ENDODONTICS

EVIDENCE BASED DENTISTRY ROUNDS

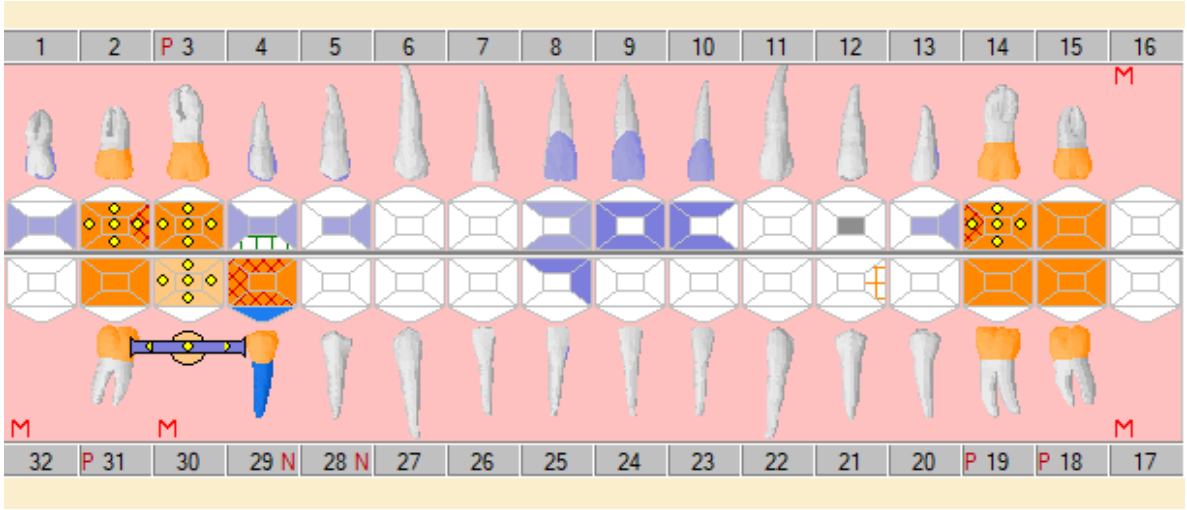
2B-2

10/21/20

ROUNDS TEAM

- **Group Leader: Dr. Pelz**
- **Specialty Leader: Dr. Jurkas**
- **Project Team Leader: D4- Sky Fox**
- **Project Team Participants:**
  - **D3- Troy Olson**
  - **D2- Andrew Altfillisch**
  - **D1-Hamaad Khan**

PATIENT



- 72 y.o Caucasian Female
- CC:"I have a bridge that is starting to break down and cracks in my front teeth I would like to get fixed"

MEDICAL HISTORY

- Medications:
  - Atenolol
  - Albuterol
  - Hydrocortisone
- Allergies
  - Nickel- noticed on ear
  - Latex- skin breaks out in hives
  - Yellow dye 5&6- swelling
  - Allergic rhinitis
- Vision problems
- High blood pressure
- Occasional congestion
- Occasional skin rash

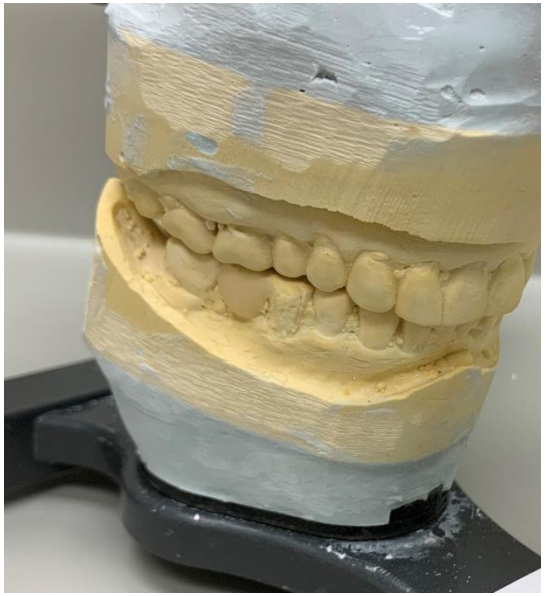
DENTAL HISTORY

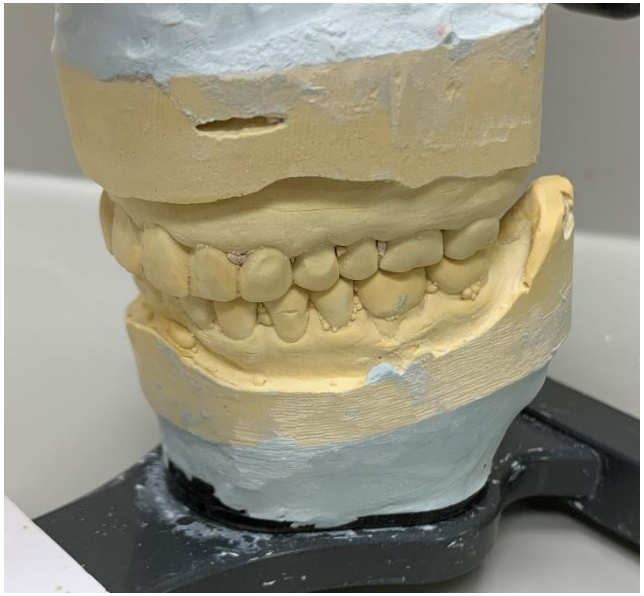
- Extractions
- Bridge
- Several full cast crowns

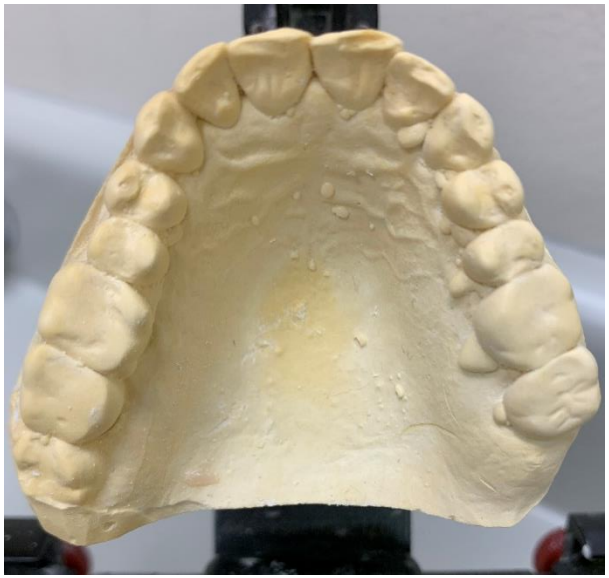
- Dental problems
  - Sensitivity to sweets and cold
  - Loose teeth (bridge #29-31)
  - Occasional Earaches

- Brushes 2x/day
- Flosses 1x/day

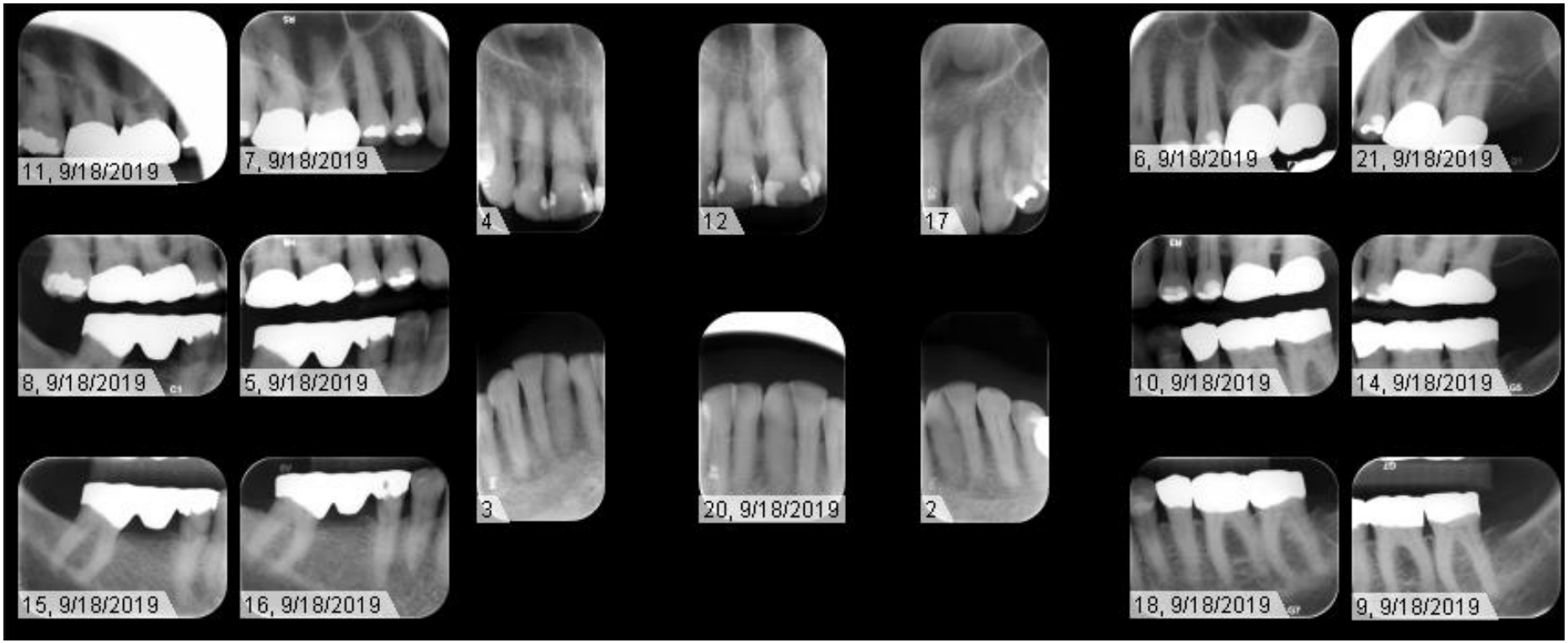
DIAGNOSTIC CAST







FMX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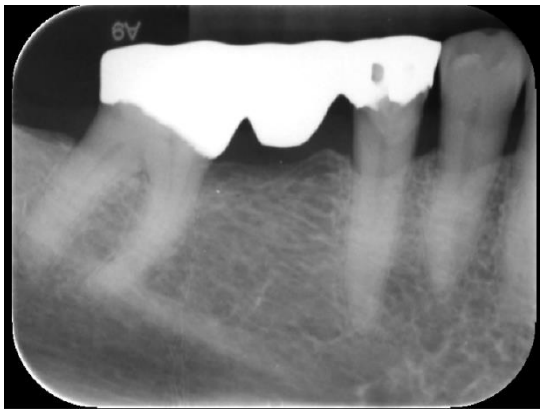
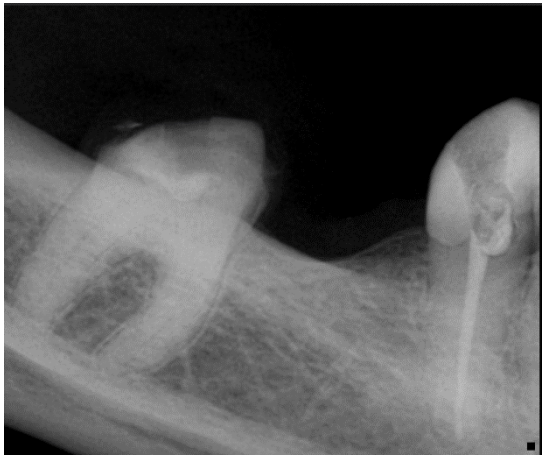
9, 9/18/2019

BRIDGE #29-31



1. Pre-op



2. RCT

3. Prefabricated Post

4. Post & Core

RADIOGRAPHIC FINDINGS

- FCC bridge #28-30 with DL recurrent decay #28

SPECIFIC FINDINGS

- Class 2 furcation: #3 and #19
- Recurrent decay: M #2 , MLD #3, M #4, #5, ML #7, MIDFL #8, M #14, DL #29
- Defective restorations: DL #4, D #13
- Overhang #21 D

PERIODONTAL CHART

																	MOBILITY
		2															FURCA
P P	P P	P P	P P	P P	P P	P P	P P	P P	P P	P P	P P	P P	P P	P P	P P	P P	PLAQUE
																	BOP
4 4 4	4 4 4	3 3 3	4 4 4	4 4 4	4 4 4	4 4 4	4 4 4	4 4 4	5 5 5	4 4 4	3 3 3	4 4 4	4 4 4	4 4 4			MGJ
3 3 3	3 3 4	4 4 3	3 4 4	4 4 4	4 3 4	3 2 3	3 2 3	4 3 3	2 2 2	4 3 4	4 4 4	2 2 3	4 4 4	3 3 3			CAL
2 2 2	1 1 2	1 1 1	1 2 3	2 1 2	2 1 2	2 1 2	2 1 2	3 2 2	2 2 2	3 2 3	2 2 2	2 2 3	2 2 2	2 2 2			P.D.
1 1 1	2 2 2	3 3 2	2 2 1	2 3 2	2 2 2	1 1 1	1 1 1	1 1 1	0 0 0	1 1 1	2 2 2	0 0 0	2 2 2	1 1 1			FGM
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16		
-1 0 -1	1 2 2	2 3 2	1 1 1	0 0 0	1 1 1	1 1 1	1 1 1	-1 1 -1	0 0 0	0 0 0	1 1 1	1 2 1	1 2 2	1 1 1			FGM
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																	MGJ
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P P	P P	P P	P P	P P	P P	P P	P P	P P	P P	P P	P P	P P	P P	P P	P P		PLAQUE
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																	BOP
	4 4 4		4 4 4	4 4 4	4 4 4	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			MGJ
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	2 2 2		1 1 2	1 1 1	1 1 1	1 1 1	1 1 1	1 1 2	2 1 2	2 1 2	2 1 2	1 1 1	2 2 2	2 2 2			P.D.
	3 2 2		2 2 2	2 2 2	0 0 0	1 1 1	2 2 2	2 2 2	1 1 1	0 0 0	0 0 0	1 1 1	1 1 1	1 1 2			FGM
32	31	30	29N	28N	27	26	25	24	23	22	21	20	19	18	17		
	2 2 2		1 1 1	1 2 1	0 0 0	2 2 2	1 1 1	1 1 1	2 2 2	0 0 0	1 1 1	1 1 1	5 3 3	3 3 3			FGM
	2 1 2		2 2 2	2 1 2	2 1 1	1 1 1	1 1 1	1 1 1	1 1 1	1 1 1	2 1 1	1 1 1	2 1 1	2 2 2			P.D.
	4 3 4		3 3 3	3 3 3	2 1 1	3 3 3	2 2 2	2 2 2	3 3 3	1 1 1	3 2 2	2 2 2	7 4 4	5 5 5			CAL
	3 3 3		2 2 2	4 4 4	4 4 4	4 4 4	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
			B B B														BOP
	P P P		P P P	P P P	P P	P P P	P P P	P P P	P P P	P P	P P	P P	P P	P P			PLAQUE
													2				FURCA
																	MOBILITY

DIAGNOSIS

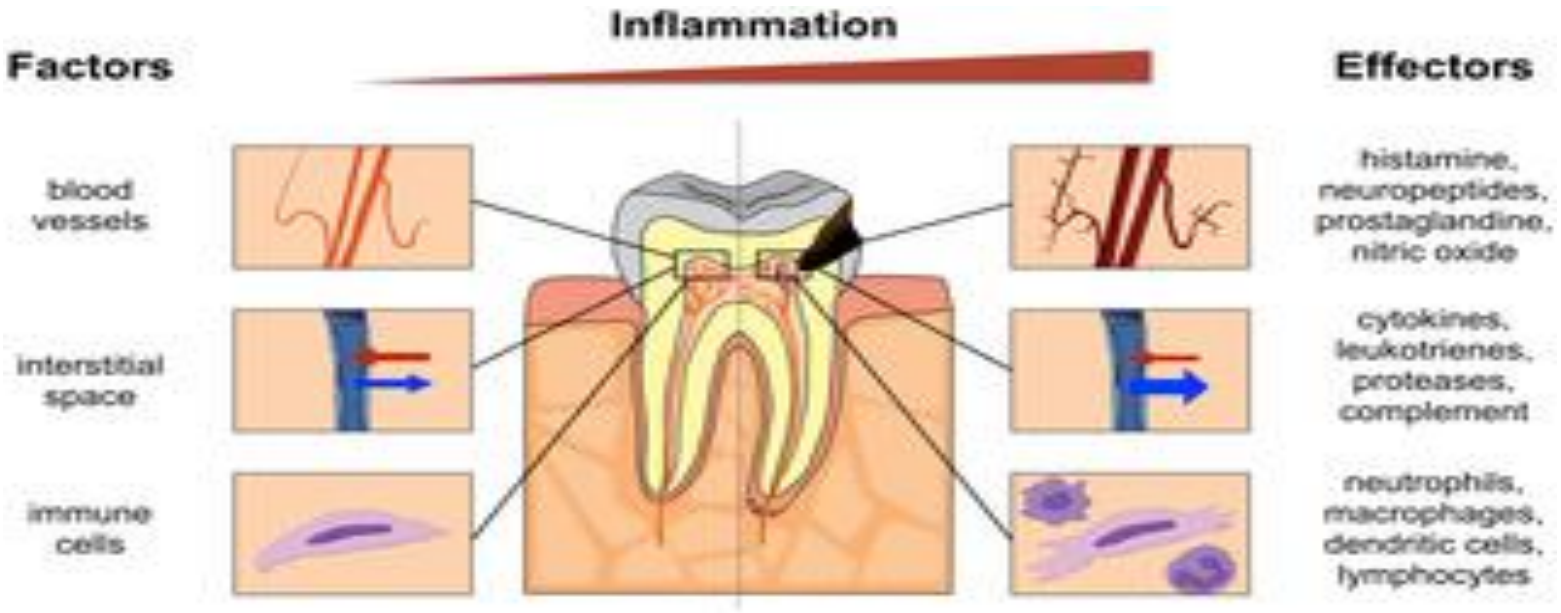
- Full cast bridge #29-31 obtains class1 mobilty, with recurrent decay at the DL of #29

PROBLEM LIST

- Recurrent decay
- Defective restorations
- Loose bridge

D1: WHAT IS THE INFLAMMATORY PATHWAY FROM A NECROTIC NERVE?

- Microcirculation
- Pulp Nerves
- Diseased pulp
- Disease progression Leading to Necrosis



Sources:

Yu, C., and PV Abbott. "An Overview of the Dental Pulp: Its Functions and Responses to Injury." *Wiley Online Library*, John Wiley & Sons, Ltd, 12 Mar. 2008, onlinelibrary.wiley.com/doi/pdf/10.1111/j.1834-7819.2007.tb00525.x.

Zanini, Marjorie, et al. "Pulp Inflammation Diagnosis from Clinical to Inflammatory Mediators: A Systematic Review." *Journal of Endodontics*, Elsevier, 17 May 2017

Rechenberg, Dan-Krister, et al. "Biological Markers for Pulpal Inflammation: A Systematic Review." *PLOS ONE*, edited by Irina Kerkis, vol. 11, no. 11, 2016, p. e0167289. *Crossref*, doi:10.1371/journal.pone.0167289.

D2: ETIOLOGY OF ENDODONTIC INFECTIONS

- ***Pathway of Infection***
  - ***Trauma***
  - ***Faulty restorations***
    - ***Bacteria travel through saliva***
  - ***Dental Procedure***
    - ***Dentinal tubules***
    - ***Blood stream***

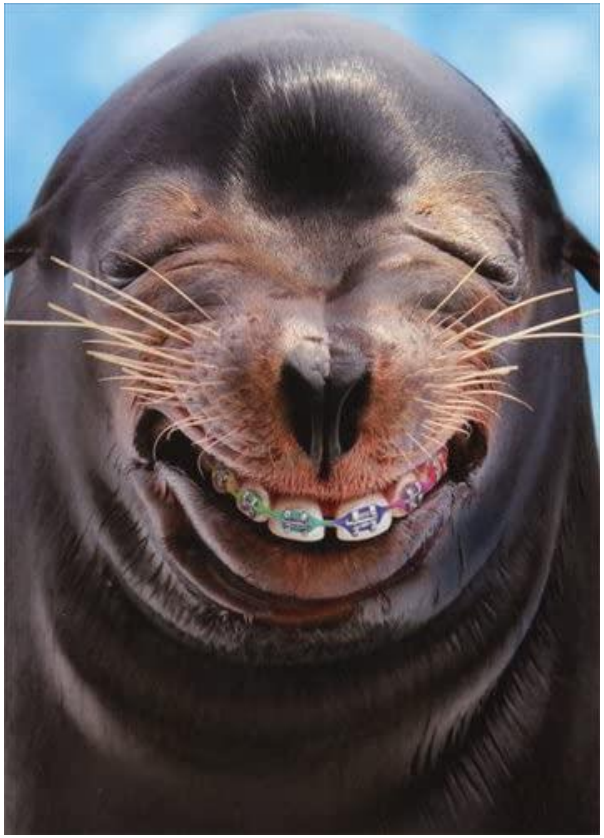
ENDODONTIC MICROBIOLOGY

- Intraradicular
  - Black pigmented anaerobic rods
  - Prevotella
  - Porphyromonas
  - Tannerella forsythia
- Extraradicular
  - Development of an abscess
  - Actinomyces
  - Treponema
- Persistent after treatment
  - Gram positive
    - Streptococci
    - Lactobacilli
    - Actinomyces
  - Gram negative anaerobic rods
    - Campylobacter
    - Prevotella

CLINICAL QUESTION

- What is the mechanical aspect of gutta percha for the restorative placement of a post and core?

D3:
THE APICAL SEAL!



- Gutta percha creates and maintains the apical seal to prevent bacterial leakage and reinfection

PICO FORMAT

- P: Patients with endodontically treated teeth
- I: Gutta percha
- C: Mineral trioxide aggregate (MTA)
- O: Better apical seal against bacterial microleakage

PICO FORMATTED QUESTION

In patients with endodontically treated teeth,
does gutta percha or
mineral trioxide aggregate (MTA)
result in a better apical seal
when post and core placement is indicated?

SEARCH BACKGROUND

- Databases used:
  - PubMed
  - Science Direct
- Dates of Searches
  - 10/12 – 10/15
- Keywords:
  - Endodontically treated teeth
  - Post and core, post space preparation
  - Apical seal, microleakage
  - Gutta percha, mineral trioxide aggregate

THE PROSTHODONTIC MANAGEMENT OF ENDODONTICALLY TREATED TEETH: A LITERATURE REVIEW. PART II. MAINTAINING THE APICAL SEAL

CHARLES J. GOODACRE, DDS, MSD AND
KENNETH J. SPOLNIK, DDS, MSD

JOURNAL OF PROSTHODONTICS
VOL. 4, NO 1 (MARCH) 1995: PP 51-53.

TOPICS OF INTEREST

The Prosthodontic Management of Endodontically Treated Teeth: A Literature Review. Part II. Maintaining the Apical Seal

Charles J. Goodacre, DDS, MSD, and Kenneth J. Spolnik, DDS, MSD†*

Part II of the three-part literature review series addresses factors related to prosthodontic treatment that can affect the apical seal and endodontic success.

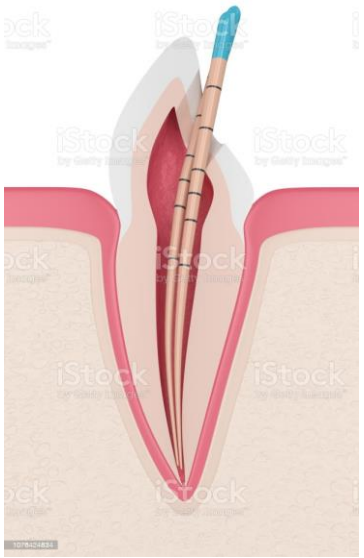
J Prosthod 1995;4:51-53.

INDEX WORDS: endodontically treated teeth, posts and cores, apical seal

KEY MESH TERMS: ENDODONTICALLY TREATED TEETH, POST AND CORE, APICAL SEAL, GUTTA PERCHA

KEY FINDINGS

- Minimum of 5mm gutta percha is necessary for an adequate apical seal
- When only 3mm or less is present, there is a significantly greater incidence of leakage



- Other related findings:
  - Adequately condensed gutta percha can be safely removed immediately after endodontic treatment (immediate post placement)
  - Both rotary and hot instruments can be safely used to remove gutta percha

IN VITRO COMPARISON OF THREE DIFFERENT LENGTHS OF REMAINING GUTTA-PERCHA FOR ESTABLISHMENT OF APICAL SEAL AFTER POST-SPACE PREPARATION

SAEED RAHIMI ET. AL

JOURNAL OF ORAL SCIENCE
VOL. 50, NO. 4, 435-439, 2008.

Journal of Oral Science, Vol. 50, No. 4, 435-439, 2008

Original

***In vitro* comparison of three different lengths of remaining gutta-percha for establishment of apical seal after post-space preparation**

Saeed Rahimi[1)], Shahriar Shahi[1)], Saeed Nezafati[2)], Mohammad F. Reyhani[1)], Sahar Shakouie[1)] and Leila Jalili[3)]

[1)]Department of Endodontics, Tabriz Dental School, Tabriz University (Medical Sciences), Tabriz, Iran
2)Department of Oral and Maxillofacial Surgery, Tabriz Dental School, Tabriz University (Medical Sciences), Tabriz, Iran
[3)]Private Practice, Tabriz, Iran

(Received 13 May and accepted 16 October 2008)

KEY MESH TERMS: APICAL SEAL, GUTTA PERCHA, MICROLEAKAGE, POST SPACE PREPARATION

WHAT THEY DID

- 126 single-rooted maxillary anterior teeth without resorption
- Root canals filed to Size #40 and filled with gutta percha (lateral condensation), then prepared with post-space using Gates-Glidden leaving 4, 5 and 6mm remaining
- Teeth sealed coronally with Fuji II glass ionomer cement

- Entire surface except for apical 2mm covered with layer of sticky wax and two layers of nail polish, then placed in India ink for 72 hours

WHAT THEY FOUND

- Negative control (completely coated) showed no microleakage
- Positive control (no gutta percha) showed complete penetration

- Apical microleakage observed in 4, 5, and 6mm experimental groups
  - Greatest amount of gutta percha = least amount of leakage

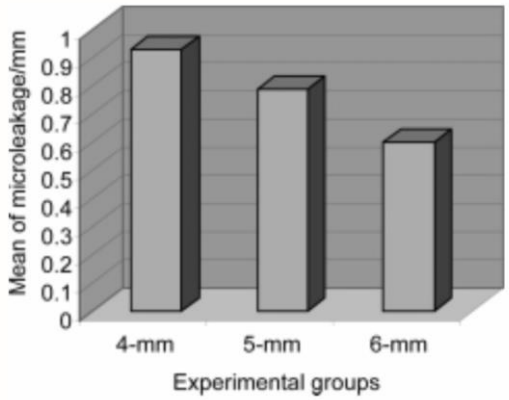


Fig. 2 The mean microleakage in the experimental groups.

COMPARING THE CORONAL SEAL OF DIFFERENT THICKNESSES OF MTA WITH GUTTA-PERCHA AFTER POST SPACE PREPARATION

MOHAMMAD FROUGH REYHANI ET. AL

THE SCIENTIFIC WORLD JOURNAL
VOLUME 2015

Research Article

Comparing the Coronal Seal of Different Thicknesses of MTA with Gutta-Percha after Post Space Preparation

Mohammad Frough Reyhani,[1] Hamidreza Yavari,[1] Negin Ghasemi,[1] Saeed Rahimi,[2] Mohammad Hosien Soroush Barhaghi,[3] Hadi Mokhtari,[1] and Payman Sarikhani[4]

[1]*Department of Endodontics, Dental Faculty, Tabriz University (Medical Sciences), Tabriz 5154613475, Iran*
[2]*Dental and Periodontal Research Center, Dental Faculty, Tabriz University (Medical Sciences), Tabriz 5154613475, Iran*
[3]*Department of Microbiology, Medical Faculty, Tabriz University (Medical Sciences), Tabriz 5154613475, Iran*
[4]*Dental Faculty, Tabriz University (Medical Sciences), Tabriz 5154613475, Iran*

KEY MESH TERMS: GUTTA PERCHA, APICAL SEAL, POST SPACE PREPARATION, MINERAL TRIOXIDE AGGREGATE

WHAT THEY DID

- 50 central incisors selected, crowns removed to leave roots measuring 13mm in length
- Filed up to #60 using K-file, irrigated with NaOCl, smear layer removed with EDTA
  - Group 1 – gutta percha (4mm)
  - Group 2 – gutta percha (5mm)
  - Group 3 – MTA (1mm)
  - Group 4 – MTA (2mm)
  - Group 5 – MTA (3mm)
- Outside of tooth sealed with nail varnish except for apical 2mm

THE LEAKAGE EVALUATION SYSTEM

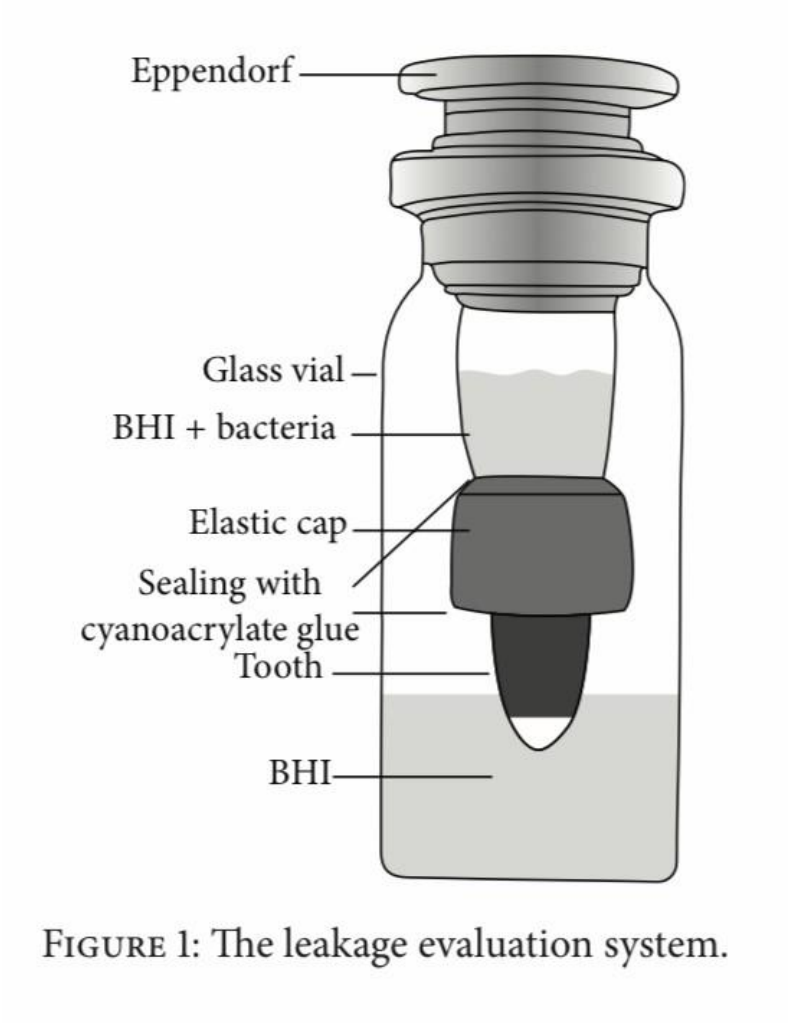


FIGURE 1: The leakage evaluation system.

WHAT THEY FOUND

- Number of samples exhibiting microleakage in MTA was less than those of gutta percha at all intervals
- Mean number of days with no microleakage
  - Maximum with 3mm MTA
  - Minimum with 4mm gutta percha

Table 1: The number of samples with microleakage in each group during the evaluation period.

Group	Size	Day 10	Day 20	Day 30	Day 40	Day 50	Day 60	Day 70	Day 80	Day 90	Day 100	Day 110	Day 120
MTA	1 mm			1	3	3	3	4	5	5	7	8	8
	2 mm		1	1	2	3	4	5	5	6	7	7	8
	3 mm			1	1	2	3	4	5	6	7	8	8
Gutta-percha	4 mm	1	4	6	8	8	8	8	8	8	8	8	8
	5 mm	1	3	5	7	8	8	8	8	8	8	8	8
Positive control	—	5	5	5	5	5	5	5	5	5	5	5	5
Negative control	—	0	0	0	0	0	0	0	0	0	0	0	0

DISCUSSION

- MTA offers several benefits over gutta percha
  - Bactericidal properties
  - Sets in presence of blood and moisture
  - Bioactive – forms chemical bond with intracanal dentin

DISCUSSION

- Able to create seal with MTA plug in teeth with short roots to accommodate post & core
  - No need to remove root canal filling material
  - No trauma inflicted on root during removal
- Useful in teeth with immature apices which require post and core
- However
  - Difficult to remove MTA if retreatment is required

CLINICAL BOTTOM LINE

- Both gutta percha and MTA serve as viable options for producing a clinically acceptable apical seal
- MTA may result in a better apical seal compared to gutta percha, especially when minimal amounts of material must be used
    - Examples:
        - Teeth with short roots
        - Trying to accommodate a post of a certain length
            - Ideal 2/3 root length with bony support OR
            - At least equal to root length

CONCLUSIONS AND RECOMMENDATION

- Gutta percha is fine in most instances and remains the gold standard for apical seal

- Teeth with short roots or immature apices may require MTA to accommodate ideal post length

LEVELS OF EVIDENCE

Levels of Evidence: (For Therapy/Prevention, Etiology/Harm)

See http://www.cebm.net/index.aspx?o=1025

[1] **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

[2, 3] **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

[X] **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

- Limitations:
  - Age/date of some data
    - Endodontics is somewhat established field
  - Level of evidence
    - Non-randomized control study, in vitro research

CONCLUSIONS: D4

Based on your D3's bottom line recommendations, how will you ***advise*** your patient?

- Due to the limited amount of coronal structure remaining after bridge removal and caries excavation, a 4 unit bridge with a prefabricated post and core will be utilized at site #28 with atleast 5mm of gutta percha to assure there is adequate apical seal.

QUESTIONS?

Thank you!