THE APICOECTOMY

EVIDENCE-BASED ROUNDS

Group 10 A-3

11/11

ROUNDS TEAM

- Group Leader: Dr. Yray
- Specialty Leader: Dr. Loney
- Project Team Leader: Logan Herm
- Project Team Participants:
  - D1: Jacob Knight
  - D2: Collin Zweifel
  - D3: Maryam Tunio

PATIENT

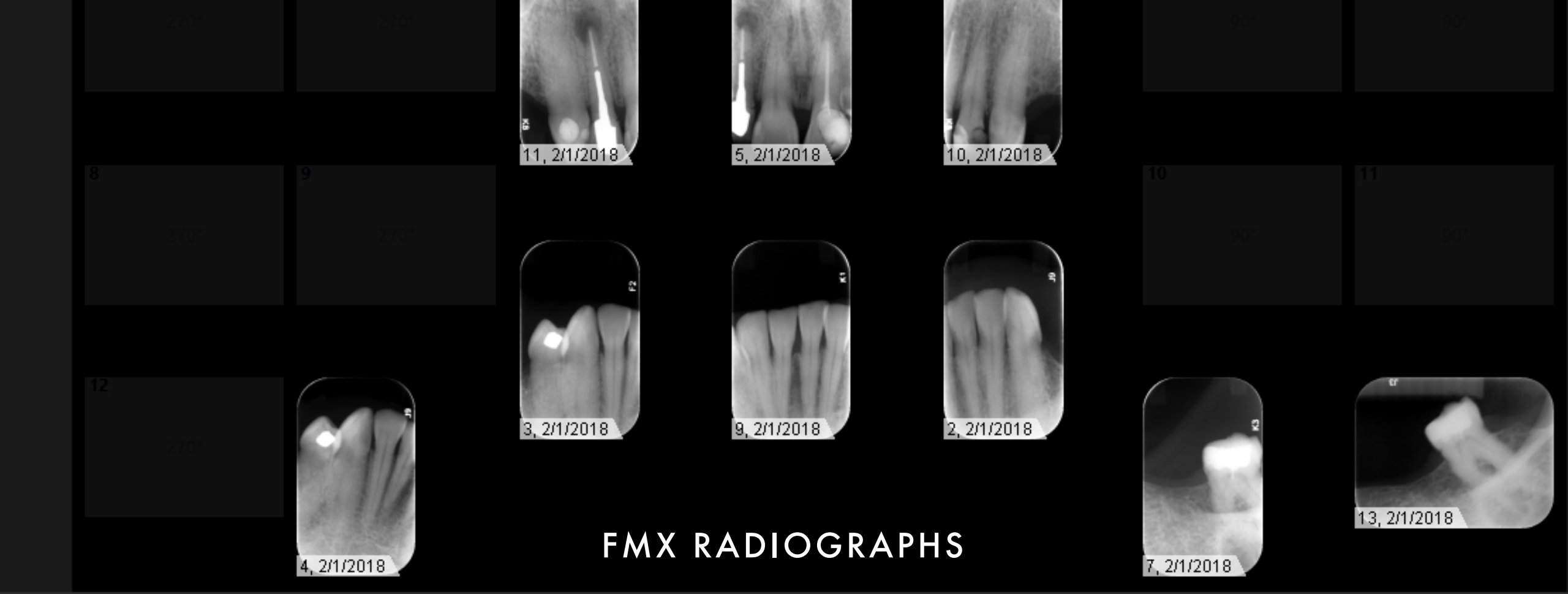
- Patient is a 54-year-old African-American Female
- Presented most recently with CC of "I think I need a post, core and crown," while also expressing interest in partial dentures and possibly implants.

MEDICAL HISTORY

- Significant for history of hypertension.
- Medications include carvedilol, spironolactone, furosemide and Vit. D supplement

DENTAL HISTORY

- Patient initially presented to the school in 2014 with a chief complaint of fractured #9
- Comprehensive care has been provided fairly consistently since initial presentation
  - Tooth #7 was diagnosed with pulpal necrosis and symptomatic apical periodontitis in 2014
  - #7 underwent endodontic therapy in 2016 and was restored with Post/Core and PFM crown in 2018
- Patient now presents to new student with interest in continued comprehensive care to save teeth, to get partials, and possibly implants



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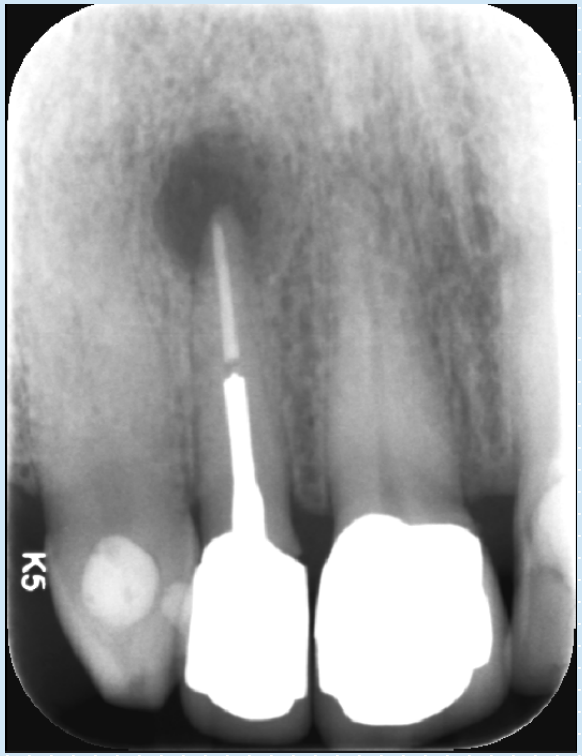
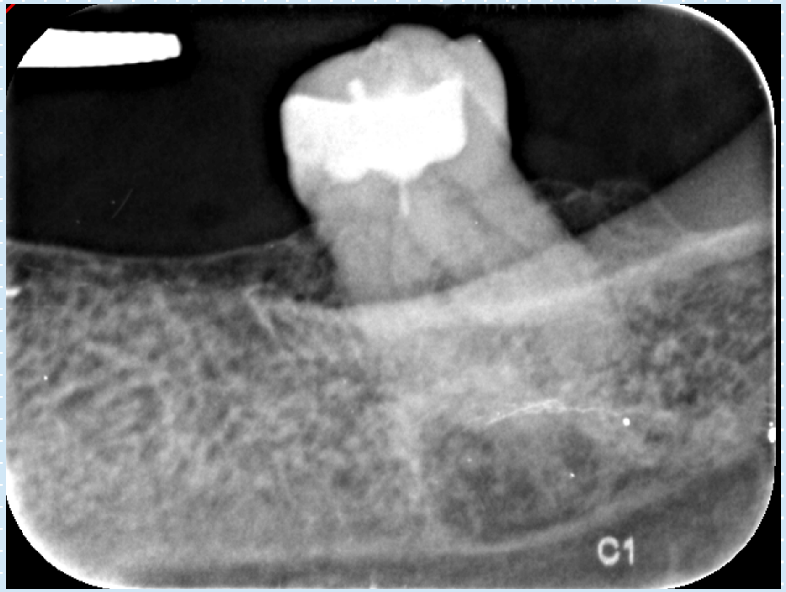
MAXILLARY RADIOGRAPHS



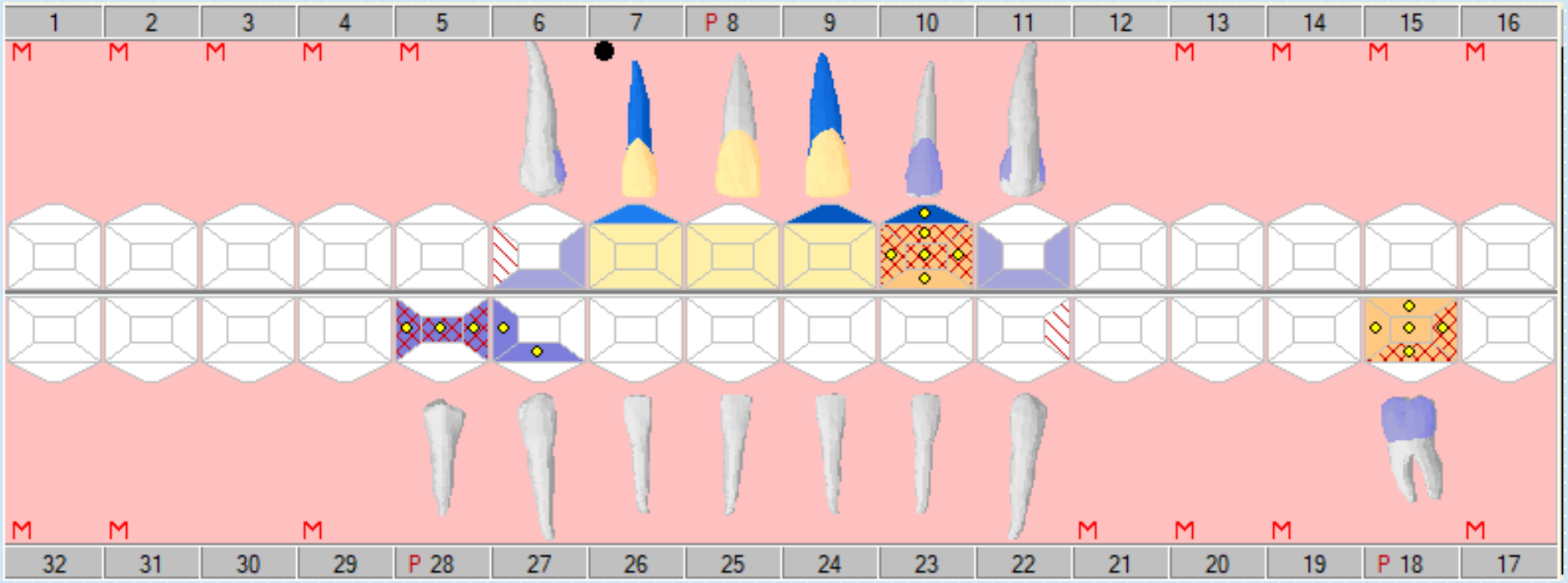
MANDIBULAR RADIOGRAPHS



RADIOGRAPHIC FINDINGS

- ML composite #6
- Endodontically treated #7 with post and crown
  - Persistent periapical radiolucency #7
- PFM crown #8
- Distal decay #10
- MLD composite #11
- MOLDB composite resin #18
- Incipient caries D #27
- MOD Amalgam with recurrent caries #28

CLINICAL FINDINGS



CLINICAL FINDINGS

- Confirmed radiographic findings
- Class II mobility #7 (endo consult for persistent PARL)
- #10 caries distal (likely endo, post/core and crown pending caries excavation)
- #18 large composite (will need survey crown for partial)
- #27 incipient/watch
- #28 distal recurrent caries with mesial staining

SPECIFIC FINDINGS

- Patient was sent for consult with endo for persistent periapical radiolucency #7
- Findings:
  - Soft tissue: WNL and no signs of swelling and/or sinus tract
  - Hard tissue: PFM crown with metal post #7, previously RCT treated
- Testing:
  - #6 WNL response to cold, percussion and palpation
  - #7 no response to cold, WNL response to percussion and palpation
  - #8 WNL response to cold, percussion and palpation
- No signs of cracks or fractures, normal bone levels

PERIODONTAL CHARTING

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PLAQUE INDEX

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DIAGNOSIS

- #7 was diagnosed as previously treated with asymptomatic apical periodontitis
- Given a favorable prognosis
- Patient presented treatment options of:
  - Apicoectomy
  - Extraction
  - No treatment

PROBLEM LIST

- Caries
- Defective restoration
- Esthetics
- Missing teeth
- Periapical radiolucency
- Sensitivity
- Home Care
- Mobility

D1 BASIC SCIENCE

- ***D1 Basic Science Question:***
  - **What is an apicoectomy?**
- ***Discussion:***
  - ***Apicoectomy:*** Procedure to remove the apical pathology following root canal
  - **Indications:** Typically performed when non-surgical root canal therapy does not resolve pathology
    - Can also be performed in instances of obstructed canal or perforated root
  - **Contraindications:** Avoided in teeth lacking proper periodontal support or non-restorable teeth
  - Procedure is performed by removing apical pathology with portion of root apex
  - Completed by placing a root end filling material or sealant at the apex, and often a bone graft + membrane to aid in regeneration
  - **Overall purpose:** Removal of pathological tissue to allow for proper apical regeneration, resulting in restoration of tooth structure and function

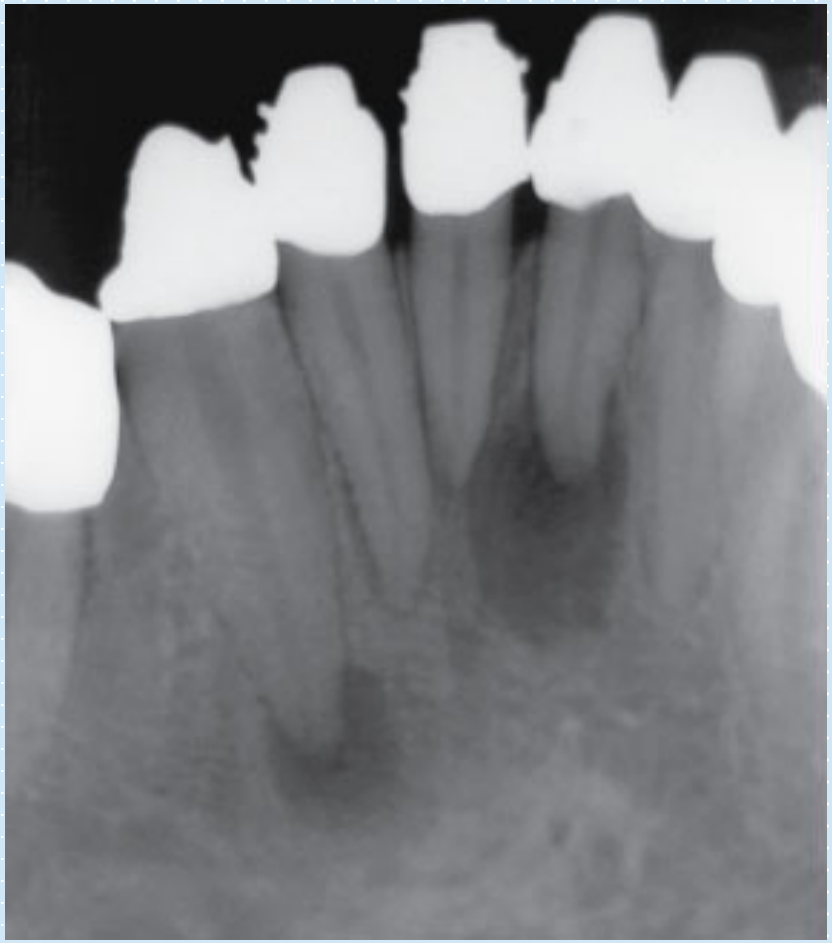
Arx, T. V. (2005). Failed Root Canals: The Case for Apicoectomy (Periradicular Surgery). *Journal of Oral and Maxillofacial Surgery, 63*(6), 832-837. doi:10.1016/j.joms.2005.02.019

Setzer, F. (2019, March 24). What is an apicoectomy? Retrieved November 04, 2020, from https://www.eoi.nyc/video-of-what-is-apicoectomy-or-root-end-surgery-procedure-recovery-from-risks-of-success-rate-and-apicoectomy-failure/

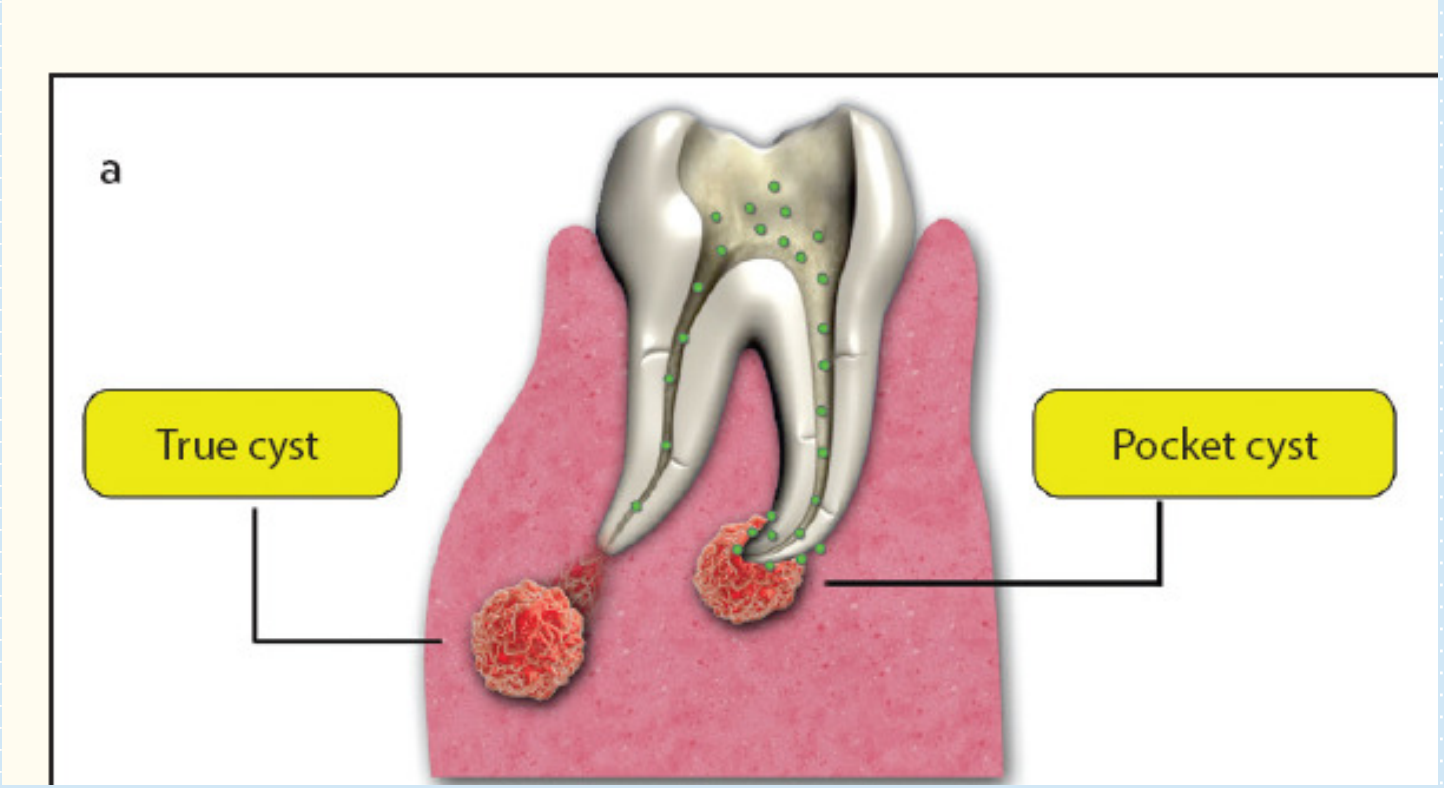
D2 PATHOLOGY

- ***What is a periapical cyst, periapical abscess and periapical granuloma? How do you tell the difference?***

PERIAPICAL GRANULOMA



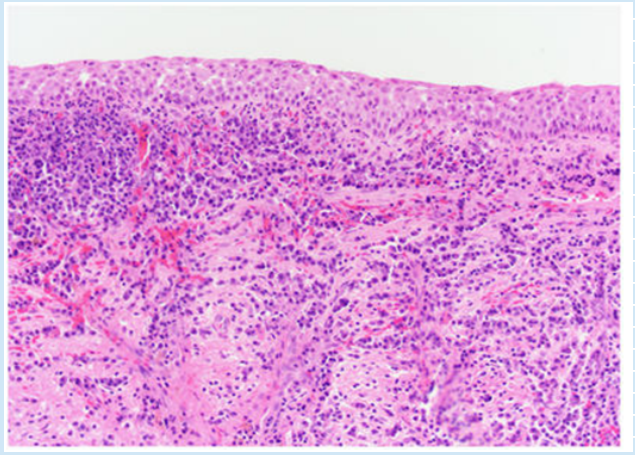
PERIAPICAL CYST



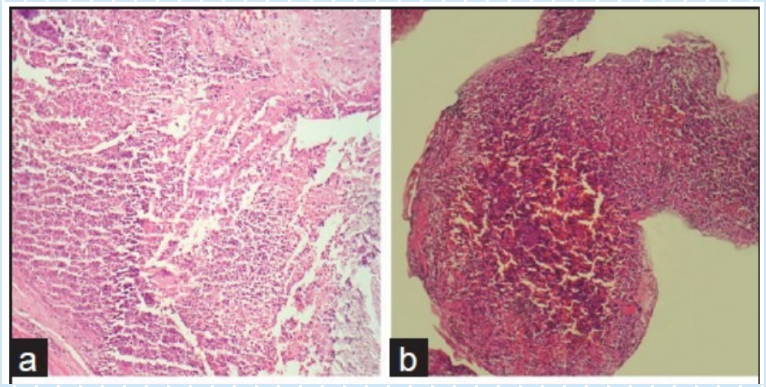
PERIAPICAL ABSCESS

HOW TO DISTINGUISH: HISTOLOGICALLY

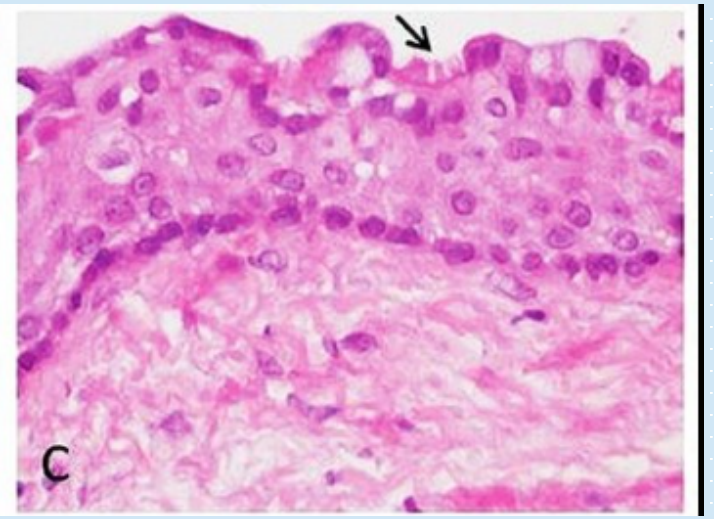
- All three lesions present as a radiolucency near the apex of the tooth→ can't diagnose with radiograph
- Tx: RCT, apicoectomy, or extraction



Periapical Cyst



Periapical Abscess vs Granuloma



D3 PICO

- **Clinical Question**: What is the most biocompatible material used for a root end fill in an apicoectomy procedure?

PICO FORMAT

- **P:** Presence of infection in root canal treated tooth
- **I:** Endodontic microsurgery with MTA as filling material
- **C:** Amalgam/composite as filling material
- **O:** Long term success (~5 years)

PICO FORMATTED QUESTION

- When performing apicoectomy, how does long term success differ when using MTA vs amalgam/composite?

CLINICAL BOTTOM LINE

- When compared to traditional materials for root end filling such as composite and amalgam, MTA has better biocompatibility and creates a better apical seal, which is imperative for treatment success.

SEARCH BACKGROUND

- **Date(s) of Search:** 11/2/2020
- **Database(s) Used:** Pub-Med
- **Search Strategy/Keywords:** apicoectomy retrofill material

SEARCH BACKGROUND

- **MESH terms used:** endodontic microsurgery, amalgam, composite, MTA

ARTICLE 1 CITATION, INTRODUCTION

- **Title:** Outcomes of MTA as root-end filling in endodontic surgery: a systematic review
- **Citation:** Tang Y, Li X, Yin S. Outcomes of MTA as root-end filling in endodontic surgery: a systematic review. Quintessence Int. 2010 Jul-Aug;41(7):557-66. PMID: 20614042.
- **Study Design:** Systematic review
- **Study Need / Purpose:** To compare the clinical outcomes of mineral trioxide aggregate (MTA) used as root-end filling with other materials in endodontic surgery to determine which modality offers more favorable outcomes.

ARTICLE 1 SYNOPSIS

- **Method:**
  - Compared randomized controlled trials comparing MTA with other materials, or placebo
- **Results**
  - Included 5 studies
  - MTA is similar in effectiveness to IRM (intermediate restorative material)
  - Statistically significant different with MTA and amalgam, with MTA being superior
- **Conclusions:** MTA is better to use than amalgam; more research and long term follow up still needed.
- **Limitations:** Follow up limited

ARTICLE 1 SELECTION

- **Reason for selection**
  - High level of evidence, specific to MTA
- **Applicability/implications** to patient
  - Helps confirm MTA as material choice

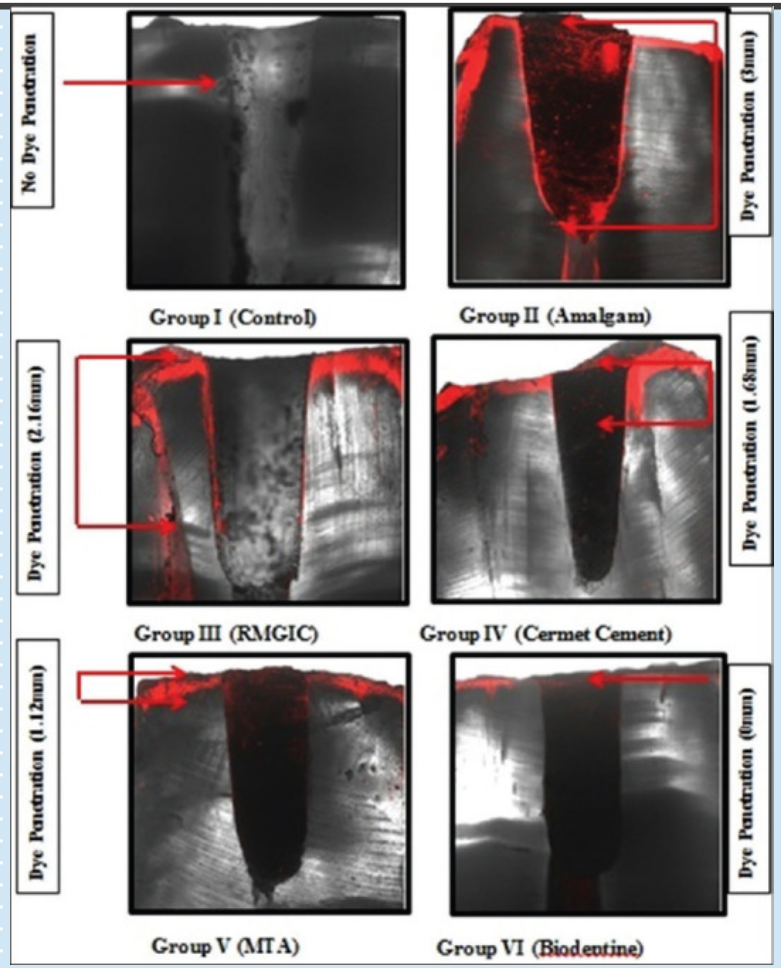
ARTICLE II CITATION, INTRODUCTION

- **Title:** An *in vitro* Comparative Evaluation of the Sealing Ability of Five Different Root-end Filling Materials under Confocal Laser Microscopy
- **Citation:** Singh FJ, Ahuja L, Kakkar G, Kakkar A, Garg A, Mahajan A. An *in vitro* Comparative Evaluation of the Sealing Ability of Five Different Root-end Filling Materials under Confocal Laser Microscopy. *Contemp Clin Dent*. 2020;11(1):51-54. doi:10.4103/ccd.ccd_662_18
- **Study Design:** in vitro study
- **Study Need / Purpose:** Compare and evaluate best sealing ability of five different root end filling materials: silver amalgam, RMGIC, cermet cement, MTA, and Biodentine using ConFocal Laser Scanning Microscope

ARTICLE II SYNOPSIS

- **Method**
  - 90 human incisors collected, decoronated, RCT performed
  - Apical 3mm resected, different root end filling materials
  - Control group, amalgam, RMGIC, Cermet Cement, MTA, Biodentine
- **Results**
  - Biodentine had greatest sealing ability, followed by MTA, Cermet Cement, RMGIC. Silver amalgam had least sealing ability
- **Conclusions**
  - MTA has superior sealing ability when compared to amalgam
  - Further research needed for newer materials such as Biodentine
- **Limitations:** in vitro study

ARTICLE II


No Dye Penetration
Dye Penetration (3mm)
Group I (Control)
Group II (Amalgam)
Dye Penetration (2.16mm)
Dye Penetration (1.68mm)
Group III (RMGIC)
Group IV (Cermet Cement)
Dye Penetration (1.12mm)
Dye Penetration (0mm)
Group V (MTA)
Group VI (Biodentine)

ARTICLE 11 SELECTION

- **Reason for selection**
  - Lower level of evidence, but visually displays importance of apical seal
- **Applicability/implications to patient**
  - Important in material selection to pick material with least microleakage

ARTICLE III CITATION, INTRODUCTION

- **Title:** Biocompatibility of root-end filling materials: recent update
- **Citation:** Saxena P, Gupta SK, Newaskar V. Biocompatibility of root-end filling materials: recent update. Restor Dent Endod. 2013;38:119–127.
- **Study Design:** Review of clinical studies, in vivo studies, and in vitro studies
- **Study Need / Purpose:** To comparatively analyze biocompatibility and tissue response to root-end filling materials

ARTICLE III SYNOPSIS

- **Method:**
  - Reviewed results from clinical studies, in vitro, and in vivo studies.
  - Compared 8 materials: amalgam, gutta percha, ZOE, GIC, composite resins/resin ionomer hybrids, Diaket, MTA, other MTA formulations, and various new materials such as Biodentine.
- **Results**
  - Amalgam showed cytotoxicity, MTA showed biocompatibility
  - MTA had most favorable apical tissue response
  - Composite shows varying responses depending on nature of leachable components
- **Conclusions**
  - MTA can be suggested as a biocompatible root-end filling material. Predictable
  - New materials show comparable results, and more research/clinical trials required
- **Limitations:** Inclusion of in vivo/in vitro studies

ARTICLE III SELECTION

- **Reason for selection**
  - Good comparison of many different materials
  - High/middle level of evidence
- **Applicability/implications to patient**
  - Confirms biocompatibility of MTA

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

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

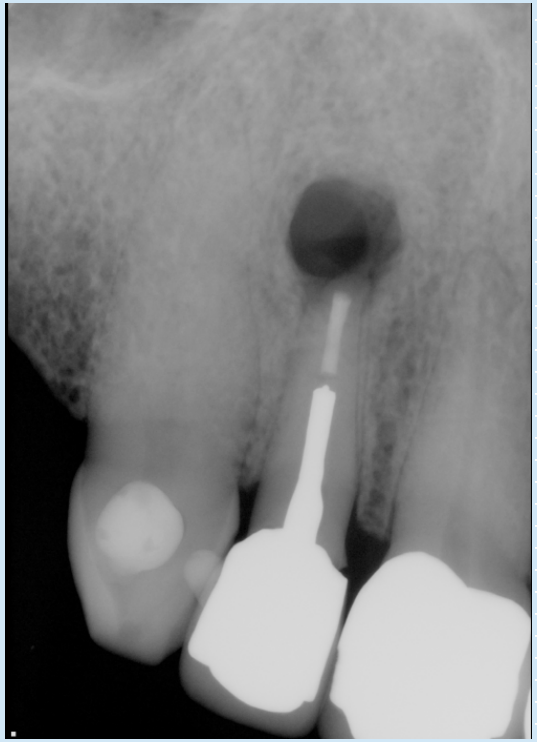
CONCLUSIONS: D3

- How does the evidence apply to this patient?
  - Apicoectomy was treatment option because removing crown in anterior region is not preferred and because there was an existing post/core
- Advising D4:
  - Based on the evidence found, MTA is a more biocompatible root filling material compared to composite/amalgam. Further research and clinical trials are required to test newer materials.

CONCLUSIONS: D4

- Because the tooth was previously treated with RCT, post/core and PFM, apicoectomy is the best available option for regenerating tissue and improving survival of the tooth.
- Although presented with options of extraction and no treatment, patient elected to have the apicoectomy completed.

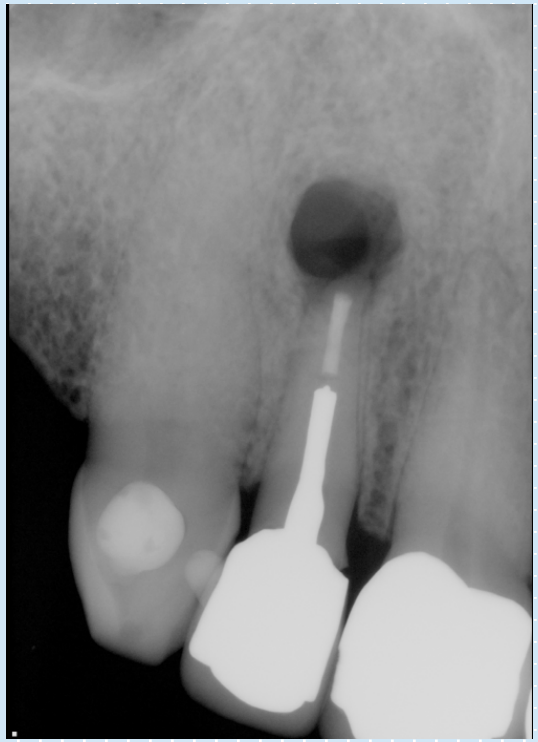
PROCEDURE



Pre-Op

- Intrasulcular full-thickness mucoperiosteal flap was developed from #9 to #6 with a vertical release at distal of #6.
- Osteotomy was completed to gain access to the apex of #7 using surgical handpiece.
- Soft tissue at apex was retrieved, placed in formalin and sent for biopsy.
- 3mm of apical root was resected using surgical handpiece and remaining structure was prepared using ultrasonic tip.
- Bioceramic Root Repair used to complete root end fill. Following, allograft bone graft and resorbable collagen membrane placed over site.
- Flap replaced with 4-0 chromic gut.

TREATMENT



Pre-Op

Post-Op

BIOPSY RESULTS

Clinical Data: #7 previously endo treated with longstanding apical radiolucency. Extension of lesion through the lingual cortical plate

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DIAGNOSIS: SHAVE BIOPSY, Anterior R maxilla assoc with the periapex of 7:
FIBROSIS WITH MIXED INFLAMMATION AND GRANULATION TISSUE (SEE NOTE)

Specimen Site: Anterior R maxilla assoc with the periapex of 7

Gross Description: Specimen received in formalin, vial labeled with patient's name, 1x1x1 to 6x4x1 mm skin wedges. Shave, tan, not oriented. 3 pieces tissue received, 5 portions submitted in 1 block. All tissue submitted.

Microscopic Description:
There is dense fibrous tissue. There is heavy inflammation and granulation tissue. No squamous epithelium is identified.

Diagnosis: **FIBROSIS WITH MIXED INFLAMMATION AND GRANULATION TISSUE (SEE NOTE)**

Note: The changes are not specific. An apical granuloma clearly may produce such findings. There is no epithelium to suggest a dentigerous cyst and there are no ameloblastic elements or evidence of malignancy. Clinical and radiographic correlation is required.

DISCUSSION QUESTIONS

Questions may also be from Group Leader or Specialist


THANK YOU