Fall 2020 Rounds

Evidence Based Dentistry Rounds

Periodontics

Group 4

Team A1

October 28th 2020

Rounds Team

- **Group Leader: Dr. Grady**
- **Specialty Leader: Dr. Kofina**
- **Project Team Leader: D4- Luke Weston**
- **Project Team Participants: D1- Elise Austin; D2- Grant Karlsson-Ellifson; D3- Nicole Reitz**

George

- 78 Y.O. Greek Male
- CC: “I broke my tooth over Covid and I want an implant to replace it.”
- Long time patient of the school, since 2001, and has had successful implants in the past.

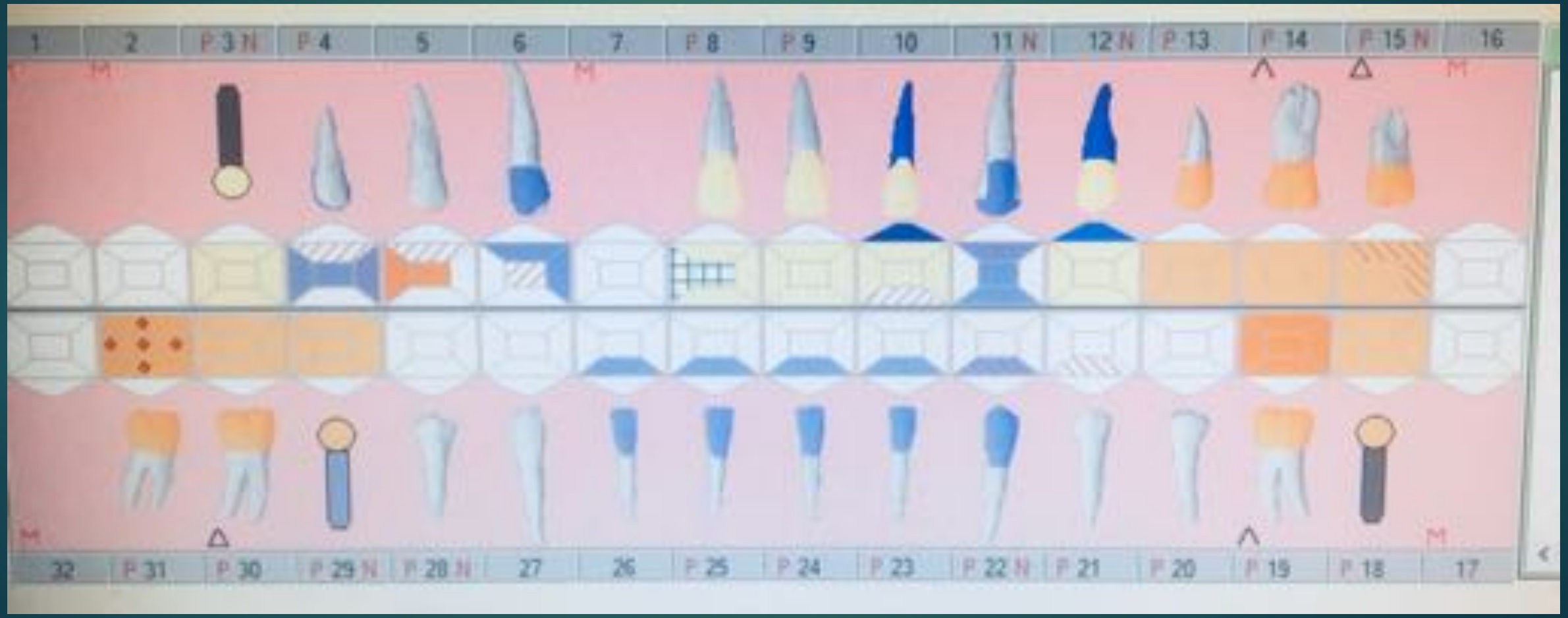
Medical History

- Current & past:
  - High B.P.
  - Medications: Triamterene-hydrochlorthiazid 25 mg, flaxseed oil, fish oil
  - NKDA

Dental History

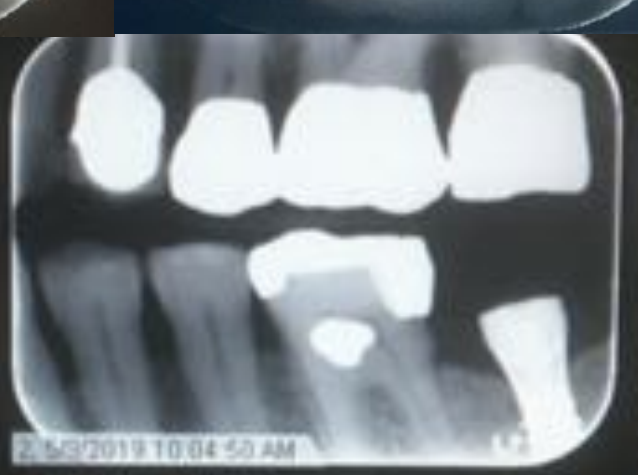
- Missing: #1, 2, 3, 16, 17, 18, 29, 32
- Fractured: #7
- Implants: #3, 18, 29
- Endo: 10, 12
- PFM Crowns: #8, 9, 10, 12
- Gold Crowns: 13, 14, 15, 19, 30 and planned #31
- Gold Inlay: #5
- Resins: #4 MOD, #6 MF, #11 FIL, #22F, 23F, 24F, 25F, and 26 F

Odontogram


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

Radiographs

Radiographs



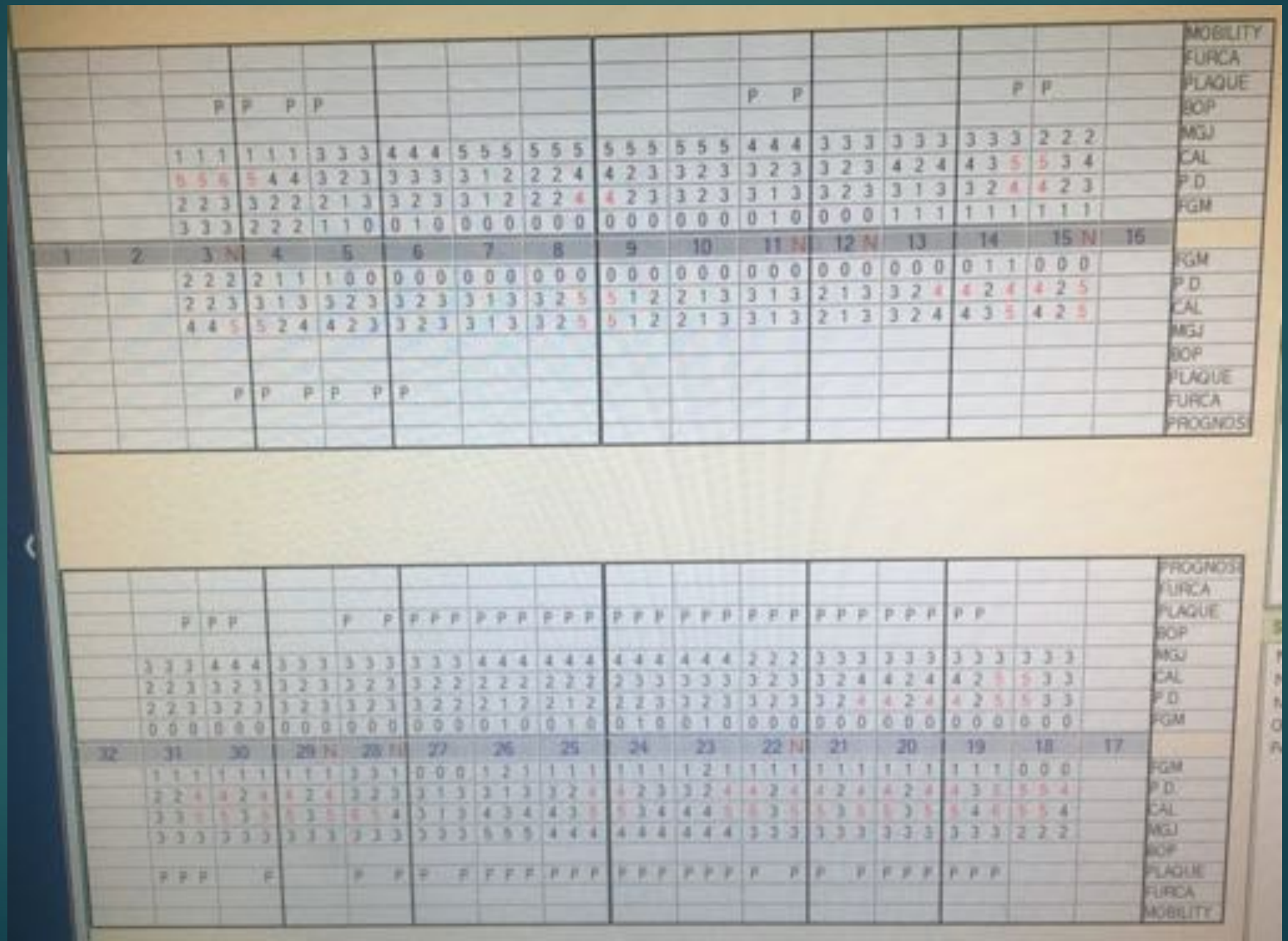
Radiographic Findings

- #7 broken at gingival level
- Recurrent distal caries under crown #8

Clinical Findings

- #7 broken at gingival level with caries
- #8 has distal caries under PFM crown

Periodontal Charting



Diagnosis

- None Restorable #7 and 8…… However!

Problem List

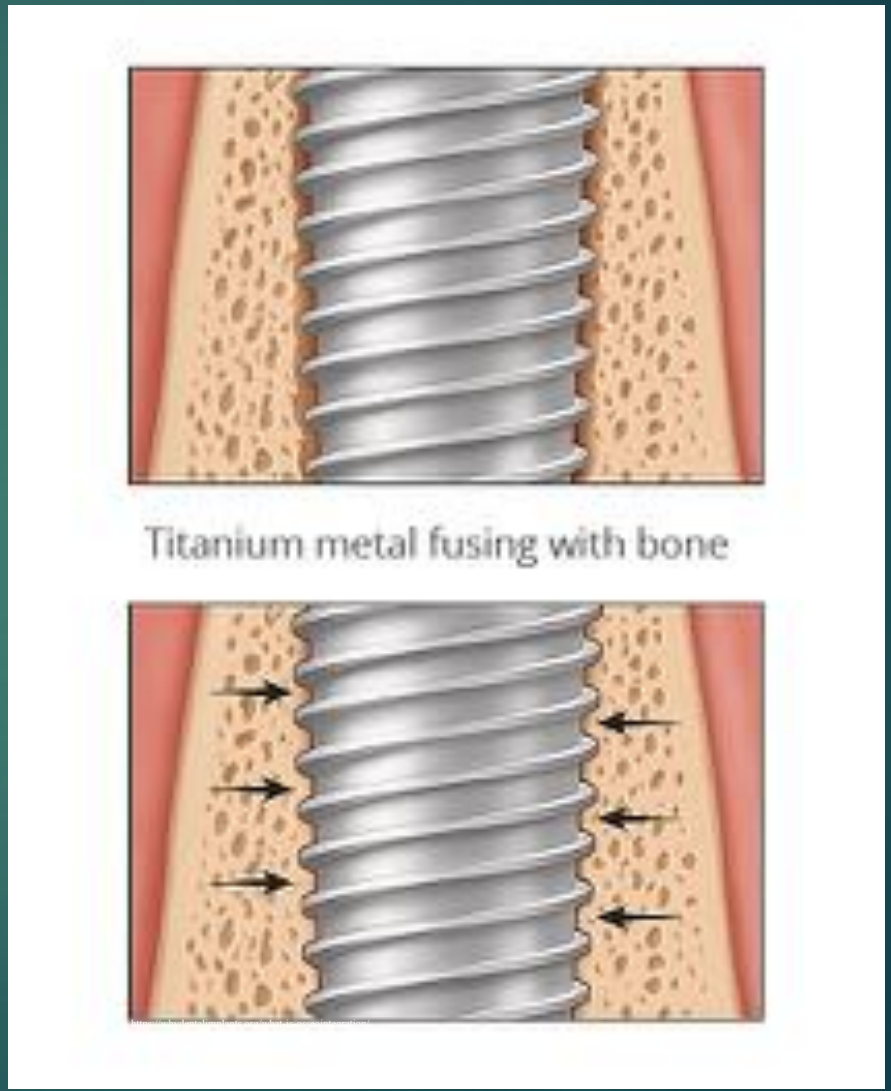
- Caries, Missing Teeth, Esthetics

Presentation Questions

- Clinical Question: In what situations can immediate implants be considered?
- PICO Question: In patients receiving implants when do immediate implants have a comparable success rates as well as survival rates to traditional implants?
- Pathology Question: What causes implants to fail?
- Basic Science Question: How do implants osseointegrate?

D1: How Do Implants Osseointegrate?

- "Osseointegration refers to a direct structural and functional connection between ordered, living bone and the surface of a load-carrying implant."



Mavrogenis, A F, et al. "Biology of implant osseointegration." *Journal of Musculoskeletal and Neuronal Interactions*, vol. 9, no. 2, 2009, pp. 61–71.

Steps to Osseointegration

1) Blood surrounds and forms a clot → Procallus

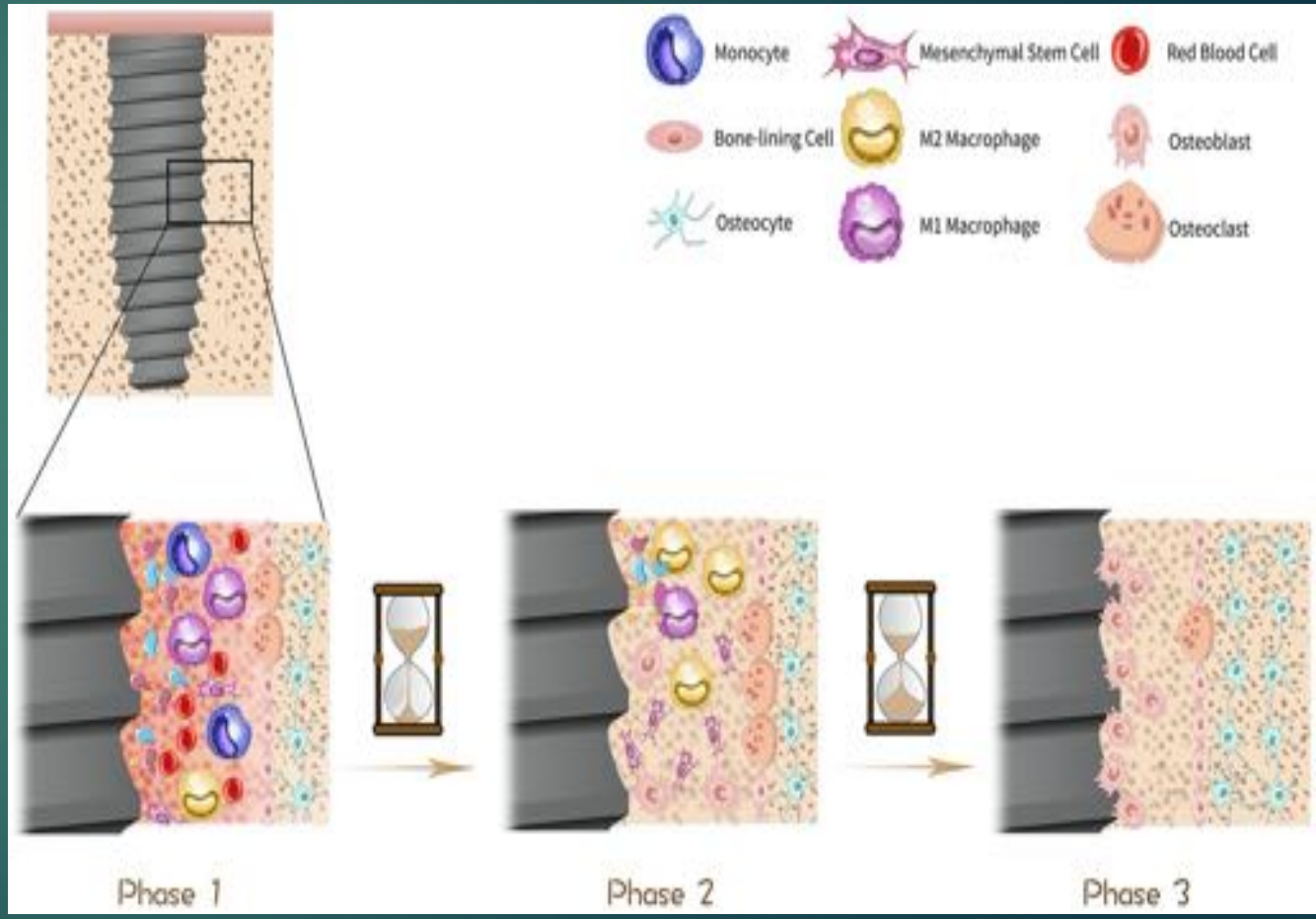
   *Phagocytic cells and lymphoid cells surround the region

2) Mesenchymal stem cells differentiate into osteoblasts and fibroblasts→ Callus

3) Osteoblasts and osteocytes

   *Formation of new bone

   *Mineralization



Zhou, Anqi, et al. "Role of Hippo-YAP Signaling in Osseointegration by Regulating Osteogenesis, Angiogenesis, and Osteoimmunology." *Frontiers*, Frontiers, 24 July 2020, www.frontiersin.org/articles/10.3389/fcell.2020.00780/full.

Jayesh, Rudrapandya S, and V Dhinakarsamy. "Osseointegration." *Journal of pharmacy & bioallied sciences* vol. 7,Suppl 1 (2015): S226-9. doi:10.4103/0975-7406.155917Mavrogenis, A F, et al. "Biology of implant osseointegration." *Journal of Musculoskeletal and Neuronal Interactions*, vol. 9, no. 2, 2009, pp. 61–71.

Mavrogenis, A F, et al. "Biology of implant osseointegration." *Journal of Musculoskeletal and Neuronal Interactions*, vol. 9, no. 2, 2009, pp. 61–71.

D2 Pathology

- ***Question: What causes implant failure?***
- ***Discussion:***
  - ***Failure occurs when function is not achieved*** [1]
  - ***Failure Modes*** [2]
    - ***Lack of osseointegration***
      - ***Early or late***
    - ***Mechanical failure***
    - ***Violation of anatomical structures***
    - ***Lack of patient adaptation***

1. Esposito, M., Hirsch, J., Lekholm, U., & Thomsen, P. (1998). Biological factors contributing to failures of osseointegrated oral implants, (II). Etiopathogenesis. *European Journal of Oral Sciences,106*(3), 721-764. doi:10.1046/j.0909-8836..t01-6-.x
2. Al-Sabbagh, M., & Bhavsar, I. (2015). Key Local and Surgical Factors Related to Implant Failure. *Dental Clinics of North America,59*(1), 1-23. doi:10.1016/j.cden.2014.09.001

D2 Pathology

- ***Early Failure*** [1]
  - ***Insufficient osseointegration from normal bone healing***
  - ***Risk factors: trauma, infection, delayed healing, premature loading***
  - ***Features: implant mobility, peri-implant radiolucency***
- ***Late Failure***
  - ***Osseointegration is not sustained*** [1]
  - ***Risk factors: lack of maintenance therapy, poor oral hygiene, and smoking*** [2]
  - ***Features: bone loss around implant, BOP***

1. Al-Sabbagh, M., & Bhavsar, I. (2015). Key Local and Surgical Factors Related to Implant Failure. *Dental Clinics of North America,59*(1), 1-23. doi:10.1016/j.cden.2014.09.001
2. Jepsen, S., Berglundh, T., Genco, R., Aass, A. M., Demirel, K., Derks, J., . . . Zitzmann, N. U. (2015). Primary prevention of peri-implantitis: Managing peri-implant mucositis. *Journal of Clinical Periodontology,42*. doi:10.1111/jcpe.12369

D3 PICO

- **Clinical Question**
  - In what situations can immediate implants be considered?

PICO Format

P: Patients that need implants

I: Immediate implants

C: Traditional implants

O: Success and survival rates

PICO Formatted Question

- For patients that need implants, when do immediate implants have comparable success rates, as well as survival rates, to traditional implants?

Clinical Bottom Line

- Pt presents with compromised #7 and #8 that may be indicated for immediate implant placement.
- While immediate implants are an attractive option because they reduce treatment time and surgical appointments, studies show immediate implants have significantly higher risk of failure than conventional implants.
- It's important to identify the criteria that indicate immediate implant placement to minimize risk of failure and maximize successful treatment outcome for our patient.

Search Background

- **Date(s) of Search:** October 19th, 2020
- **Database(s) Used:** PubMed
- **Search Strategy/Keywords:** Immediate implant placement, delayed implant placement, success rates, survival rates

Search Background

- **MESH terms used:**
  - Dental implantation, endosseous
  - Dental implants, single tooth
  - Randomized controlled trials
  - Humans
  - Treatment outcome

Article 1 Citation, Introduction

- Citation:
  - Chrcanovic BR, Albrektsson T, Wennerberg A. Dental implants inserted in fresh extraction sockets versus healed sites: a systematic review and meta-analysis. J Dent. 2015 Jan;43(1):16-41. doi: 10.1016/j.jdent.2014.11.007. Epub 2014 Nov 26. PMID: 25433139.
- Study Design: Systematic Review
- Study Need / Purpose:
  - Compare failure rates of implants placed in fresh sockets (immediate) versus healed sockets (traditional)

Article 1 Synopsis

- Method
  - 73 randomized and non-randomized controlled trials on humans
  - 8,241 implants in fresh sockets
  - 19,410 implants in healed sockets
- Results
  - Implants placed in fresh sockets had significantly higher failures rates

Article 1 Synopsis - Results

- Immediate implant considerations
  - Adequate hard tissue for primary stability
    - Need to engage 3-5mm of apical bone
      - 10mm alveolar crest height, 4-5mm alveolar crest width
    - Use implants that are wider than alveolus
  - Ideal implant position
    - 2mm buccal bone, lingually positioned
    - 1.5mm bone mesial and distal to implant
    - 1mm below alveolar crest
  - Adequate soft tissue, thick biotype

Article 1 Synopsis - Results

- Failures rates significantly different
  - Prosthetic rehabilitation: single crown > full arch prostheses
  - Loading: immediate loading > conventional loading
- Failures rates not significantly different
  - Arch
  - Marginal bone loss
  - Post-operative infection

Article 1 Synopsis

- Conclusions
  - Immediate implants have higher failure rates than conventional implants
  - Adequate hard/soft tissue and ideal implant position is necessary for immediate placement
- Limitations
  - Most studies were not randomized
  - Many confounding variables
    - Location, healing periods, loading periods, prostheses, opposing dentition, brands, surface treatments
    - Diabetes, smoking, periodontal disease

Article 1 Selection

- Reason for selection
  - Helps answer PICO question
  - High level of evidence
- Implications
  - Need to assess patient's hard and soft tissue
  - Arch not significant factor
  - Higher failure rates in single crowns supported by immediate implants

Article 2 Citation, Introduction

- Citation:
  - Lang NP, Pun L, Lau KY, Li KY, Wong MC. A systematic review on survival and success rates of implants placed immediately into fresh extraction sockets after at least 1 year. Clin Oral Implants Res. 2012 Feb;23 Suppl 5:39-66. doi: 10.1111/j.1600-0501.2011.02372.x. PMID: 22211305.
- Study Design: Systematic Review
- Study Need / Purpose: examine success and survival rates of immediate implants

Article 2 Synopsis

- Method
  - 46 prospective studies, mean follow up time 2.08 years
- Results
  - 98.4% 2-year survival rate for immediate implants
  - 5 variables affecting survival rate
    - *Antibiotics
      - Pre-operative antibiotics only – lowest survival rate
      - Both pre-operative and post-operative antibiotics – highest survival rate
    - Reason for extraction
    - Implant site: maxilla vs. mandible
    - Implant site: anterior vs. posterior
    - Loading

Article 2 Synopsis

- Results
  - Success rate defined by "absence of any biologic, technical and aesthetic complications"
    - Studies with mean follow up time 3 or more years
  - Biologic
    - Peri-implant mucositis in 80% of subjects
    - Peri-implantitis in 28% of subjects
  - Technical
    - Abutment screw loosening in 9.8% of implants, one study
  - Aesthetic
    - Buccal soft tissue recession in 20% of subjects
    - Closely associated with buccally positioned implants and thin biotype

Article 2 Synopsis

- Conclusions
  - High survival rate, limited success?
- Limitations
  - Does not compare to traditional implants
  - Few studies to analyze success rate

Article 2 Selection

- Reason for selection
  - Examines success rates as well as survival rates
  - Helps answer PICO question
  - High level of evidence
- Implications
  - Arch and location not significant factors
  - Consider pre- and post- operative antibiotics
  - Biologic and aesthetic complications common

Article 3 Citation, Introduction

- Citation:
  - Koh RU, Rudek I, Wang HL. Immediate implant placement: positives and negatives. Implant Dent. 2010 Apr;19(2):98-108. doi: 10.1097/ID.0b013e3181d47eaf. PMID: 20386212.
- Study Design: Narrative Review
- Study Need / Purpose: Offer clinicians guidelines for immediate implant placement

Article 3 Synopsis

- Method
  - 62 Pubmed articles reviewed
- Results/conclusions

Indications	**Contraindications**
Systematically healthy Adequate hard tissue Adequate soft tissue Intact buccal plate Thick biotype	Complicated systemic disease Anatomic structure involvement i.e. maxillary sinus Hx of bisphosphonates No intact buccal plate Thin biotype

Article 3 Synopsis

- Limitations
  - Low level of evidence
  - Lack of objective, systematic selection criteria
  - Author bias in interpretation/conclusion

Article 3 Selection

- Reason for selection
  - Helps answer clinical question
- Implications
  - Consider patient's medical history, medications
  - Consider patient's anatomy

Levels of Evidence

- [x] **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
- [x] **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

Conclusions: D3

- Based on the above considerations, how will you advise your D4?
  - Immediate implants can be successful with careful case selection and thoughtful treatment planning
  - Need to evaluate patient's bone volume, soft tissue, biotype and health history before proceeding
  - Consider antibiotics as well as biologic and aesthetic complications

Conclusions: D4

Clinical Question: In what situations can immediate implants be considered?

For best esthetic outcome: RCT#7 and bury to save bone levels and immediate implant with delayed loading

Discussion Questions

- Ellie: What are other options for treatment if implant placement fails?

What can be done to improve the osseointegration of implants in low quality bone?

What is a risk of immediate implant placement?

Do certain areas such as anterior mandible or maxilla show higher success rates for immediate implant osseointegration?

- Grant: What things can we do to help prevent external and host related factors that contribute to implant failure?

In terms of host related risk factors, would we try to combat them prior to ever placing the implant? Or are there times where an implant is placed regardless of metabolic disease or oral health status?

Will the medication that the patient is currently taking cause any concerns for the implant procedure?

- Nicole: What are the contraindications of immediate implants?

What helps determine the success rate of immediate implants?

What effect will immediate implants have on the periodontium of the missing tooth and adjacent teeth compared to traditional implants?

How long will you wait after root extraction to have a successful healing before proceeding with the implant placement?

- Myself: If an implant is immediately placed in the esthetic zone, how long should one wait before restoring it?

What will be done during the healing period for esthetics?

Are there any special considerations taken for immediate implant placement as it pertains to grafting?

Will a bridge have a more predictable esthetic outcome?

If an immediate implant is decided, will there also need to be a bone graft?

Do you have to consider different definitive restorations with an immediate implant compared to a traditional implant?

THANK YOU