Fall Rounds 2020

Evidence Based Dentistry Rounds
Specialty: Endodontics

Group: 9

Team: 5B

Date: 10/28/2020

Rounds Team

Group Leader: Dr. Derderian

Speciality Leader: Dr. Korte

Project Team Leader: Rebecca Willfahrt

Project Team Participants: Rizwan Bader (D3), Marissa Bunge (D2), Shaun Nelson (D1)

Patient Background

- 68 year old caucasian male
- “My crown fell off in the back and my lower front teeth need work”

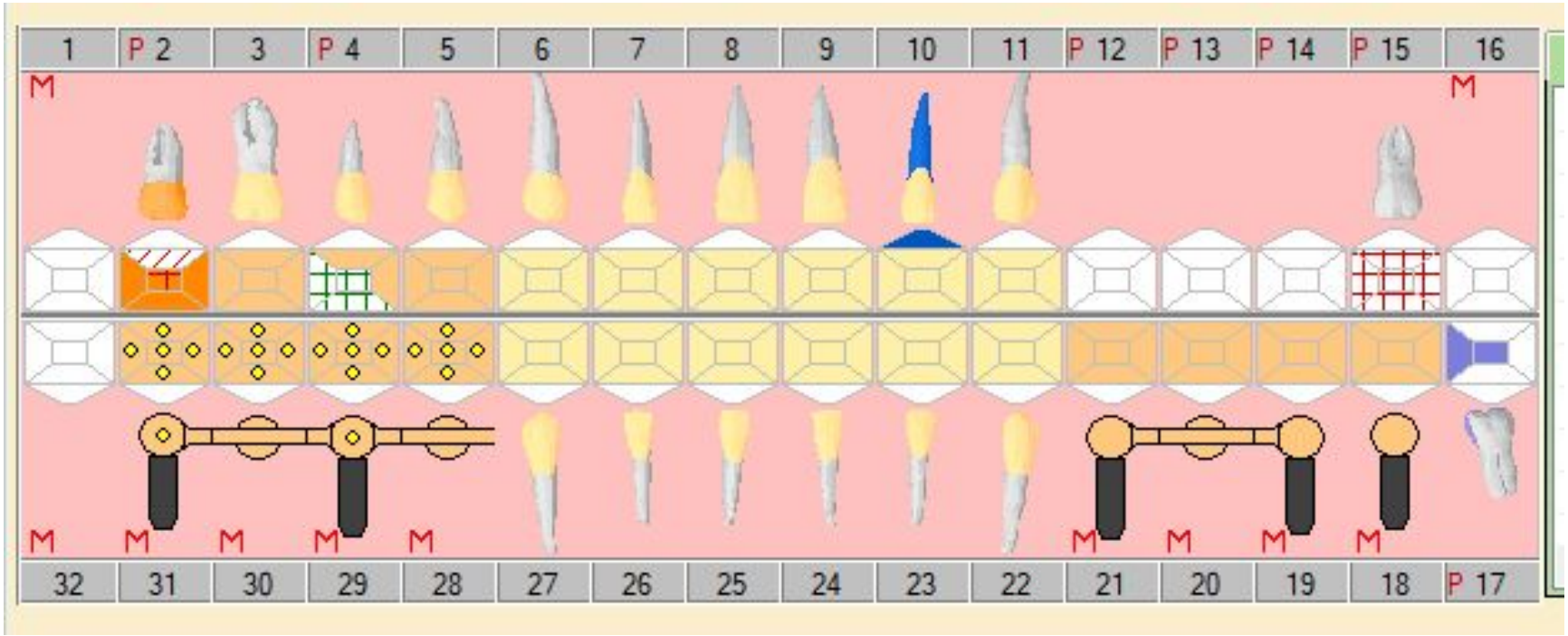
Medical History

- Glaucoma
  - Latanoprost
  - Dorzolamide
- Benign Prostatic Hyperplasia
  - Tamsulosin
- High Blood Pressure
  - Aspirin
- High Cholesterol
  - Simvastatin
- **Acid Reflux/Heartburn**
  - Ranitidine

Past Dental History

- Before MUSoD:
  - Bilateral mandibular implant supported bridges
  - Every remaining tooth crowned except #6, #11, #15 (lost crown), #17, #22-27
- At MUSoD:
  - Crowned #6-11 and #22-27 (Completed)
    - Where we are now:
      - Upon completion, convinced patient to invest in posterior occlusal support
      - Agreed to redo crowns #12-14 and implant supported bridge #28-31

Odontogram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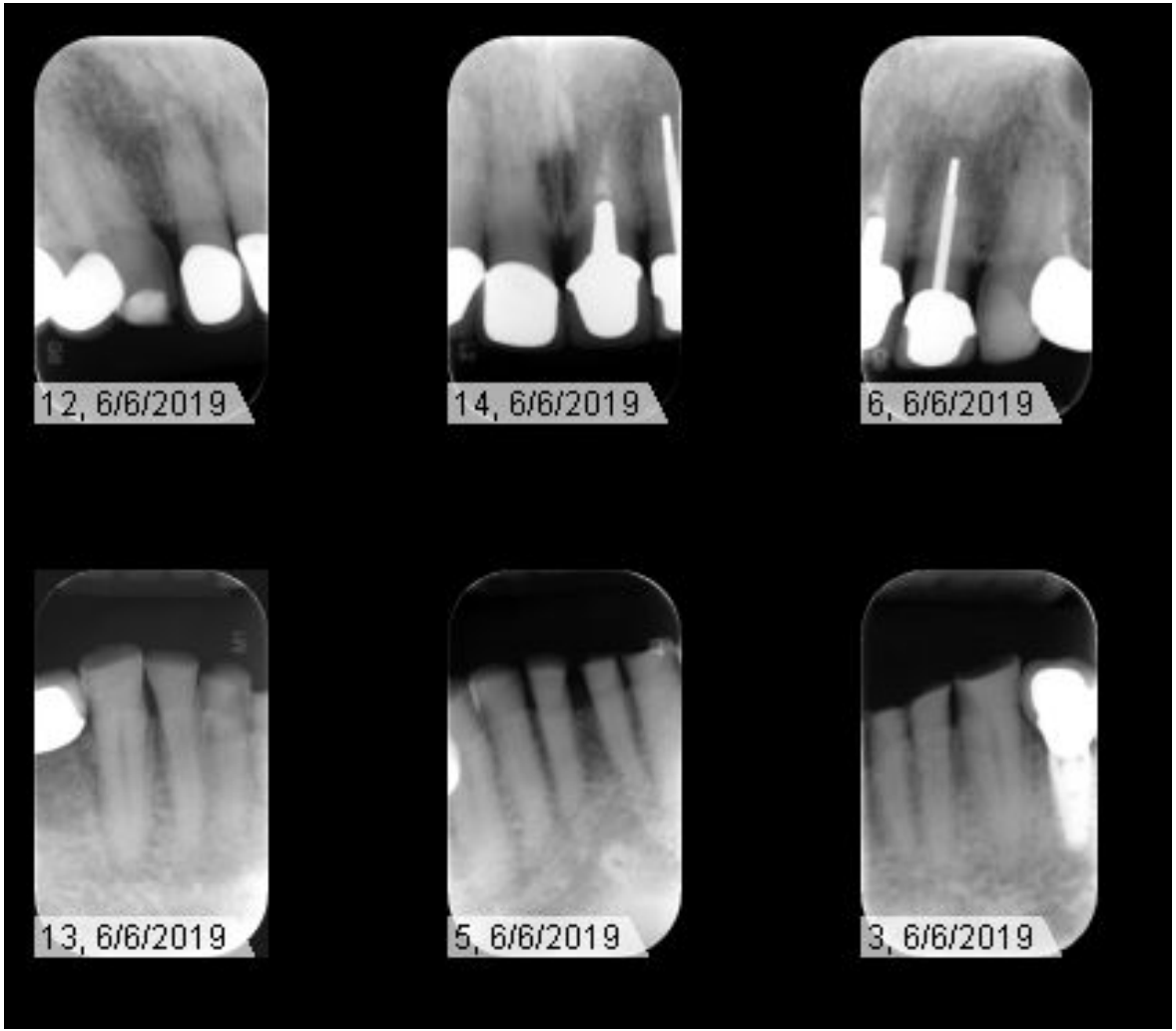
Initial Radiographs

- Patient Left

Initial Radiographs

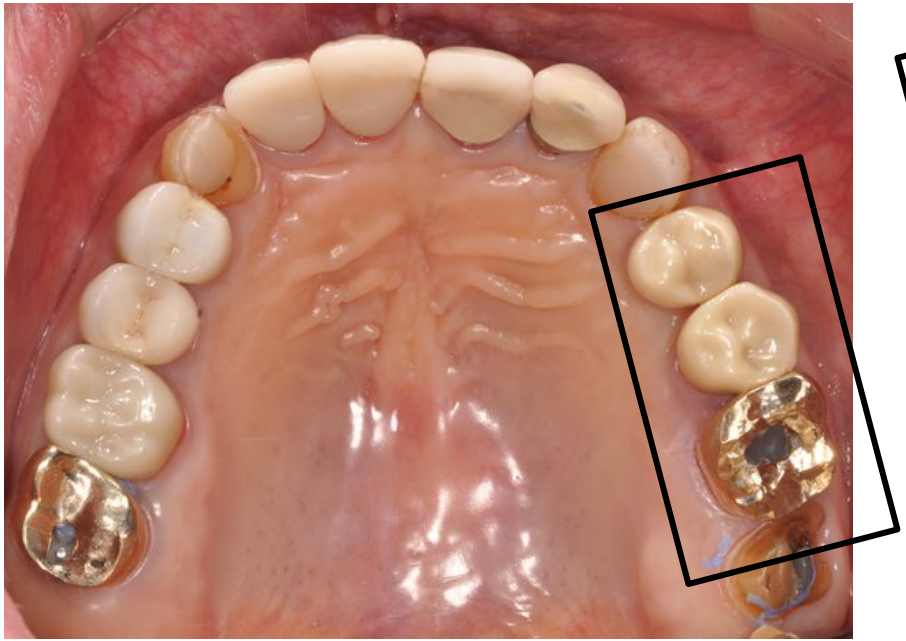
- Patient Anterior

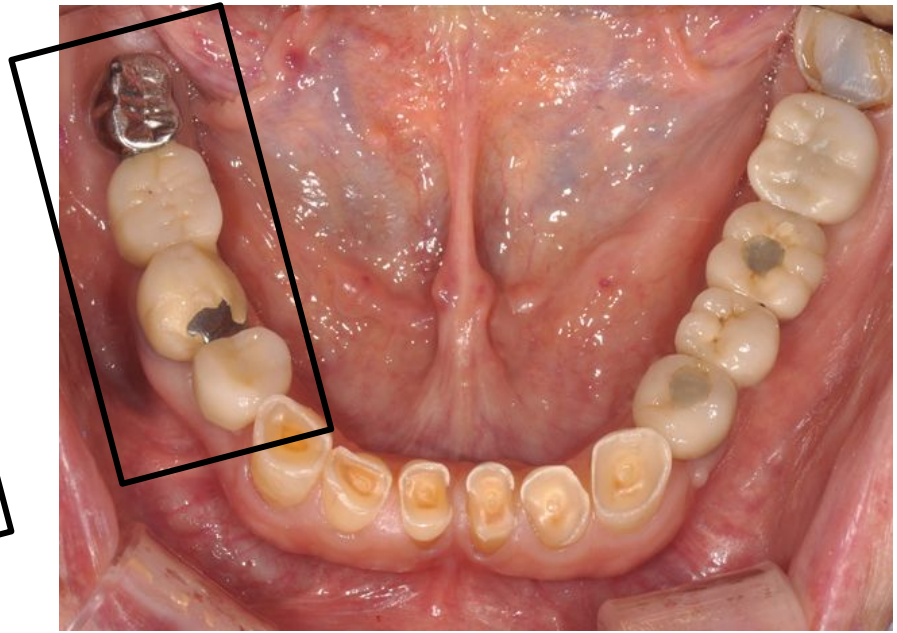


Initial Radiographs

- Patient Right

Next Steps





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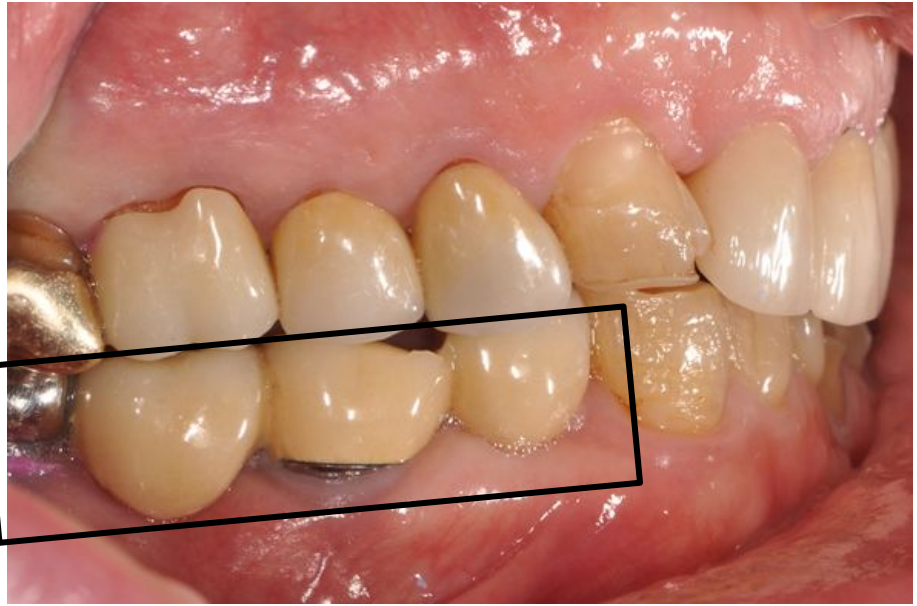
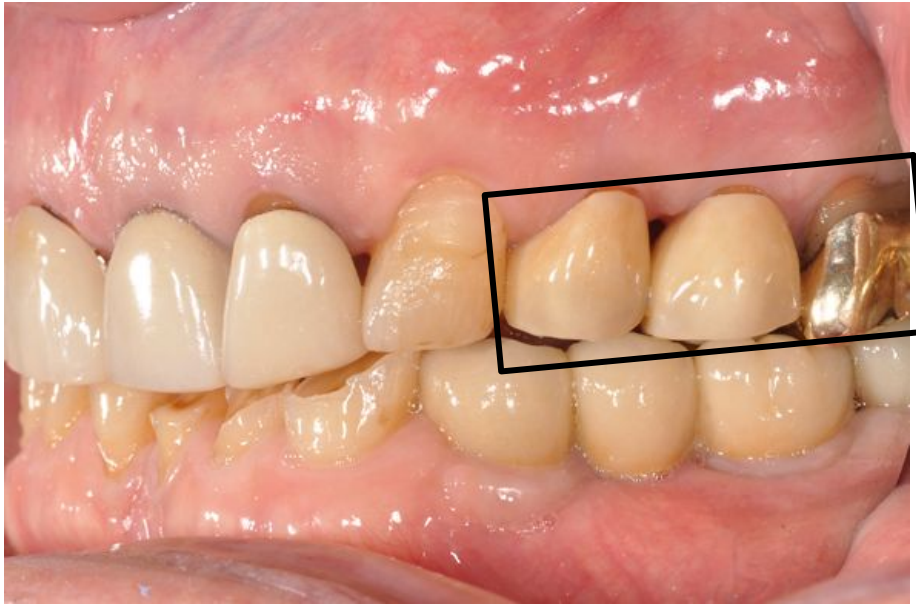
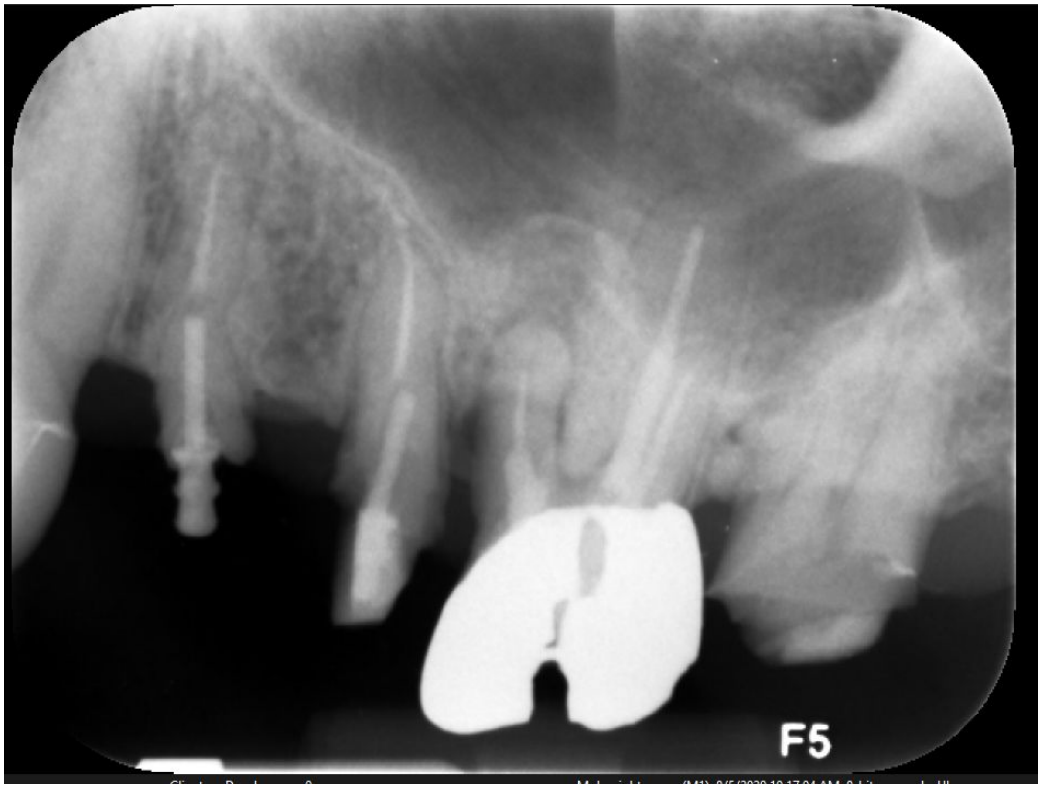




Beginning Posterior Restoration...



Diagnosis

- Asymptomatic irreversible pulpitis
- Asymptomatic periodontitis

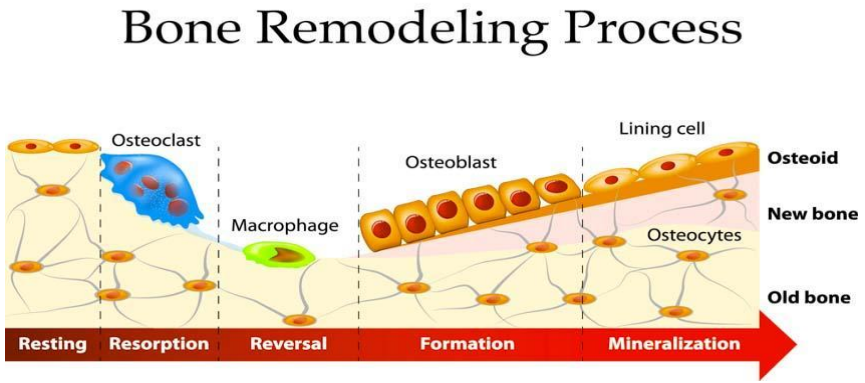
Problem List

- Lack of proper posterior support
- Endodontically involved teeth
  - Asymptomatic irreversible pulpitis with asymptomatic periodontitis
- Existing post and core

Bone Remodeling - Resorption

- Purpose of bone remodeling is repair micro-damage, calcium homeostasis, and shape skeletal growth
  - Regulated by stress on bone, parathyroid hormone, vitamin D, local and systemic factors

- Osteoclast: multinucleated cell that breaks down bone
  - Ruffled membrane with H+ATPase that transports acidic protons/enzymes causing bone matrix degradation
  - Osteoclastogenesis may be induced by immune cells from inflammation



HealthCMi. “Acupuncture Found Effective For Postmenopausal Osteoporosis.” *HealthCMi CEUs*, 20 June 2020, www.healthcmi.com/Acupuncture-Continuing-Education-News/1896-acupuncture-found-effective-for-postmenopausal-osteoporosis.

Florencio-Silva, Rinaldo, et al. “Biology of Bone Tissue: Structure, Function, and Factors That Influence Bone Cells.” *BioMed Research International*, Hindawi Publishing Corporation, 2015, www.ncbi.nlm.nih.gov/pmc/articles/PMC4515490/.

Bone Remodeling - Formation

- Osteoblast: cuboidal cell that forms bone
  - Secretes unmineralized bone (osteoid) which mineralizes into bone matrix
  - Undergoes apoptosis or becomes bone lining cell or osteocyte
- Osteocyte: former osteoblast trapped in bone matrix with dendritic processes that sense mechanical stress
  - Communicate with osteoblasts and osteoclasts on surface and alter their activity
- Osteoblasts and osteoclasts communicate via gap junctions, cytokines, and cell-bone matrix

Chen, Xiao, et al. “Osteoblast-Osteoclast Interactions.” *Connective Tissue Research*, U.S. National Library of Medicine, Mar. 2018, www.ncbi.nlm.nih.gov/pmc/articles/PMC5612831/.
Florencio-Silva, Rinaldo, et al. “Biology of Bone Tissue: Structure, Function, and Factors That Influence Bone Cells.” *BioMed Research International*, Hindawi Publishing Corporation, 2015, www.ncbi.nlm.nih.gov/pmc/articles/PMC4515490/.

What is the Process of Bone Inflammation?

Process:

•Fracture hematoma and acute inflammation are essential to healing.

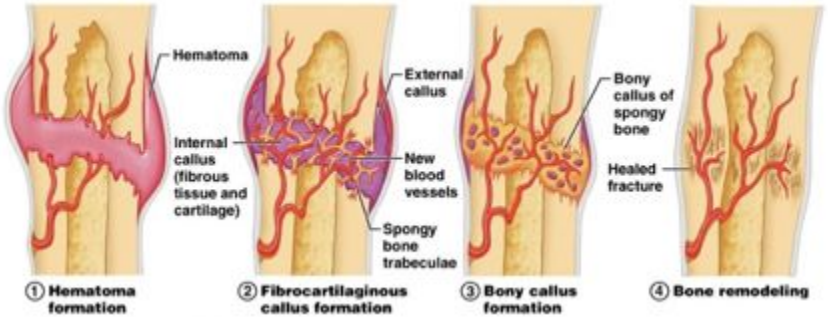
•Neutrophils arrive first and recruit monocytes and macrophages.

•Macrophages clear necrotic tissue and the provisional matrix. They also secrete inflammatory and chemotactic mediators.

•Monocytes resorb bone fragments and the necrotic ends of bone.

•Guided proliferation, differentiation, and extracellular matrix of mesenchymal stem cells and osteoprogenitor cells.

•Growth factors are also key mediators.



Re-establishment of hemostasis and end of acute inflammation:

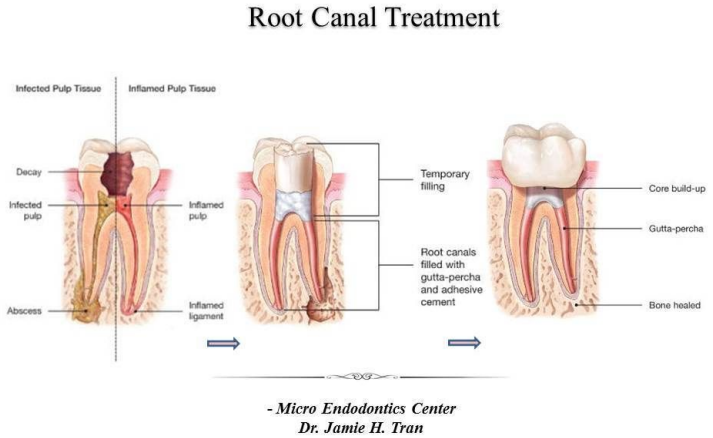
•Anti-inflammatory and reparative cytokines are needed.

•The inflammatory reaction and fracture hematoma are cleared and replaced with granulation tissue.

OR

Chronic inflammation:

•If cytokines are still secreted, ongoing tissue damage is seen, or there is impaired hemostasisà chronic inflammation occurs.



Source:

Loi, Florence, et al. “Inflammation, Fracture and Bone Repair.” *Bone*, Elsevier, 2 Mar. 2016

D3 PICO

- **Clinical Question: What is the most effective treatment for patients needing an endodontic retreatment**

PICO Format

P: Patients needing endodontic intervention

I: Endodontic surgery

C: Extraction and implant placement

O: More successful outcome

PICO Formatted Question

- In patients needing endodontic intervention is endodontic surgery when compared against extraction and implant placement more successful

Clinical Bottom Line

- Due to implants and endodontic surgery having different criteria of success the need for more randomized control trials between endodontic surgery and extraction and implant placement are needed in order to determine which treatment option is more superior.
- Available evidence is unable to provide clinicians with reliable guidelines in order to treat periapical lesions

Search Background

- **Date(s) of Search:** October 6th , October 7th, October 14th
- **Database(s) Used: Pubmed, Science Direct, Google Scholar**
- **Search Strategy/Keywords:** Endodontic surgery, Mircosurgery, Extraction, Implant

Search Background

- **MESH terms used: Dental implants, Microsurgery, Prognosis, Treatment outcome**

Article 1 Citation, Introduction

- Citation: Torabinejad M, Landaez M, Milan M, Sun CX, Henkin J, Al-Ardah A, Kattadiyil M, Bahjri K, Dehom S, Cortez E, White SN. Tooth retention through endodontic microsurgery or tooth replacement using single implants: a systematic review of treatment outcomes. J Endod. 2015 Jan;41(1):1-10. doi.

- Study Design: Systematic Review

- Study Need / Purpose: Compares the successfulness of endodontic microsurgery and single implants

Article 1 Synopsis

- Method: Electronic search that compared data regarding EMS and implant placement from Jan 2002- Dec 2012
  - A minimum 2 year follow up
  - EMS root end filling material was not considered
  - Implant placement used single cylindrical shape (regardless of surface type)
- Results:
  - Success and survival outcomes of implants increased over time- indicate most complications happen early
  - Endodontic microsurgery success and survival became more unsuccessful over time
  - Success and survival was higher for single implants than endodontic surgery in short and long term studies
  - EMS studies used Movlen criteria
  - Implants studies used mostly Albrektsson success criteria.

Article 1 Synopsis Cont.

- Conclusions:
  - When NSRCT failed, single implant was a superior option to EMS with long term survival
  - EMS can only be recommended only if non surgical RCT failed
  - EMS was more financially beneficial
  - More specific guidelines and protocols needed to guide clinicians in identifying evidence based treatment options
  - Quality of different success criteria prevent valid comparison of success rates

- Limitations:
  - No direct studies comparing EMS and Single implants
  - Lack of one clearly defined success criteria
  - Single implants and EMS had many sources of heterogeneity

Article 1 Selection

- Reason for selection:
  - Provides insight on the success of the two treatment outcomes
  - Relevance to PICO question
- Applicability to your patient
  - Outlined concept of success between implant placement and endodontic surgery. Our patient went with extraction and implant placement which has high levels of success.
- Implications
  - Finance
  - Restorability of the tooth

Article 2 Citation, Introduction

- Citation: Setzer FC, Kim S. Comparison of long-term survival of implants and endodontically treated teeth. J Dent Res. 2014 Jan;93(1):19-26. doi

- Study Design: Expert opinion

- Study Need / Purpose: Need for specific studies on implant or endodontic surgery success

Article 2 Synopsis

- Method: Examined and compared studies that summarized the benefits, disadvantages, success, and survival of implant and endodontic microsurgery
  - Endodontic surgical outcomes of studies was assessed by Rud or Molvens criteria
  - Implant criteria for most studies are defined by Albrektsson, but many studies used their own criteria

- Results
  - Meta-analysis found success rates of 96.7-97.5 for single unit implants over the span of 6-7 years
  - Meta-analysis found success rate of 91.4%-93.5% for endodontic microsurgery after 1 year follow-up
  - Survival rates of implants were higher for rough surface than machined
  - Endodontic microsurgery using MTA had better levels of success

Article 2 Synopsis Cont.

- Conclusions
  - Satisfactory esthetics and gingival architecture is difficult to achieve with implants
  - Single implant is recommended in periodontally compromised teeth
  - Endodontic microsurgery is becoming a highly favorable outcome with failed RCT treatments
  - The use of traditional root end surgery is becoming outdated due to its low success rates
- Limitations:
  - Studies lack the common definition of success for implants
  - More long term studies are needed
  - High risk of bias

Article 2 Selection

- Reason for selection
  - Examined the success for both implants and endodontic surgery
  - Indication
- Applicability to your patient
  - Patient had apical periodontitis in the posterior maxilla and soft tissue esthetics was not a concern.
- Implications
  - Soft tissue
  - Recurring infection

Article 3 Citation, Introduction

- Citation: Tsesis I, Rosen E, Taschieri S, Telishevsky Strauss Y, Ceresoli V, Del Fabbro M. Outcomes of surgical endodontic treatment performed by a modern technique: an updated meta-analysis of the literature. J Endod. 2013 Mar;39(3):332-9. doi:
- Study Design: Meta Analysis
- Study Need/Purpose: Further analyze what type of surgical endodontic procedure would give the best success for our patient

Article 3 Synopsis

- Methods: Clinical trials examining outcomes of endodontic surgery on patients with apical periodontitis with endodontically treated teeth
  - 1 year follow up
  - Outcome evaluated by Rud or Molven criteria
  - Lesions were in the periapical area
- Results:
  - Root filling MTA had highest level of success
  - Operative microscopes and endoscopes had significantly better success outcomes than loupes
  - The age, sex, presence of post, and lesion size did not have significant effect on the outcome
  - Pooled percentage of success was 89% and the percent of failure was 6.4% using endodontic microsurgery
  - Traditional root end surgery had a success rate of 59%

Article 3 Synopsis cont.

- Conclusion:
  - Teeth without periodontal disease using modern endodontic surgery with MTA retrofilling material is a successful treatment option with a 1 year postoperative period
- Limitation
  - Short follow-up period -1 year follow-up

Article 3 Selection

- Reason for selection
  - Identification of which type endodontic surgery will have a more successful outcome for our patient
- Applicability to your patient
  - If patient chose to save the tooth rather than extract how should the endodontic surgery be performed to lead to the highest successful outcome
- Implications
  - Restorability of the tooth
  - Healing

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

Conclusions: D3

D3: How does the evidence apply to this patient?

Although the literature has no comparative trials and there is a lack of evidence based guidelines, patient specific factors can influence treatment. For our patient, esthetics and finance was not a concern so extraction and implant was treatment of choice.

Conclusions/Disposition of the Case

- Redid implant supported bridge #28-31 - placed 10/13/20
- Advised patient to extract #12-14
  - 9/25/20 - ext. 12-14 and grafted ridge
- Implant placement #12 and #14 with sinus lift
  - April 2021
- 3-unit bridge planned for #12-14

Discussion Questions

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