EVIDENCE BASED DENTISTRY ROUNDS: ENDODONTICS

GROUP 6A-5

SEPTEMBER 30, 2020

Rounds Team

- **Group Leader:** Dr. Cimmrmancic
- **Specialty Leader:** Dr. Haxhia
- **Project Team Leader:** Carli Hogan
- **Project Team Participants:**
  - Hanna Benelhachemi (D3)
  - Jessica Romano (D2)
  - Cameron Johns (D1)

Patient

- S.M.
- 58 years old
- Male
- Lebanese
- CC: “I have sensitivity to hot and cold and sweets, and I think a tooth is chipped.” (12/10/19)

Medical History

- Mild GERD
  - *Takes Pepcid OTC*

Dental History

- Missing Teeth: #s 1, 5, 16, 17, 21, 32

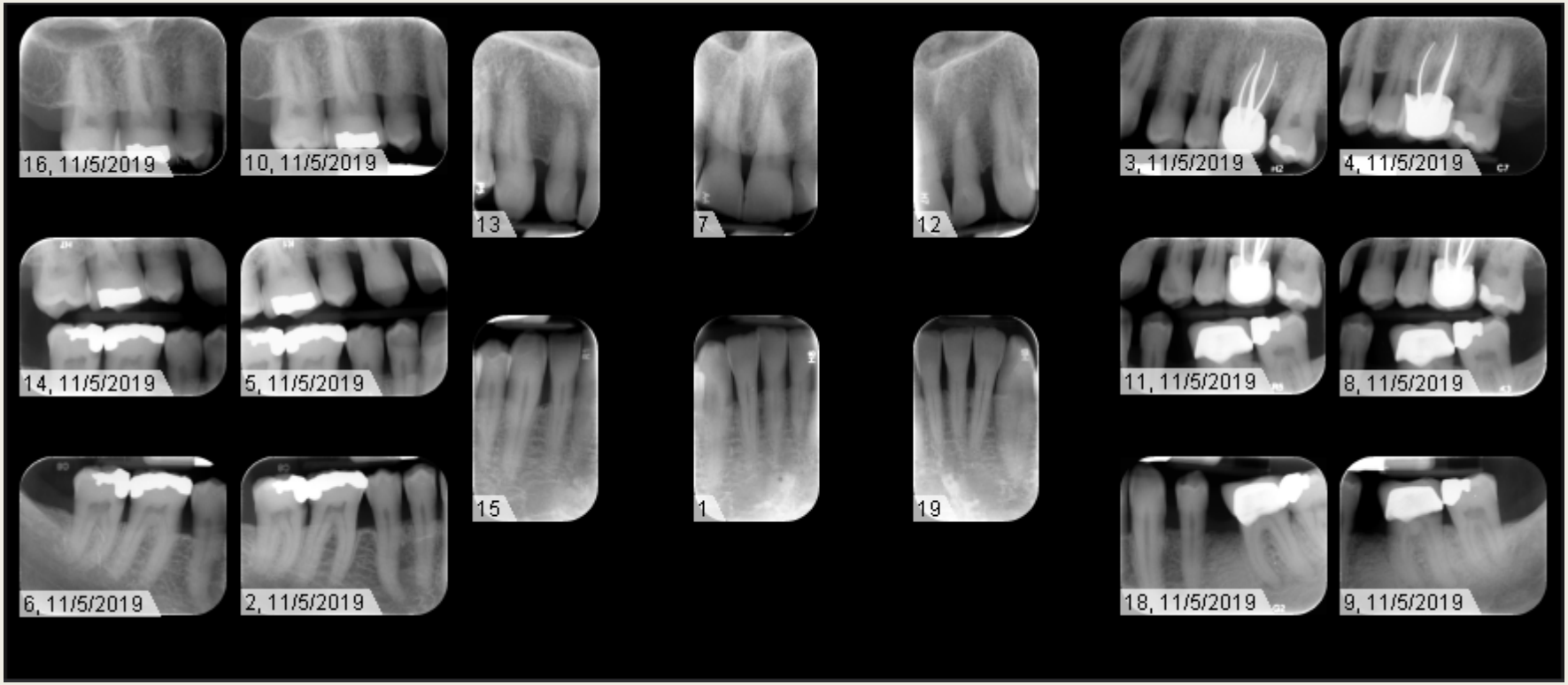
- #3 O amalgam
- #18 MO amalgam
- #30 MOD amalgam
- #31 MO amalgam
- #9 ML resin

- #19 RCT w/ gutta percha & defective PFM crown
- #14 RCT w/silver points & gold crown
  - *Pt. has had discomfort with #14 for "many years"*

- Brushes 1x/day
- Flosses 1x/day

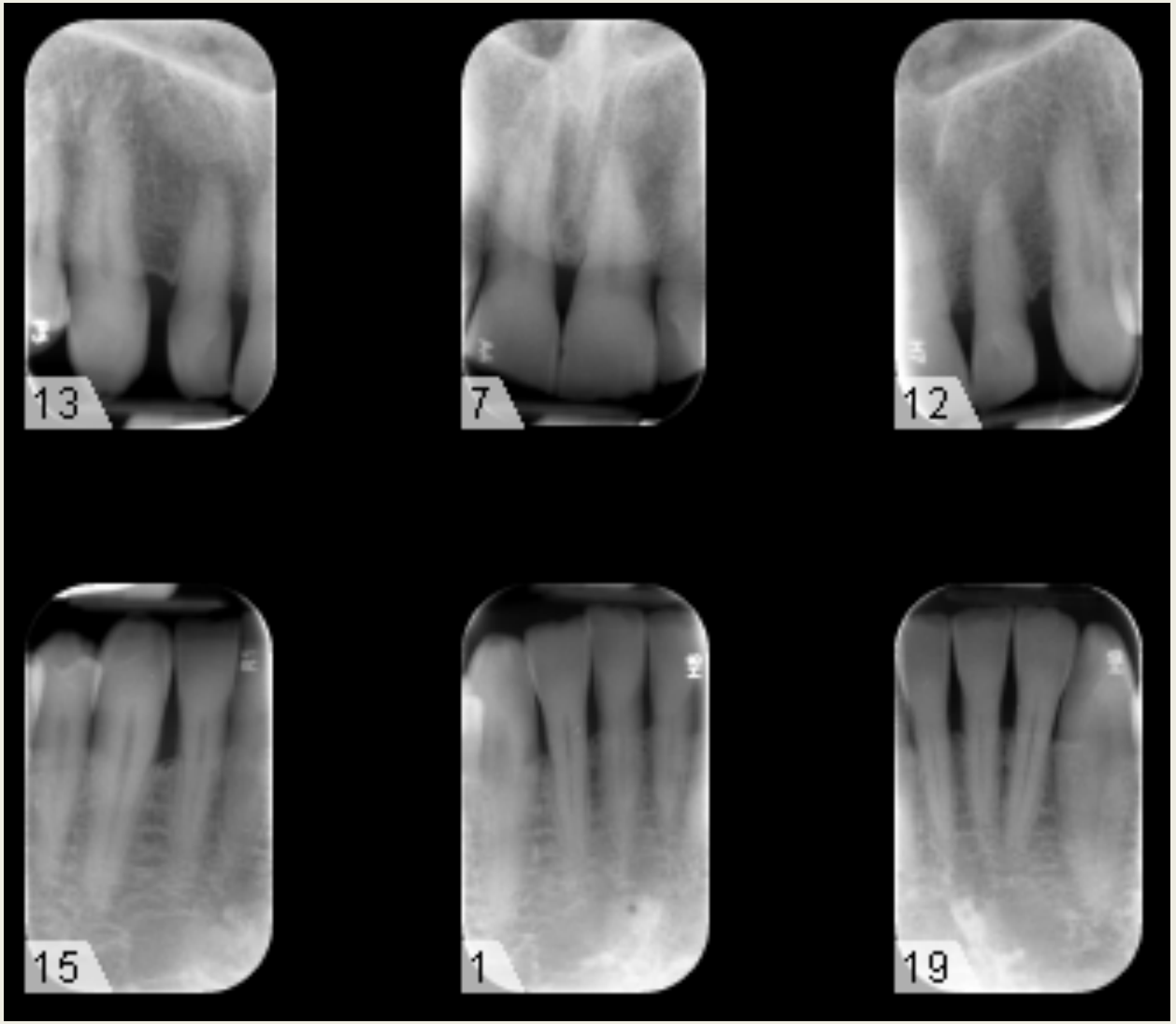
Radiographs

FMX: 11/5/2019



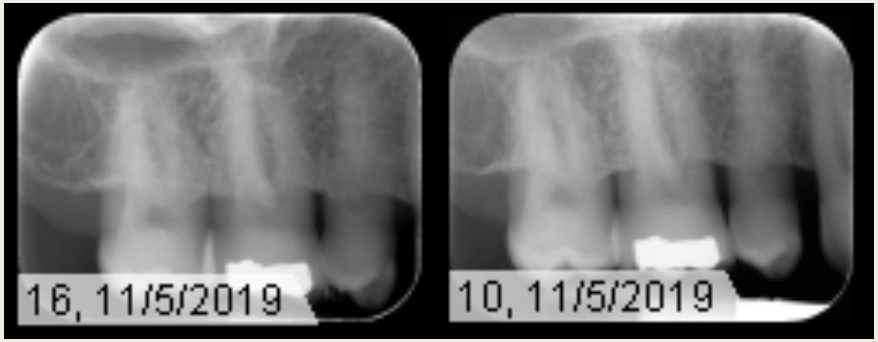
Radiographs

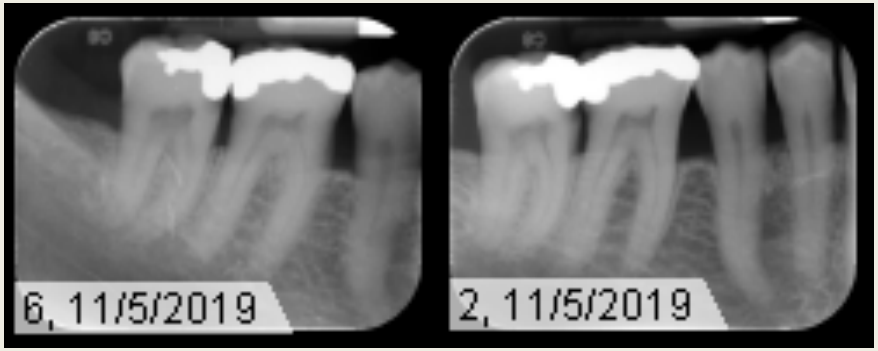
(11/5/2019)

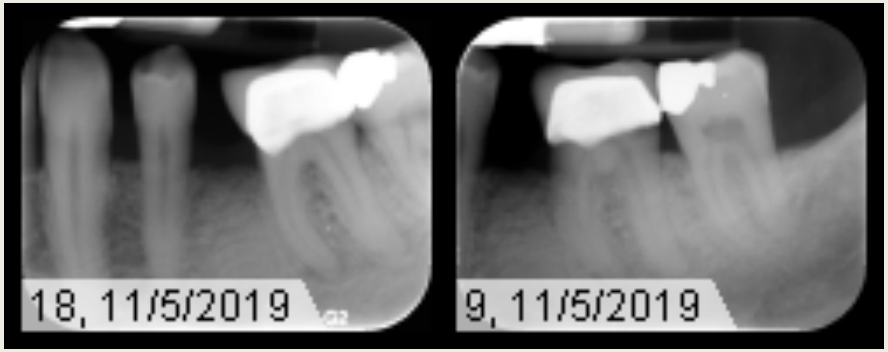


Radiographs

(11/5/2019)

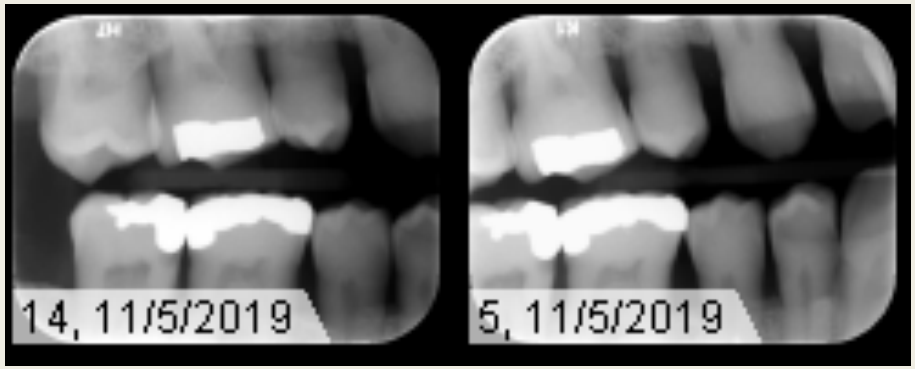


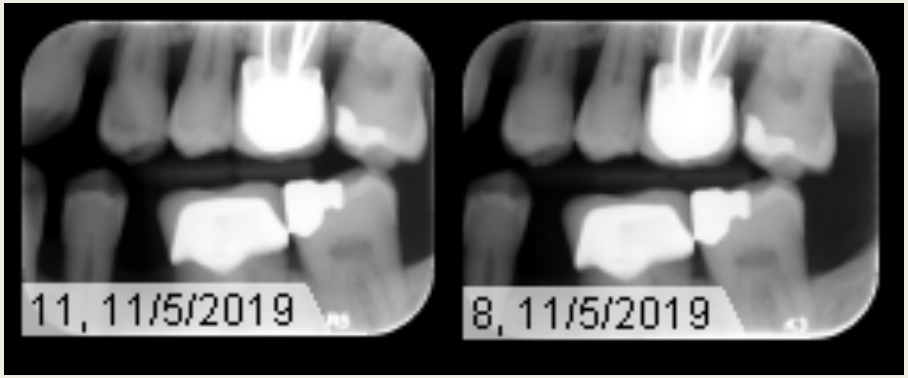




Radiographs

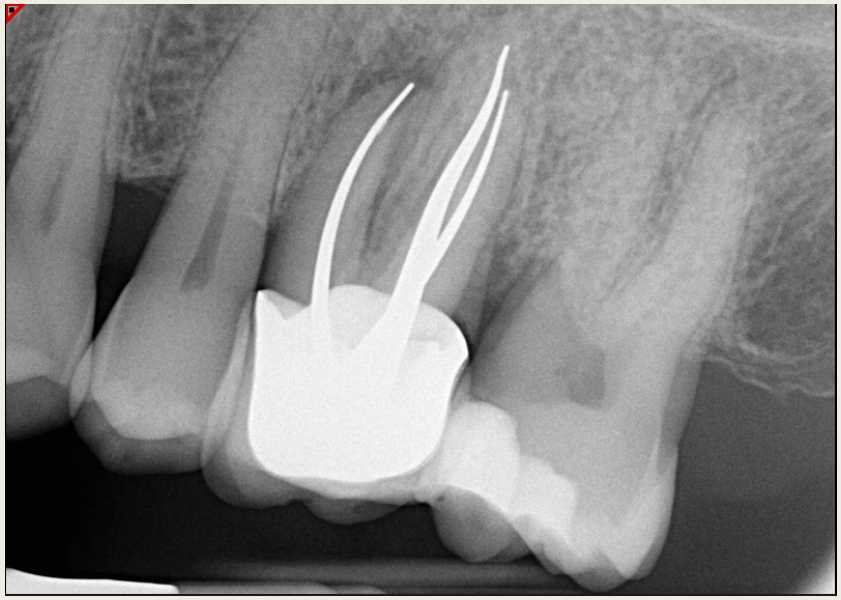
(11/5/2019)

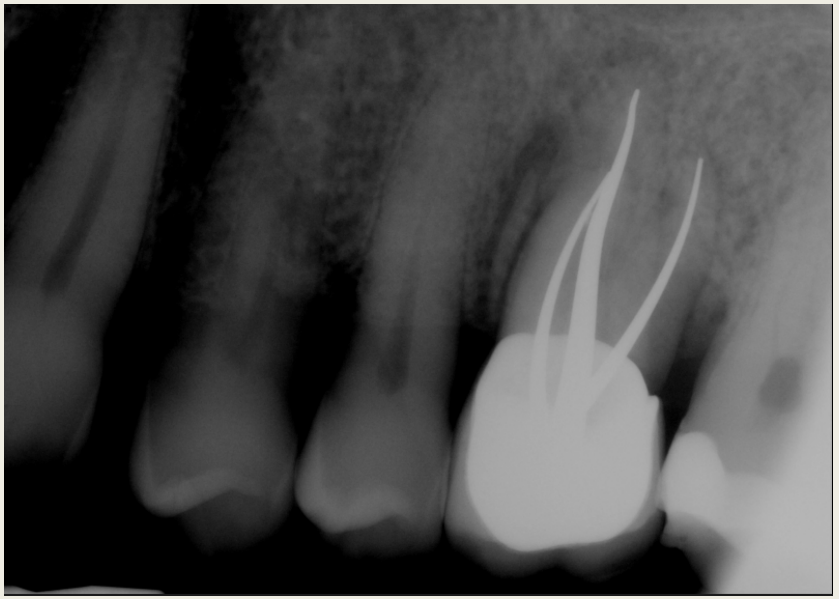




Radiographs

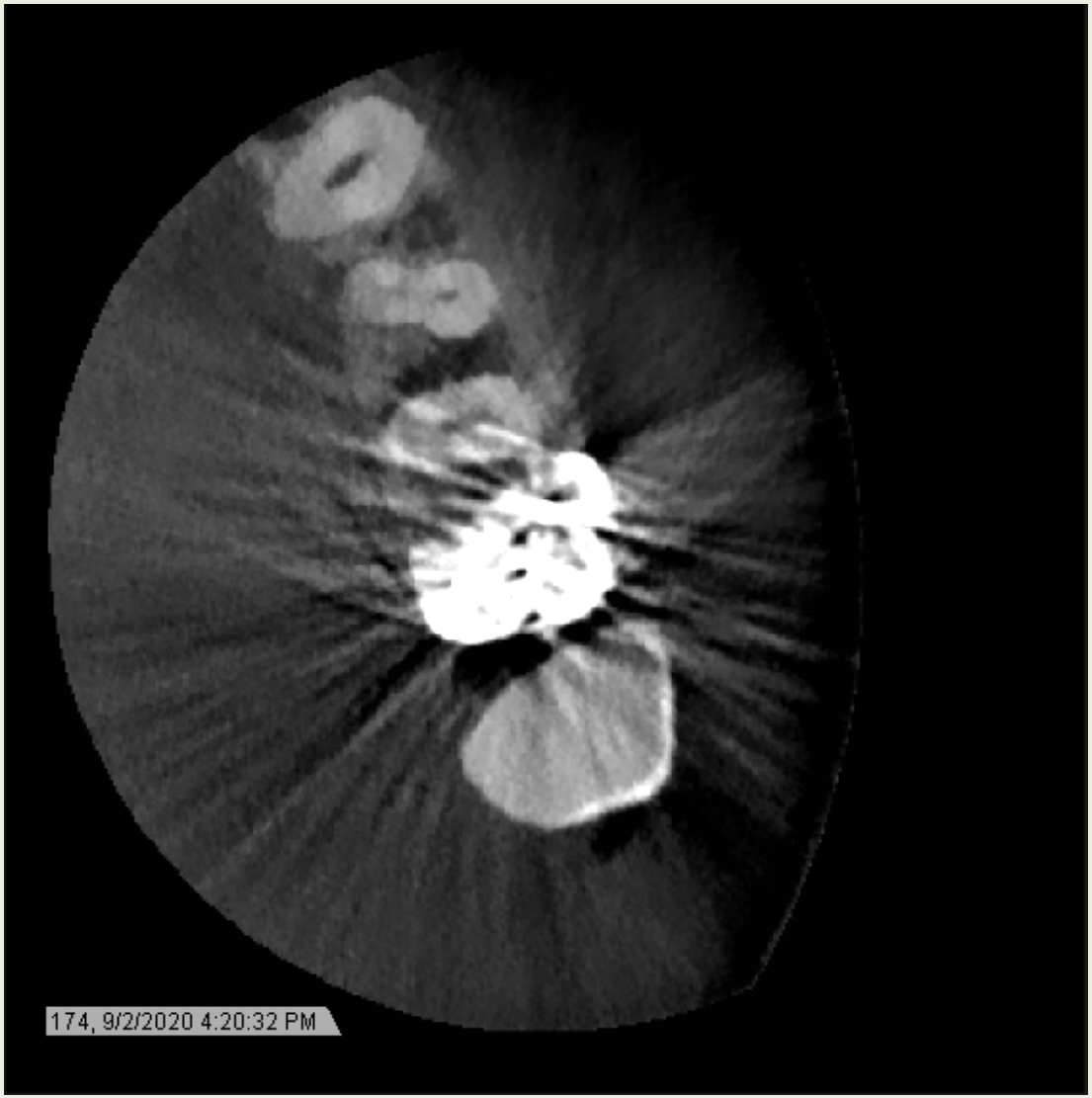
(9/2/2020)





Radiographs

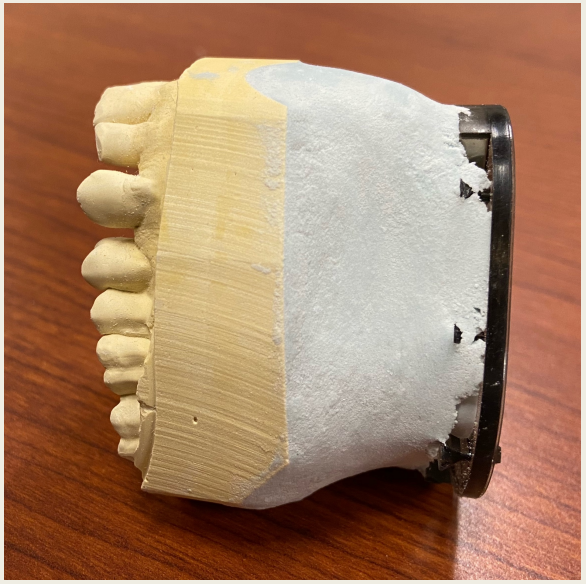
(9/2/2020)



Radiographic Findings

- #9 M caries (now restored)
- #14 PARL on MB and P roots
- #19 PARL on M root
- #31 M recurrent caries

Diagnostic Casts



Periodontal Charting (2/12/2020)

																	MOBILITY
	1	1												1	1		FURCA
					P	P					P	P					PLAQUE
	B	B												B B	B		BOP
	3 3 3	4 4 4	4 4 4	4 4 4	6 6 6	6 6 6	6 6 6	6 6 6	6 6 6	6 6 6	5 5 5	4 4 4	5 5 5	5 5 5		MGJ
	4 3 4	3 5 5	4 3 3	1	2 2 1	1 1 3	2 1 2	2 1 2	2 1 2	2 1 2	4 2 3	4 2 3	2 2 10	4 2 3		CAL
	2 2 2	2 3 4	3 2 2	1	2 2 1	1 1 3	2 1 2	2 1 2	2 1 2	2 1 2	3 1 2	3 1 2	2 2 10	3 2 3		P.D.
	2 1 2	1 2 1	1 1 1		0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	1 1 1	1 1 1	0 0 0	1 0 0		FGM
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
	0 1 0	2 3 1	0 1 0		0 0 0	0 0 0	0 0 0	0 1 0	0 1 0	0 1 0	1 2 1	1 2 1	0 0 0	0 1 0		FGM
	3 1 2	4 1 3	2 1 2		2 1 3	2 1 2	2 1 3	3 1 2	2 1 4	2 1 2	2 1 2	2 2 3	3 2 7	2 2 4		P.D.
	3 2 2	6 4 4	2 2 2		2 1 3	2 1 2	2 1 3	3 2 2	2 2 4	2 2 2	3 3 3	3 4 4	3 2 7	2 3 4		CAL
																	MGJ
	B	B											B B	B			BOP
																	PLAQUE
																	FURCA
																	PROGNOSI

																	PROGNOSI
	1	1											1	1			FURCA
	P P	P P	P P							P P		P P	P P	P P			PLAQUE
													B	B			BOP
	3 3 3	3 3 3	3 3 3	3 3 3	3 3 3	3 3 3	3 3 3	3 3 3	3 3 3	3 3 3		3 3 3	3 3 3	3 3 3			MGJ
	4 2 4	4 3 5	2 2 2	2 2 2	2 2 2	2 2 2	2 2 2	2 2 2	2 2 2	2 3 2		2 3 2	4 3 4	4 4 5			CAL
	3 2 3	3 2 3	2 1 2	2 1 2	2 1 2	2 1 2	2 1 2	2 1 2	2 1 2	2 1 2		2 1 2	3 2 3	3 2 3			P.D.
	1 0 1	1 1 2	0 1 0	0 1 0	0 1 0	0 1 0	0 1 0	0 1 0	0 1 0	0 2 0		0 2 0	1 1 1	1 2 2			FGM
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17		
	1 1 2	2 1 2	0 1 0	0 1 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0	0 0 0		0 1 2	0 0 0	2 1 2			FGM
	2 1 5	4 1 5	2 1 2	2 1 2	3 3 2	4 1 3	4 1 3	3 1 3	3 1 2	2 1 2		3 1 2	2 1 2	2 2 3			P.D.
	3 2 7	6 2 7	2 2 2	2 2 2	3 3 2	4 1 3	4 1 3	3 1 3	3 1 2	2 1 2		3 2 4	2 1 2	4 3 5			CAL
	3 3 3	3 3 3	3 3 3	3 3 3	3 3 3	4 4 4	4 4 4	4 4 4	4 4 4	4 4 4		2 2 2	3 3 3	3 3 3			MGJ
													B	B			BOP
	P P	P P	P P	P						P		P					PLAQUE
	1	1											1	1			FURCA
																	MOBILITY

Clinical/Specific Findings

- 10mm PD on #14 D
  - *Found by Dr. Brunner on 2/12/2020*
- #14 PARL on MB and P roots
  - *Found radiographically by Dr. Jurkas on 9/2/2020*

Diagnosis

- Diagnosis: #14 Previously treated/Asymptomatic Apical Periodontitis
- Prognosis: Favorable; however explained that it may be difficult to retrieve the silver points and other etiologies for the infection may be found including cracks or fractures
- Dr. Jurkas 9/2/2020

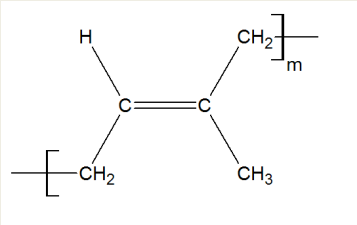
Problem List

- Caries
- PARLs

D1: Basic Science

What is gutta percha?

- A material used in root canals to form a tight three-dimensional seal of the root canal system after removal of the dental pulp. [1]
  - *Considered to by the best choice of endodontic filling material today*



2

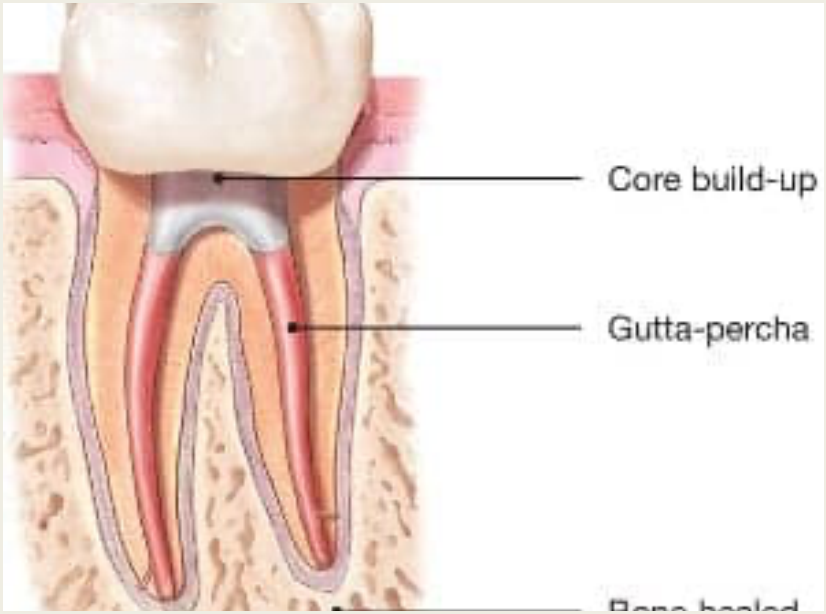
- Gutta percha is a 1,4, trans-polyisoprene[1]
- Components of gutta percha
  - *Organic material adds Tensile strength, stiffness, brittleness, and radiopacity*
    - Gutta percha (20%)
    - Waxes or resins (3%)
  - *Inorganic material*
    - Zinc oxide (56%) – filler material that increases brittleness and decreases percentage elongation and ultimate tensile strength. [1] Also has antibacterial traits. [3]
    - Barium sulfate (11%) radiopacifier [1]

1. Vishwanath, V. And Murali Rao, H. "Gutta-Percha in Endodontics – A Comprehensive Review of Material Science." *Journal of Conservative Dentistry*, 22, *3*, **2019**, 216-222
2. Polymer Properties Database. Steric Arrangements in Cis and Trans Configurations http://polymerdatabase.com/polymer%20physics/Cis-Trans.html (accessed Sept. 21, 2020)
3. Moorer, W. R. And Genet, J. M. "Antibacterial Activity of Gutta-Percha Cones Attribute to the Zinc Oxide Component. Oral Surgery, Oral Medicine, Oral Pathology, 53, 5, 1982, 508 - 517

D1: Basic Science

1

2



Gutta Percha

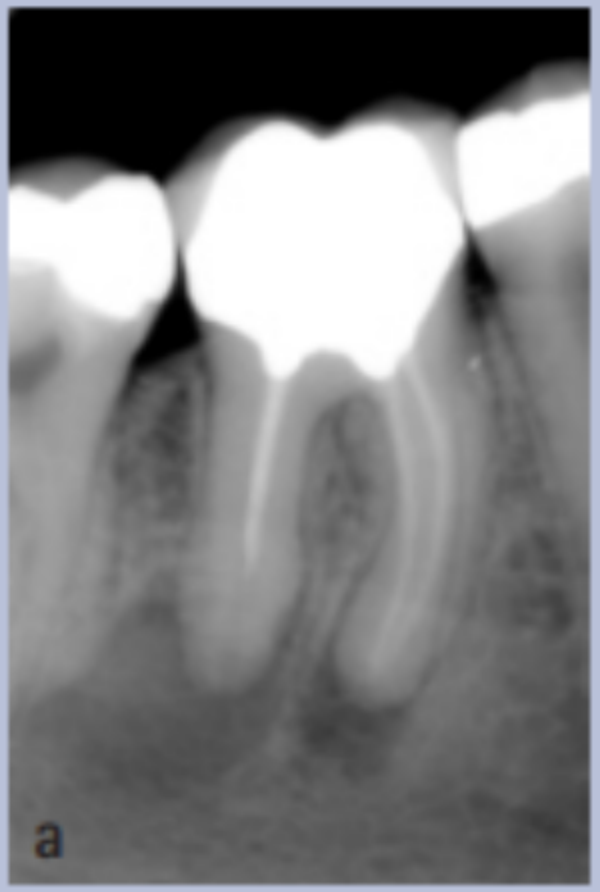
1. Vishwanath, V. And Murali Rao, H. “Gutta-Percha in Endodontics – A Comprehensive Review of Material Science.” *Journal of Conservative Dentistry*, 22, 3, **2019**, 216-222
2. Polymer Properties Database. Steric Arrangements in Cis and Trans Configurations http://polymerdatabase.com/polymer%20physics/Cis-Trans.html (accessed Sept. 21, 2020)
3. Moorer, W. R. And Genet, J. M. “Antibacterial Activity of Gutta-Percha Cones Attribute to the Zinc Oxide Component. Oral Surgery, Oral Medicine, Oral Pathology, 53, 5, 1982, 508 - 517

D2: Pathology

What are the four reasons for root canal therapy failure?

- Although there are a variety of potential causes, four reasons for root canal therapy failure our group would like to discuss include the following:

1. Inadequate Cleaning of the Canals
2. Poor Apical Sealing
3. Granulation Tissue at the Apex
4. Root Fracture

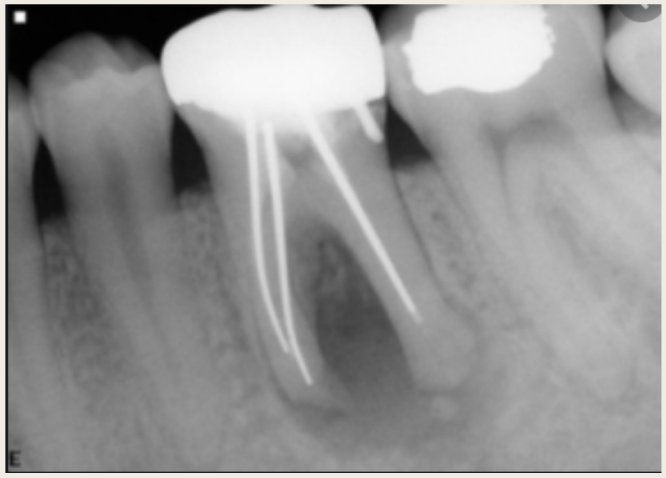


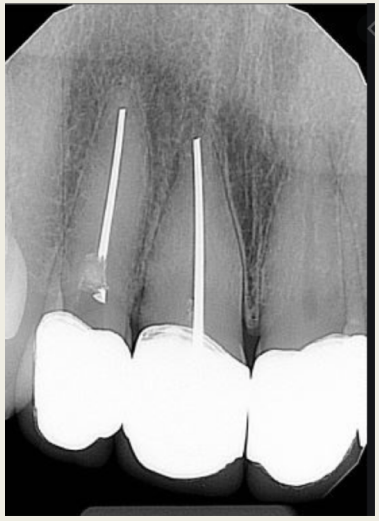
References:
1. Siqueira JF Jr. Aetiology of root canal treatment failure: why well-treated teeth can fail. Int Endod J. 2001 Jan;34(1):1-10. doi: 10.1046/j.1365-2591.2001.00396.x. PMID: 11307374.
2. Siqueira JF Jr, Rôças IN, Ricucci D, Hülsmann M. Causes and management of post-treatment apical periodontitis. Br Dent J. 2014 Mar;216(6):305-12. doi: 10.1038/sj.bdj.2014.200.PMID: 24651336.

D3: PICO

Clinical Question:

Why are silver points no longer recommended as an obturation material for Root Canal Treatment/Therapy?





PICO Format

P: Patients receiving root canal therapy

I: Silver Point Fillings

C: Gutta Percha

O: Likelihood of treatment

PICO Formatted Question

In patients who have had root canal therapy, do teeth obturated with silver point fillings, as compared to teeth obturated with gutta percha, have an increased likelihood of requiring retreatment?

Clinical Bottom Line

Patient has symptomatic #14 with periapical radiolucency at apex of MB and P roots that was previously treated with silver point fillings in another country overseas

Search Background

Date of Search: Sept. 9, 2020

Database Used: PubMed

Search Strategy/Keywords: Silver Points AND Root Canal

MESH Terms Used

Gutta Percha

Root Canal Filling Materials

Root Canal Obturation

Silver

Article 1: Scanning Electron Microscopic Examination of Root Canal Filling Materials

- Wollard, Ronald et al. *Journal of Endodontics , vol 2, no. 4, 1976 pp 98-110*
- **Study Design:** Randomized Controlled Trial- *in vitro study*
- **Study Need/Purpose:** To examine and determine which root canal filling material was most effective in obliterating the root canal space

Article 1 Synopsis

- **Method:**
  - *130 freshly extracted single rooted teeth; immediately fixed in 10% formalin solution. 2 radiographs taken before procedure*
  - *All canals→*
    - Irrigated w/ 0.5% sodium hypochlorite; saline solution
    - Dried w/ paper points
    - 5 specimens in each group
    - Obturation of canal
    - Pulp chamber filled with layer of polycarboxylate cement then amalgam
    - Teeth were returned to 10% formalin solution
  - *Examination*
    - photomicrographs - apical/middle/occlusal area (representing worst + best adhesion/adaptation)

Article 1 Synopsis

- **Results:**
  - *Photomicrographs were examined, but readings were subjective so the rating scale was discarded*
  - *Results were deemed as "subjective evaluations rather than scientifically precise recordings"*
  - *Solid Core Materials:*
    - Silver Cones + Sealer
      - *Silver Cones w/ ZOE cement: good adaptation (despite air bubbles)*
      - *Silver Cones w/ polycarboxylate cement: cement did not adhere well to cones*
    - Gutta Percha + Sealer
      - *Gutta percha had no adhesive properties- cement/sealer filled many of voids*
- **Discussion:**
  - *During processing of the samples, cracks developed in the dentin due to dehydration*
  - *Findings confirm that root canal fillings do not completely obturate root canals (poor adaptation/chemical bonding)*
  - *GP and Silver Cones have NO adhesive qualities-- sealer/cement must be used*
  - *GP shrinks + poor adaptation; Silver cones poor adherence + prone to corrosion*

Article 1 Selection

- Compares both Gutta Percha and Silver cones
  - *Current vs previous root canal filling materials*
  - *Highlighted limitations for both filling materials and reliance on sealers/cements*

- Silver point fillings were once a standard of care for RCT

- Implications for patient:
  - *RCT for #14 with silver point filling required sealer or cement*

Article 2: Degradation of a Silver Point In Association with Endodontic Infection

- Chana, et al. *International Endodontic Journal*, vol 31, no. 2, 1998 pp 141-146

- **Study Design:** Case Report
- **Purpose:** To describe the “unusual” clinical report of degradation of endodontic silver point w/ RCT of #28

Article 2 Synopsis

- **Case Report:**
  - *52 y/o female referred for symptomatic lower right mandibular premolar previously treated w/ silver point filling w/ unknown cement*
  - *Patient received tx- retrograde amalgam (improperly placed) but symptoms improved & no signs pain/swelling*
    - PA's were taken over a 2 year period → SP filling was degrading (coronally)
    - 1st year→ degraded 5mm ; 2nd year → degraded 10 mm (total)
    - Symptoms: pain upon biting, "unremitting throbbing pain", tender to tapping
  - *Patient wanted tooth save tooth→ non surgical approach to retrieve silver point filling & replaced with post/core and crown*

- **Method:**
  - *Retrieved silver point filling→ stored in buffer, rinsed, dried with liquid CO2*
  - *Analyzed with SEM and X-Ray microanalysis*

Article 2 Synopsis

- **Results:**
  - *Low magnification: Surface of silver point had deteriorated*
  - *High magnification: microbial forms were present*
  - *X Ray microanalyzer: chlorine and silver*
- **Conclusion:**
  - *Failure and degradation due to multitude of reasons:*
    - Coronal microleakage (bacteria rods formed on inner surface)
    - Corrosion- galvanic reaction/reaction with amalgam core of abutment + areas of voids
    - Occlusion- could have exacerbated degradation
  - *Combination of infection, microleakage, and galvanic degradation*
- **Limitations:**
  - *Case report-limited amount of evidence*
  - *Source of degradation/failure of silver point filling was not determined*

Article 2 Selection

- Reason for Selection:
  - *Silver point fillings were previously a standard of care for endodontic tx*
  - *We are now seeing very few of them- mostly symptomatic cases*
  - *Source of failure SP fillings*

- Applicability to Your Patient:
  - *Patient has symptomatic #14 previously (50 years ago) treated with SP fillings presents with PARL*

- Implications:
  - *Common reasons for failure of silver point fillings- according to article- are microleakage, corrosion, or galvanic degradation*
  - *Possible explanation for failure of patient's symptomatic #14 RCT w/ SPF*

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 Recommended 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

Conclusion

- Patient's #14 had RCT with silver points
    - *Silver points no longer used as obturation material*
        - Infection, microleakage, galvanic degradation
- Specialist must know how to retreat a tooth that has been treated with silver points
- Advise D4 to retreat #14and obturate with gutta percha

Conclusions: D4

- Advise patient to agree to retreatment of #14
  - *Silver points are not an ideal obturation material*
  - *Not uncommon to see silver points failing over time*

Discussion Questions

- What other materials besides gutta percha are being used safely to obturate root canals?
- What are the different types of gutta percha?
- Are there any side effects associated with gutta percha?
- How does the ability to determine the retreatment prognosis of a tooth with silver points compare to a tooth treated with gutta percha?
- Can you tell the difference between silver points and gutta percha radiographically?
- What are the indications to use silver point fillings vs. gutta percha?
- Can gutta percha or silver points degrade over time? If so, what is the main cause of this process?
- What qualities make something an ideal obturation material for RCT?
- How do the steps for applying gutta percha and silver points vary?
- How common is gutta percha hypersensitivity allergy?
- Should a clinician remove an existing silver point and replace it with gutta percha?
- What long-term effects do silver points and gutta percha have on the PDL?
- What are some of the pros and cons of using silver points vs. gutta percha?
- Why is gutta percha the top choice of material for root canals?
- Does the choice of sealer impact the use of gutta percha vs. silver point fillings?
- Are there any contraindications to suing gutta percha for RCT?

THANK YOU