Evidence Based Dentistry Rounds

Surgical Services

1B-3

September 23rd, 2020

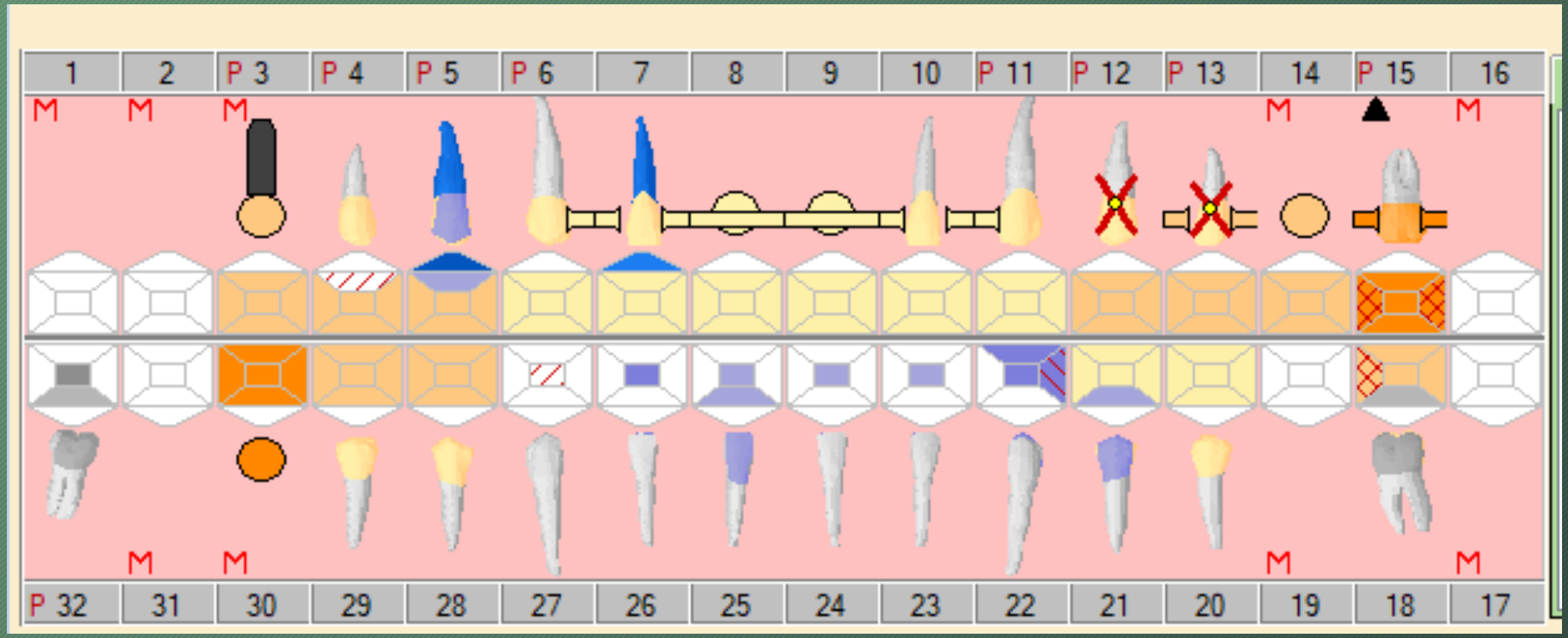
Rounds Team

- **Group Leader:** Dr. Smithy
- **Specialty Leader**: Dr. Almeida
- **Project Team Participants:**
- D4: Austin Mahlik
- D3: Soren Paape
- D2: Ciara Schwarz
- D1: Jake Landon

Patient

- 80 y/o female
- Chief Complaint: ”I think I need an implant and my tooth is broken (points to #12). It doesn’t hurt me”
- Leaves for Florida end of December

Odontogram


1 2 P 3 P 4 P 5 P 6 7 8 9 10 P 11 P 12 P 13 14 P 15 16
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Medical History

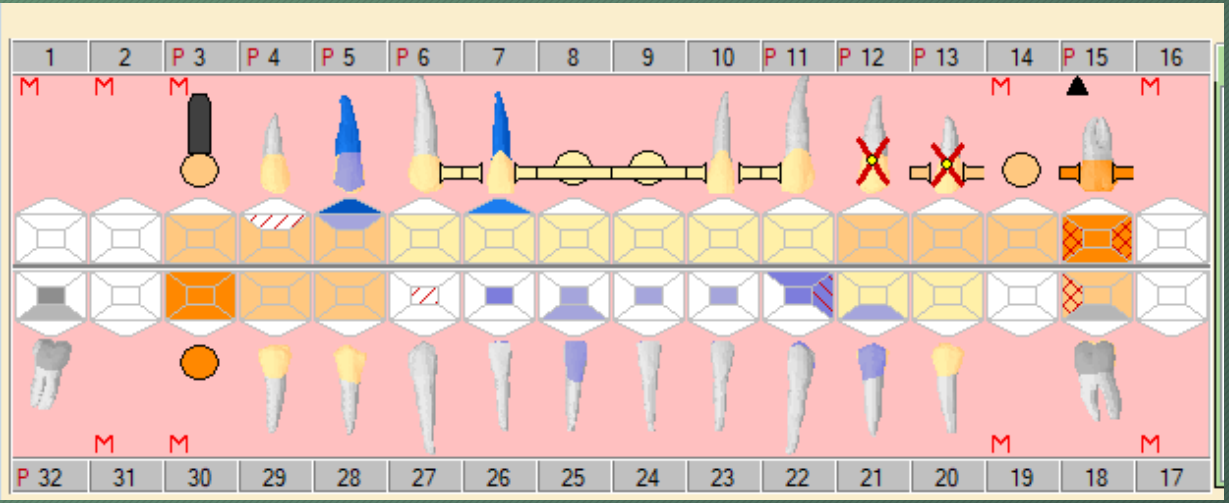
- Current & past:
  - Type 2 Diabetic
    - HbA1c 7/7.1/7.1
  - Cancer (BCC)
    - Surgically removed-healing
  - Treatment considerations
    - Healing time due to , diabetes, age, timing

Medical History

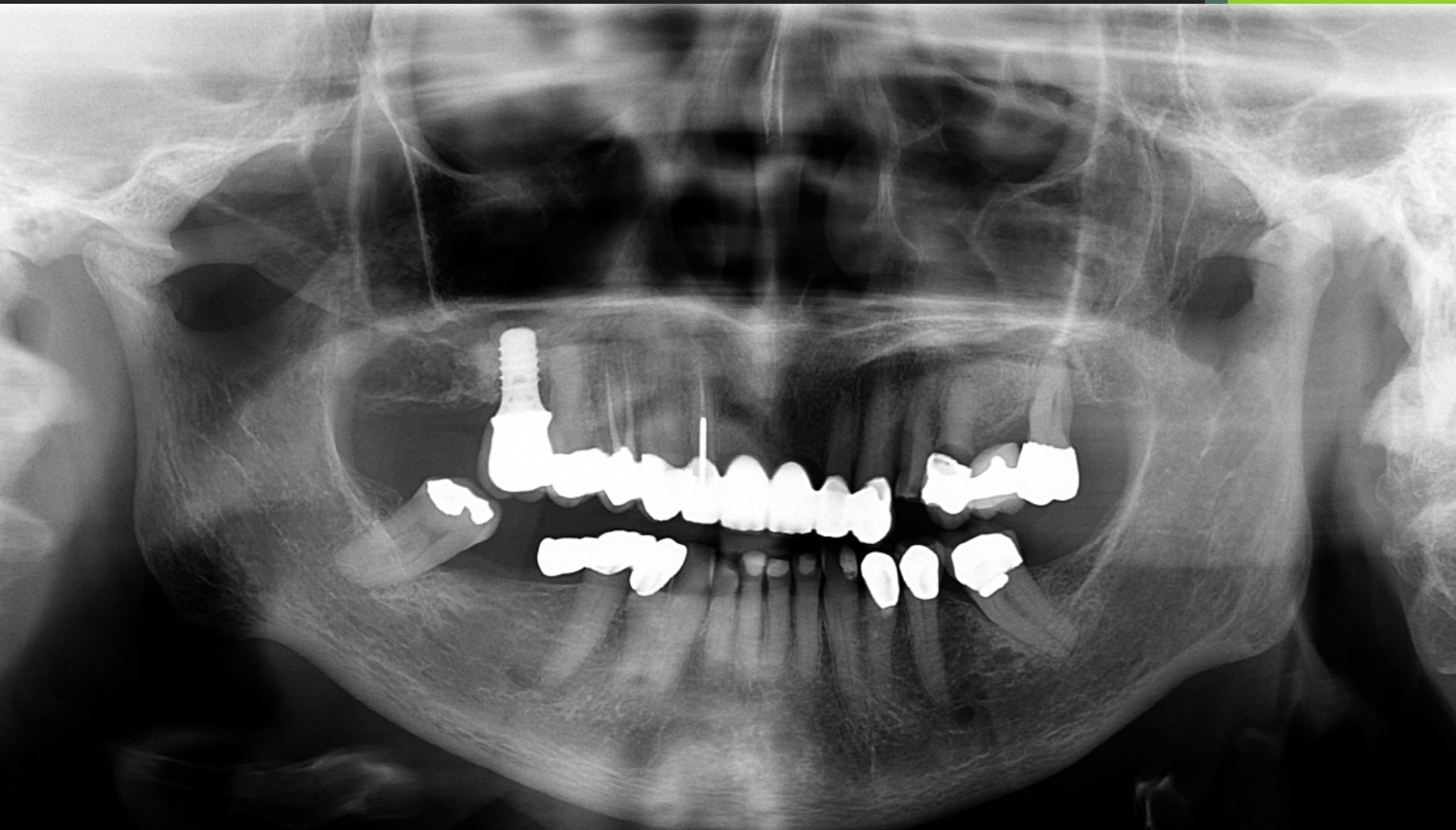
- Medications
  - Metformin
  - Lisinopril
  - Fenofibrate (cholesterol)
  - Synthroid
  - Vitamin B12

Dental History

- Implants, RCTs, FPDs, etc.
- Patient of record since 2009



Radiographs



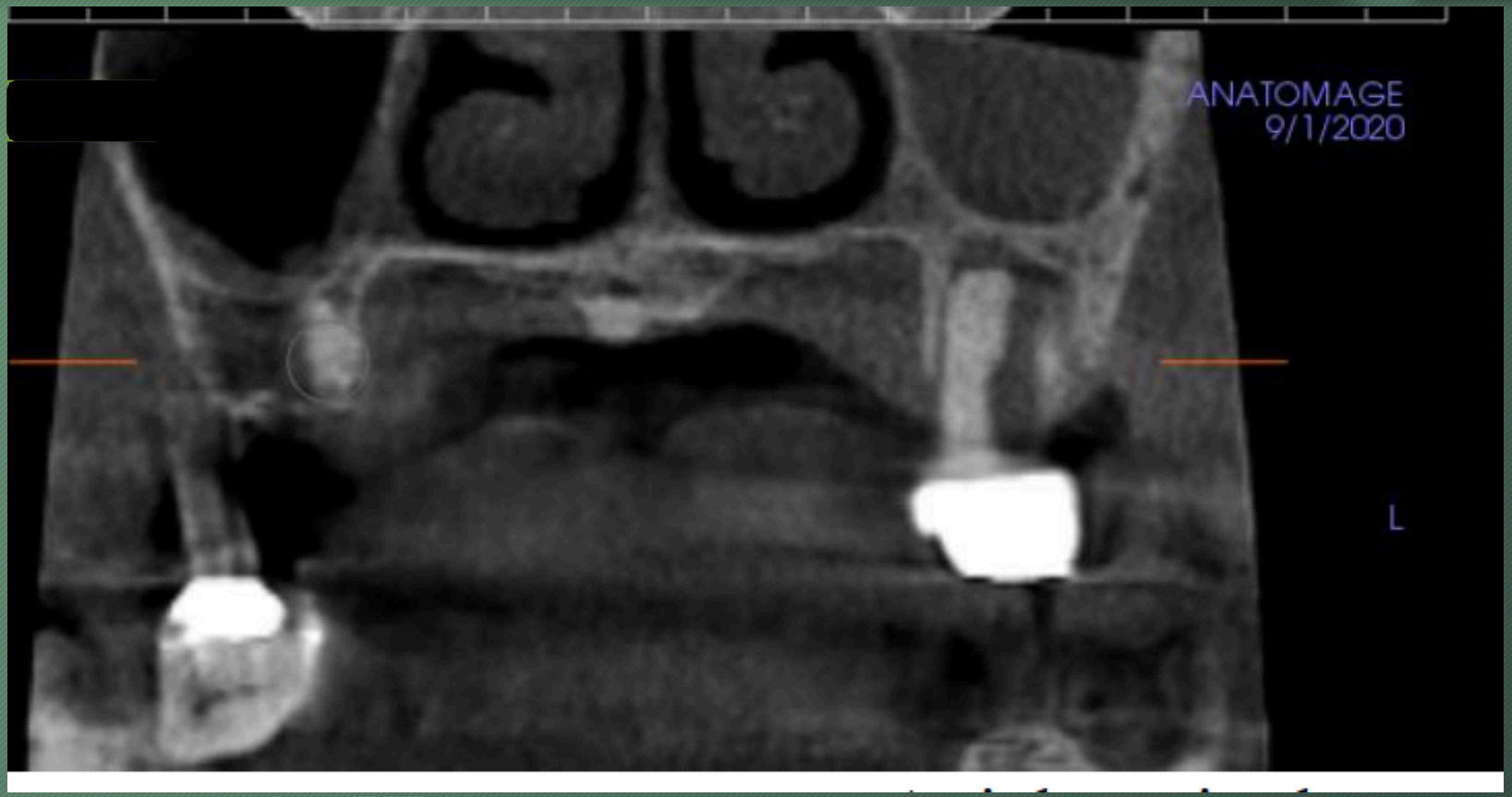
Radiographic Findings

- Gross decay/Failed bridge
- Fractured crown
- Perio/Endo lesions

Clinical Findings

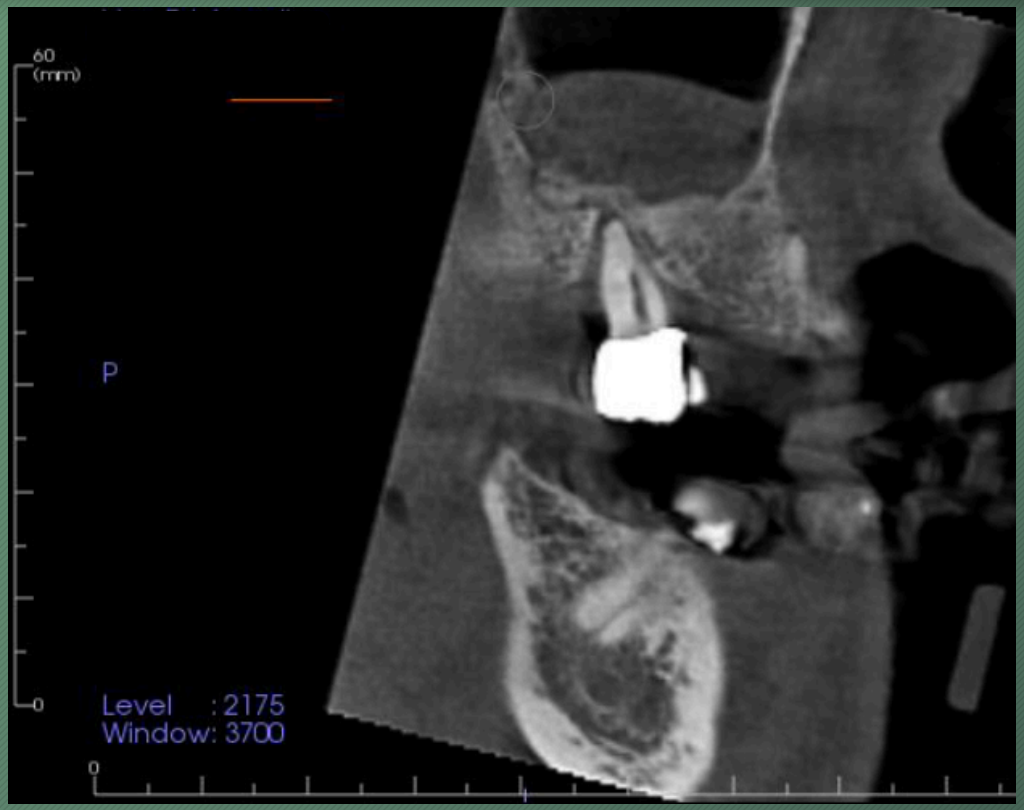
- Bruxism
- Patient is in group function with fremitus on numerous teeth

Specific Findings



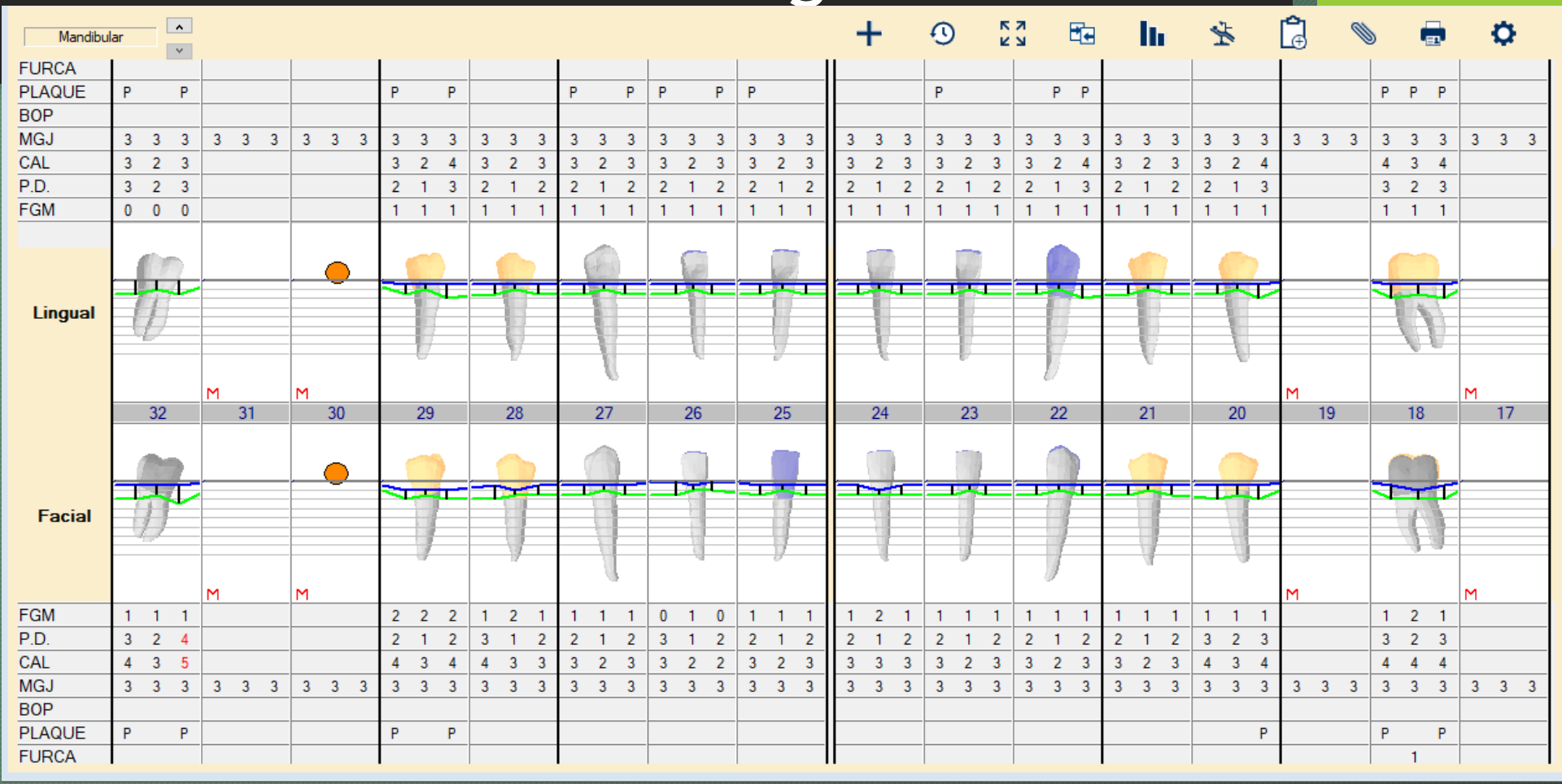
Severe periodontal bone loss around #15 with sclerotic trabecular bone.

Specific Findings

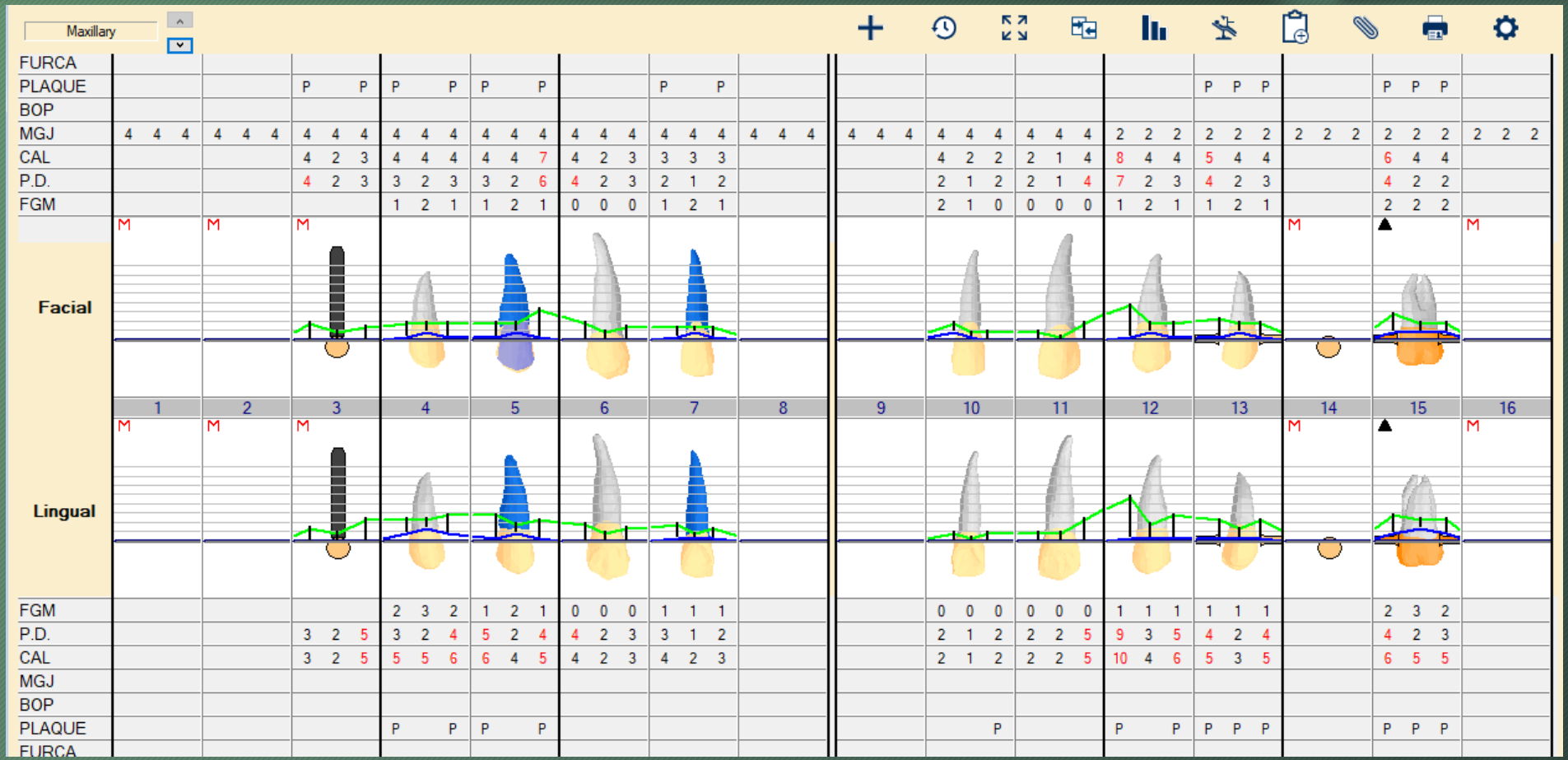


Left maxillary sinus: sinus disease (mucositis, mucus retention pseudocyst or sinusitis with possible history of trauma). Possible odontogenic origin contribution from tooth #15.

Periodontal Charting



Periodontal Charting



Diagnosis

- Gross decay with associated perio/endo lesions

Problem List

Gross decay/caries

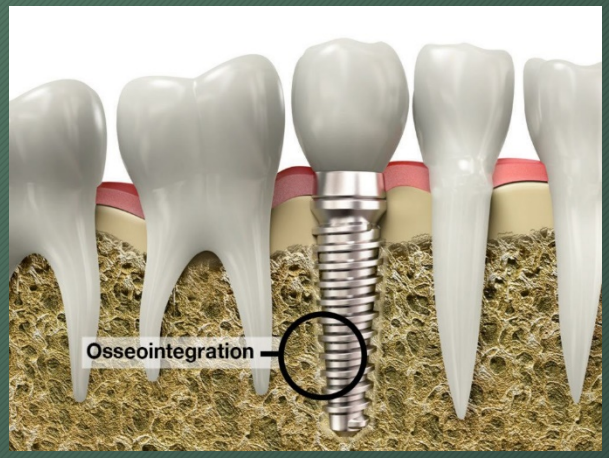
Failed restorations/bridge

Fracture teeth

Perio/endo lesions

D1 Basic Science

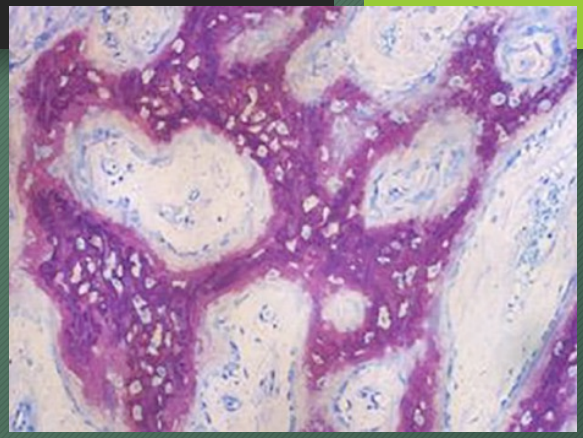
- What is osseointegration?
  - Direct contact between bone and implant
  - Materials required
    - Noncorrosive metals
  - Importance
    - Maintaining presence of bone

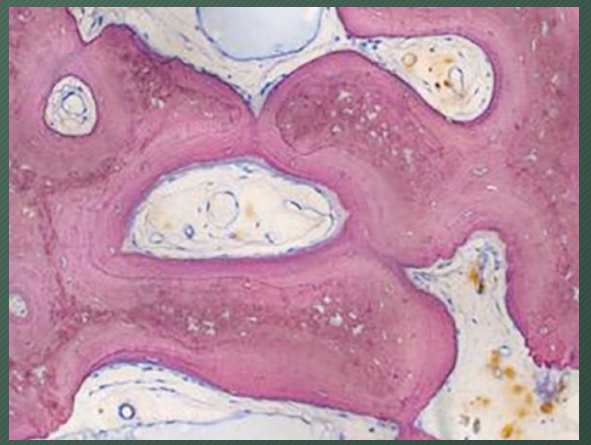


https://www.oralsurgeryassociates.com/dental-implants/osseointegration

Basic Science Question

- 3 Stages of osseointegration
  - Woven bone development
  - Lamellar bone growth
  - Bone remodeling

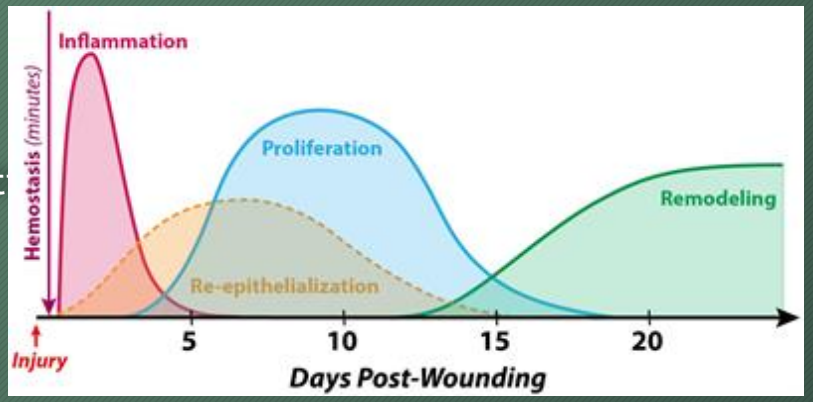




Lang, N. P. (2019). Oral Implants: The Paradigm Shift in Restorative Dentistry. Journal of Dental Research (All Images)

Implant Wound Healing Stages

1. Hemostasis
   - Vasoconstriction
   - Platelet aggregation
2. Inflammation
   - Neutrophil, macrophage & lymphocyte infiltrat
   - Granulation tissue formation
3. Proliferation
   - Provisional connective tissue matrix formation
   - Woven bone formation
4. Remodeling
   - Lamellar bone formation
   - Vascular maturation & regression

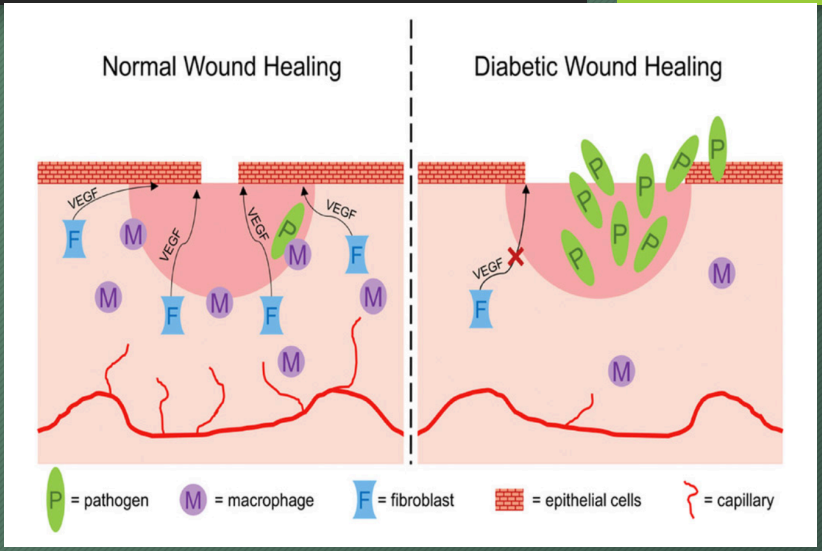


DesJardins-Park, Heather E, et al. "The Spectrum of Scarring in Craniofacial Wound Repair." *Frontiers in Physiology* , Mar. 2019.

Politis, Constantinus, et al. "Wound Healing Problems in the Mouth." *Frontiers in Physiology*, vol. 7, 2016

Diabetes & Implants

- Decreased vascularization
  - Hypoxia
  - Enhanced initial inflammation
- Persistent hyperglycemia
  - Inhibit osteoblastic activity
  - Alter parathyroid hormone regulating Ca & P
- Immunosuppression
  - Increased risk of infections
- Psychological stress



Malone-Povolny, Maggie J, et al. "Diabetic Wound Healing." *Advanced Healthcare Materials* , 15 Jan. 2019.

Dubey, Rajendrakumar, et al. "Dental Implant Survival in Diabetic Patients; Review and Recommendations." *National Journal of Maxillofacial Surgery*, vol. 4, no. 2, 2013, p. 142.

D3 PICO

Clinical Question: What is the success of implants placed in patients with relative contraindications that may impact healing including an infected site and diabetes?

PICO Format

P: Adult patient receiving an implant placement

I: Placing implants in patients with relative contraindications including an infected site and diabetes

C: Placing implants with no contraindications

O: Survival rates

PICO Formatted Question

In adult patients receiving a dental implant, how do relative contraindications including an infected site and diabetes compared to no contraindications influence the survival rate?

Clinical Bottom Line

"There are no absolute contraindications to implant placement. Patients who were over age 60, smoked, had a history of diabetes, had a history of head or neck radiation, or were postmenopausal and on hormone replacement therapy experienced significantly increased implant failure compared to healthy patients."

"The survival rates of implants placed in peri-apical sites does not statistically influence the survival rate of the implant."

"You must take a CBCT and determine if you have a good potential for building buccal bone. If not, delayed implant protocol might be considered, specifically in the aesthetic zone."

"We see a decrease in survival rate for type 1 diabetics compared to control; however, no change in type 2 diabetics compared to control."

Search Background

Date of Search: September 16th, 2020

Database(s) Used: PubMed

Search Strategy/Keywords:

- Implant Placement
- Dental Treatment
- Peri-apical Infection

Search Background

MESH terms used:

- Implant Placement
- Dental
- Infection
- Contraindications

Article 1 Citation, Introduction

Lindeboom, J. A., Tjiook, Y., & Kroon, F. H. (2006). Immediate placement of implants in periapical infected sites: A prospective randomized study in 50 patients. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology, 101*(6), 705-710. doi:10.1016/j.tripleo.2005.08.022

Study Design: Individual Randomized Controlled Trial

Study Need/Purpose: To determine clinical success when implants are placed in periapical infected sites.

Article 1 Levels of Evidence and Strength of Recommendation Taxonomy (SORT)

☐ **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) For Guidelines and Systematic Reviews
See article **J Evid Base Dent Pract 2007;147-150**
☒ **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 Synopsis

Method: Fifty patients were randomized and 25 implants were immediately placed after extraction, and 25 implants were placed after 3 month healing period. 32 implants were placed in the anterior maxilla and 18 implants were placed in the premolar region. Implant survival, mean Implant Stability Quotient (ISQ) values, gingival aesthetics, radiographic bone loss, and microbiologic characteristics of periapical lesions were evaluated for both groups.

Article 1 Synopsis

Results: 2 implants in the immediate placement group were lost (92% survival rate) and 0 implants in the 3-month healing period were lost (100% survival rate). Mean ISQ, gingival aesthetics and radiographic bone resorption, and periapical cultures were all not significantly different with the immediate placement and 3-month healing period implants.

Conclusion: Slightly lower survival rate in implants placed in periapical infected sites for immediate placement; however, this was not a statistically significant difference. However, we may want to consider delayed implant protocol in the aesthetic zone due to recession at the level of the mid-buccal gingiva.

Article 1 Selection Criteria

- High level of evidence
- Article directly addresses PICO Question

Article 2 Citation, Introduction

Chrcanovic, B. R., Martins, M. D., & Wennerberg, A. (2013). Immediate Placement of Implants into Infected Sites: A Systematic Review. *Clinical Implant Dentistry and Related Research, 17*. doi:10.1111/cid.12098

Study Design: Systemic Review

Study Need/Purpose: To review the literature regarding treatment outcomes of immediate implant placement into sites exhibiting pathology after clinical procedures to perform the decontamination of the implant's site.

Article 2 Levels of Evidence and Strength of Recommendation Taxonomy (SORT)

☒ **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)
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Article 2 Synopsis

Methods: Electronic search in PubMed was performed. The titles and abstracts from these results were read to identify studies within the selection criteria. The publication's intervention had to have been implant placement into a site classified as having an infection.

Article 2 Synopsis

Results: The study search had 706 references with 32 in the selection criteria. Of these 32, nine were case reports and review articles which were excluded. Additional hand-searching of reference lists yielded five more papers. A total of 25 papers were used.

Conclusion: High survival rates obtained in several studied supports that implants may be successfully osseointegrated when placed immediately after extraction of teeth presenting endodontic and periodontic lesions with proper surgical procedure. Issues included vague classification of the infection (periapical, endodontic, perioendodontic, and periodontal) as well as a longer follow-up for confirmation.

Article 2 Selection Criteria

- High level of evidence
- Article directly addresses the PICO question

Article 3 Citation, Introduction

Ausra, R., & Schwarz, F. (2019). The dimensions of the facial alveolar bone at tooth sites with local pathologies- A cone-beam CT analysis. doi:10.26226/morressier.5d3880b73ceb062ea26e4d4a

Study Design: Individual Randomized Controlled Trial

Study Need/Purpose: To assess the impact of various local pathologies on facial alveolar bone dimensions at tooth sites.

Article 3 Levels of Evidence and Strength of Recommendation Taxonomy (SORT)

☐ **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)
☒ **1b** – Individual RCT
☐ **2a** – Systematic Review of Cohort Studies
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Article 3 Synopsis

Method: Con-beam images of 60 patients were analyzed. Healthy teeth and teeth with local pathologies (endo, periodontally diseased, and teeth with PA lesions) were included. The thickness of facial alveolar bone was measure at the bone crest as well as 25%, 50%, and 75% from the distance of the bone crest to the root apex.

Article 3 Synopsis

Results: 1174 teeth were assessed. Periodontally diseased maxillary premolars and anterior teeth in the mandible at the bone crest, as well as maxillary molars at 25% distance from the bone crest to the root apex had lower facial bone thickness when compared to healthy teeth. One contrast to the hypothesis was mandibular diseased anterior teeth 50% from the bone crest to the root apex had a thicker bone wall.

Conclusions: Overall the results were statistically significant that local pathologies are commonly associated with a compromised socket morphology.

Article 4 Citation, Introduction

Tawil, G., Younan, R., Azar, P., & Sleilati, G. (jul-aug 2008). Conventional and advanced implant treatment in the type II diabetic patient: Surgical protocol and long-term clinical results. *Int J Oral Maxillofac Implants, 23*(4), 744-752.

Study Design: Individual Randomized Controlled Trial

Study Need/Purpose: To investigate the effect of type-2 diabetes on implant survival and complication rate.

Article 4 Levels of Evidence and Strength of Recommendation Taxonomy (SORT)

☐ **1a** – Clinical Practice Guideline, Meta-Analysis, Systematic Review of Randomized Control Trials (RCTs)
☒ **1b** – Individual RCT
☐ **2a** – Systematic Review of Cohort Studies
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Article 4 Synopsis

Method: Participants were type-2 diabetes with edentulism, had a mean HbA1c level of 7.2%, and compliant with a maintenance program. Clinical diabetes-related factors and periodontal parameters on implant survival were assessed.

Article 4 Synopsis

Results: Implant survival following conventional or advanced implant therapy was not statistically different between the well controlled (HbA1c < 7%) and the fairly well-controlled (HbA1c from 7-9%). Overall survival rate for the diabetic group was 97.2% (control 98.8%) and was not significantly different for age, gender, diabetes duration, smoking, or type of hypoglycemic therapy.

Conclusion: No statistically significant difference was found for patients or for implants for the advanced surgery cases or conventional approach in type-2 diabetic patients compared to nondiabetic patients.

Conclusions

PICO: In adult patients receiving a dental implant, how do relative contraindications including an infected site and diabetes compared to no contraindications influence the survival rate?

- Based on Lindeboom 2006 and Chrcanovic 2013, the survival rates of implants placed in peri-apical sites with infections are not statistically lower than the survival rate of implants placed in sites with no infection.
- However, based on Lindeboom 2006 and Ramanauskaite 2020, you must take a CBCT and determine if you have a good potential for building buccal bone. If not, delayed implant protocol might be considered, specifically in the aesthetic zone.
- Tawil 2008 determined there was no difference for advanced surgery cases or conventional approach in type-2 diabetics compared to nondiabetic patients.

Conclusions: D4

Two stage implant placement after extraction/ curettage/0.12% chlorhexidine rinse/socket preservation

4-6 months healing

Implant placement at sites 12 and 14

Discussion Questions

Will the severity of the contraindication have an impact on which implant material is used in the patient?

Depends on the contraindication:

"Advanced age increased the risk of implant failure; patients older than 60 years old were twice as likely to have adverse outcomes. Surprisingly, their risk of failure decreased slightly for patients older than 79 years."

Other contraindications that we couldn't determine severity: smokers, patients with a history of head and neck radiation, and postmenopausal women on hormone replacement therapy."

Discussion Questions

What other options does a patient have if the implants fail due to their diabetes?

If the implant fails the patient would need a bone grafting procedure followed by a reattempt, removable partial denture, or a fixed bridge

Are there any factors or conditions that affect osseointegration of an implant significantly more than others?

“In patients with significant osteoporosis, it may be difficult to achieve immediate implant stability because of decreased trabecular bone mass.”

“Radiation can have many deleterious effects, the most relevant to bony and soft tissue healing being hypocellularity, hypo vascularity, and hypoxemia. These changes in irradiated tissues contribute to an increased failure rate during osteoconductive phases of osseointegration.”

”Microvascular disease of the gingiva in diabetic patients may adversely affect blood supply and contribute to delayed or al wound healing and susceptibility to infection.”

Discussion Questions

If a patient with diabetes has a successful implant placement and healing process, are there additional risk factors to expect several years after the implant is placed?

Same reasons for failure. “These patients had failures beginning a few months postplacement and continuing for more than 10 years. Further studies are required to correlate implant failure with control of diabetes and other wound healing problems.”

Typically how long must a person be diabetic before they experience issues with healing?

Immediately/before becoming diabetic. The short answer is It depends..

Discussion Questions

When discussing diabetes and implant success, is there a difference between type I and type II diabetic patients and outcomes?

"Few studies demonstrated significantly higher failure of implant in type-1 diabetic patients than patients with type-2 diabetes. "Higher failure rate in diabetic type-1 may be due to depletion of insulin in tissues whereas presence of insulin in tissues of type-2 diabetic individuals may reduce deleterious effect of hyperglycemia."

What types of medications could negatively affect osseointegration?

"Postmenopausal women on hormone replacement therapy had a significant increase in failure rates of dental implants." Controversial… Also.. SSRIs, Proton pump inhibitors. Statins may improve? Controversial

Discussion Questions

Are there different measures one can take when a patient presents with osteoporotic bone? What can be done to help implant osseointegration?

"In patients with significant osteoporosis, it may be difficult to achieve immediate implant stability because of decreased trabecular bone mass." Reducing the amount of trauma and primary closure are a must.

What is the likelihood of the body rejecting a dental implant? How much of an increase is there with a diabetic patients?

One Paper…

Mandible – 4.93% failed

Maxilla – 8.16% failed

Additional Citation for Discussion Questions

Dubey, R., Gupta, D., & Singh, A. (2013). Dental implant survival in diabetic patients; review and recommendations. *National Journal of Maxillofacial Surgery, 4*(2), 142. doi:10.4103/0975-5950.127642

Moy, P., Medina, D., V. S., & Aghaloo, T. L. (n.d.). Dental implant failure rates and associated risk factors. Retrieved September 21, 2020, from https://pubmed.ncbi.nlm.nih.gov/16161741/

THANK YOU