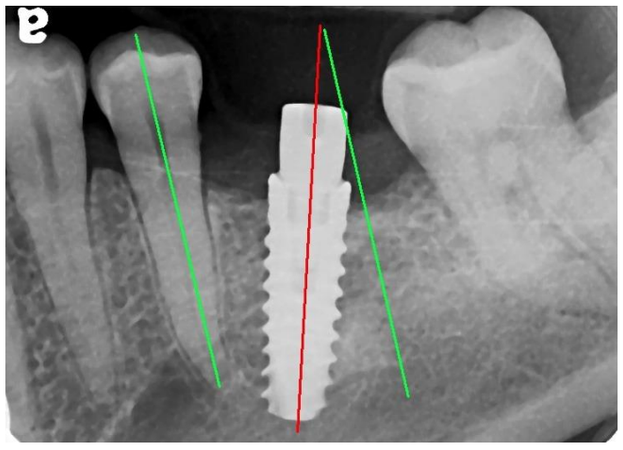
- What are causes of implant failure and how can they be avoided?

D2 Pathology Question

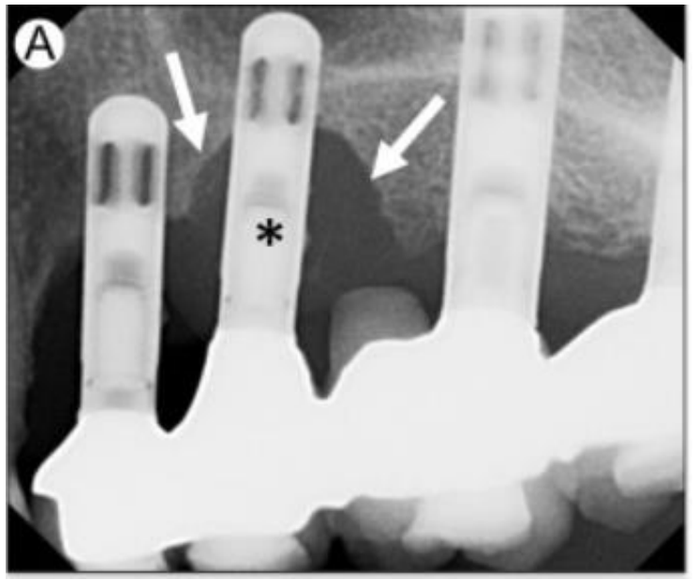
- Biomechanical overload
  - Poor angulation or positioning
  - Parafunctional habits
  - Inadequate posterior support
  - Inadequate amount of bone
- Infection or inflammation
  - Boneloss
- Other
  - Oral hygiene
  - Traumatic injury

D2 Pathology Question

- Biomechanical overload
  - Results in fracture of surrounding bone or implant or loosening due to inadequate retention
  - Bruxers have higher rate of failure than non bruxers
  - Avoid by proper planning and execution



https://www.facialart.com/archived-pages/our-practice/dental-implant-complications/implant-related-problems-complications/



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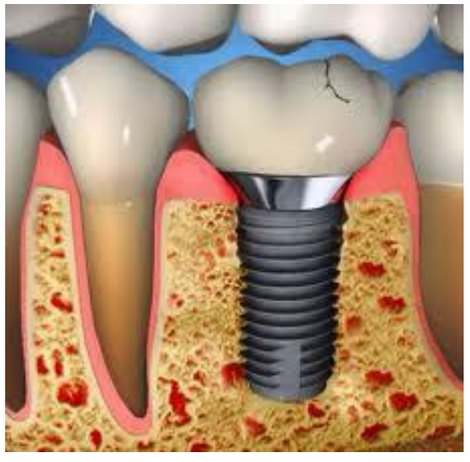

http://eximiustheseventh.blogspot.com/2013/12/what-does-bruxism-do-to-implants.html

D2 Pathology Question

- Infection and inflammation
  - Poor oral health can result in periodontal disease causing bone loss
  - Proper OHI, prophylaxis appointments every 3-6 months, ensuring no subgingival cement or overhangs present

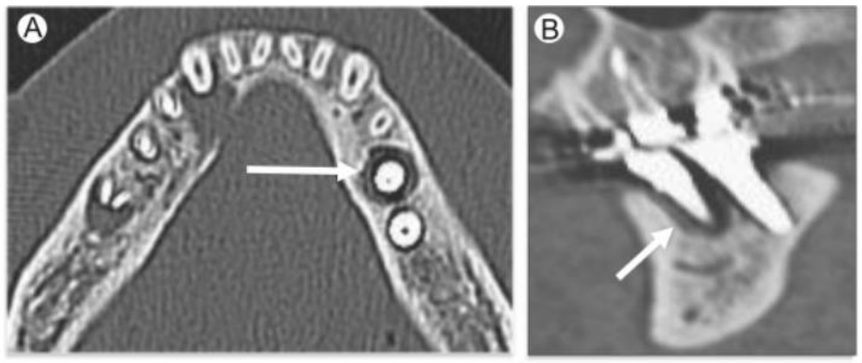

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Figure 3. Axial (A) and oblique sagittal CT (B) shows infection resulting in bone resorption and perihardware radiolucency (arrows).

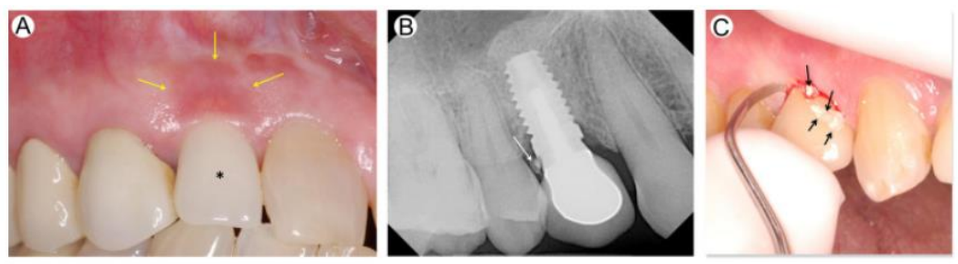

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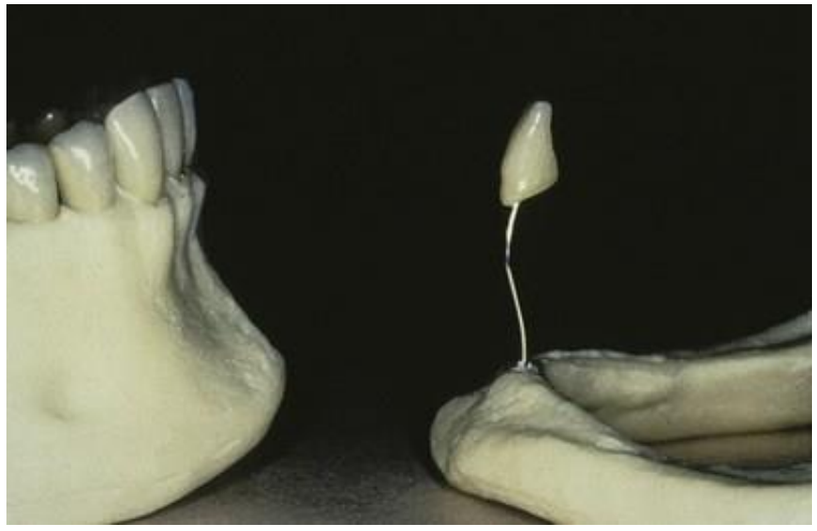
Figure 4. (A) Photo of a patient with subgingival cement causing inflammation (arrows) in area of restored implant (*). (B) Radiograph reveals radiopaque cement on distal aspect of implant (arrow). (C) Photograph demonstrates removal of the cement (arrows).

https://0-www-sciencedirect-com.libus.csd.mu.edu/science/article/pii/S0887217115000967?via%3Dihub

D2 Pathology Question

- Other
  - Natural bone resorption due to lack of vertical pressure
    - Place implants 4-6 months after extraction occurs
  - Traumatic Injury
    - Avoid situations that can result in injury

https://www.researchgate.net/figure/mplants-surrounded-by-thin-mucosa-may-be-more-prone-to-bone-resorption-with-angular-de_fig1_256440184



https://pocketdentistry.com/removable-implant-complications/

D2 Pathology Question

- Liaw, K., Delfini, R. H., & Abrahams, J. J. (2015). Dental Implant Complications. *Seminars in Ultrasound, CT and MRI*, *36*(5), 427-433. doi:10.1053/j.sult.2015.09.007
- Zhou, Y., Gao, J., Luo, L., & Wang, Y. (2015). Does Bruxism Contribute to Dental Implant Failure? A Systematic Review and Meta-Analysis. *Clinical Implant Dentistry and Related Research, 18*(2), 410-420. doi:10.1111/cid.12300
-

PICO

- P - pediatric patients
- I - Silver Diamine Fluoride
- C - Other treatment modalities
- O – Arresting cavitated carious lesions

PICO Question: How does the use of Silver Diamine Fluoride compare to over treatment options when arresting dental caries?

Clinical Bottom Line

- Silver Diamine Fluoride is an atraumatic restorative treatment that is effective at stopping carious decay. When all patient factors are considered, this treatment option is considered successful in long term RCT studies.

Research Details

- Date
  - October 18th 2019

- Key words:
  - Pediatric Patients, Silver Diamine Fluoride, ART

- Mesh terms:
  - Dental Caries
  - Dental Cavities
  - Treatment Success

Article 1

- Clinical Trials of Silver Diamine Fluoride in Arresting Caries Among Children: A Systematic Review

- Sytematic Review of 1123 publications and 19 publications on RCTs
- Assessed the effectiveness of SDF as a restorative material.

Article 1

- Analyzed the use of 38%, 30%, 10% SDF in arresting dental caries on primary teeth with some other restorative treatments

- Results showed that 30% SDF was more effective in arresting dentine caries in primary teeth than 5% NaF varnish

- When using 38% (44,800ppm) SDF to arrest dentine caries in primary teeth in children the caries arresting rate of SDF treatment was 86% at 6 mon., 81% at 12 mon., 78% at 18 mon., 65% at 24 mon., and 71% at or beyond 30 mon

- The overall arrestment of caries with 38% SDF treatment 2 times a year was 81%

Article 2

- Nonrestorative Treatments for Caries: Systematic Review and Network Meta Analysis
  - Systematic review of 44 RCTs arresting or reversing noncavitated or cavitated carious lesions
  - Directly answers the PICO in comparing nontraumatic restorative treatments for dental caries

Article 2

- Evaluated ART including sodium fluoride, stannous fluoride toothpaste, acidulated phosphate fluoride, difluorsiane, ammonium fluoride, polyols, chlorohexideine, calcium phosphate, amorphous calcium phosphate, casein phosphopeptide-ACP, nano hydroxyapatite, tricalcium phosphate, prebiotics, probiotics, Silver Diammine Fluoride, silver nitrate, lasers, resin infiltration, sealants, sodium bicarbonate, and calcium hydroxide in primary and permanent teeth

- Suggested that sealants + 5% sodium fluoride (NaF) varnish were the most effective for arresting or reversing noncavitated occlusal

- Resin infiltration + 5% NaF varnish were the most effective for arresting or reversing interproximal caries

- 5,000ppm F (1.1% NaF) toothpaste or gel were the most effective for arresting or reversing noncavitated and cavitated root carious lesions on primary and/or permanent teeth with low evidence

- Study-level data indicated that 5% NaF varnish was the most effective for arresting or reversing noncavitated facial/lingual carious lesions (low certainty)

- 38% silver diamine fluoride solution applied biannually was the most effective for arresting advanced cavitated carious lesions on any coronal surface with moderate to high certainty

Article 3

- Scientific Evidence For The Management of Dentin Caries Lesions In Pediatric Dentistry: A Systematic Review and Network Meta-Analysis

  - Systematic review of 15 RCTs with at least a 12 month follow up and including studies that contained Atraumatic restorative treatment (ART), High-viscous glass ionomers cement (HV), conventional restorative technique (CRT)
  - Article directly addresses PICO question in comparing various treatment methods to carious lesions

Article 3

- Systematic reviews of RCTs were analyzed to compare ART, HV, or CRT in a school or clinical setting in children ages 3-10 years old

- Analysis was preformed on surface involved, depth of progression into dentin, or both

- Resin Composite showed higher success rate than sealing with resin sealant however no difference in caries arrestment

- SDF ranked as #1 treatment in caries arrestment of occlusal and smooth surface lesions
  - Applications of 38% SDF two times a year showed a higher percentage of arresting active dentin caries lesions.

Level 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

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

Conclusion

- 1) Aside from staining the carious lesions black, there was no adverse complication of using SDF as a treatment material. SDF is an effective cost-efficient treatment to offer young patients or patients with special treatment needs.

- 2) It is important to have a proper analysis system when evaluating caries and the progression of the disease, this requires proper clinical evaluation and grading based off radiographic imaging and patient oral health.

- 3) The treatment of dentin carious lesions in primary teeth depends on the depth and surface involved. There are too few studies with strong enough evidence to strongly recommend the best treatment evidence.

Conclusion

- Spoon excavated #30, etched, prime, bond, placed ACTIVA BioACTIVE 38% SDF, arrested carious lesion and placed FUJI GI as long term restoration

Discussion Questions

- What are the contraindications, if any, to using SDF?
- What other factors influence SDF application success?
- How often do you reapply SDF what are the indications to reapply it?
- Is there an age restriction to using SDF?
- What is the most invasive a cavity may be for SDF to still be effective?

https://www.youtube.com/watch?v=_61IZp_RNYg