



# Modern Composite Dentistry: CRUSH your next Class II

David Clark DDS

*featuring*

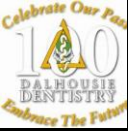
 BIOCLEAR



# BIOCLEAR LEARNING CENTER

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Varberg Sweden · Cairo Egypt  
Syracuse Italy · Taubate Brazil  
Livermore CA (Bioclear pediatrics)  
Seoul Korea · Madrid/Barcelona  
Sydney Australia · Provence France  
Baghdad Iraq

# Dental schools/GPR integrating the Bioclear Method



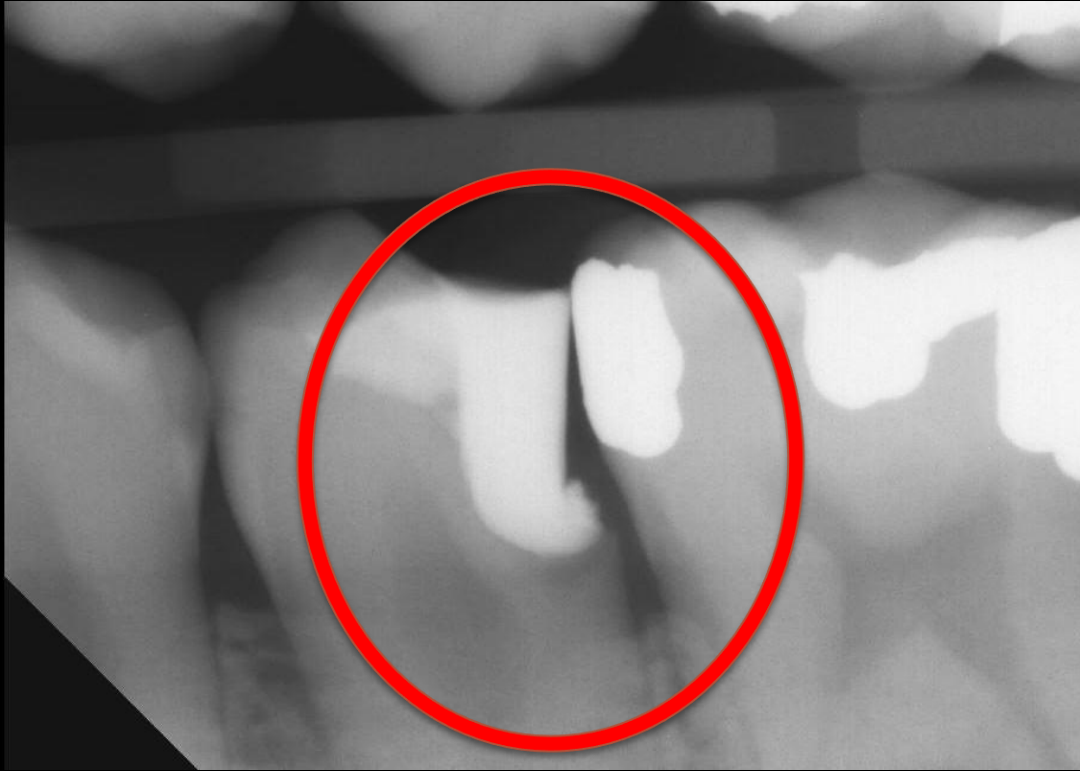
For a copy of today's presentation,  
Learning Center info or the essential  
Learning Center Library



Disclosures:  
Dr. Clark has financial interest in Bioclear



# Recent post-op x-ray from a well-known dental school



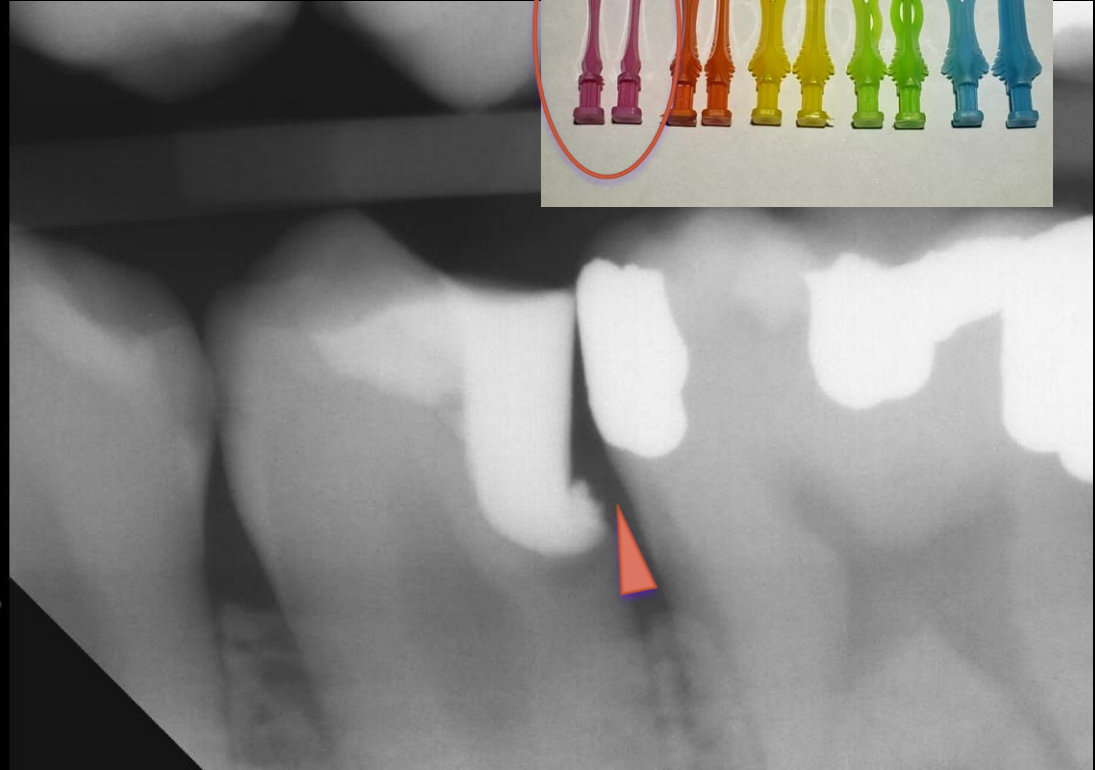
Together let's make  
a list of ten steps  
and secrets to  
create a superb  
outcome for this  
sad tooth

1. X
2. X
3. X
4. X
5. X
6. X
7. X
8. X
9. X
- 10.x



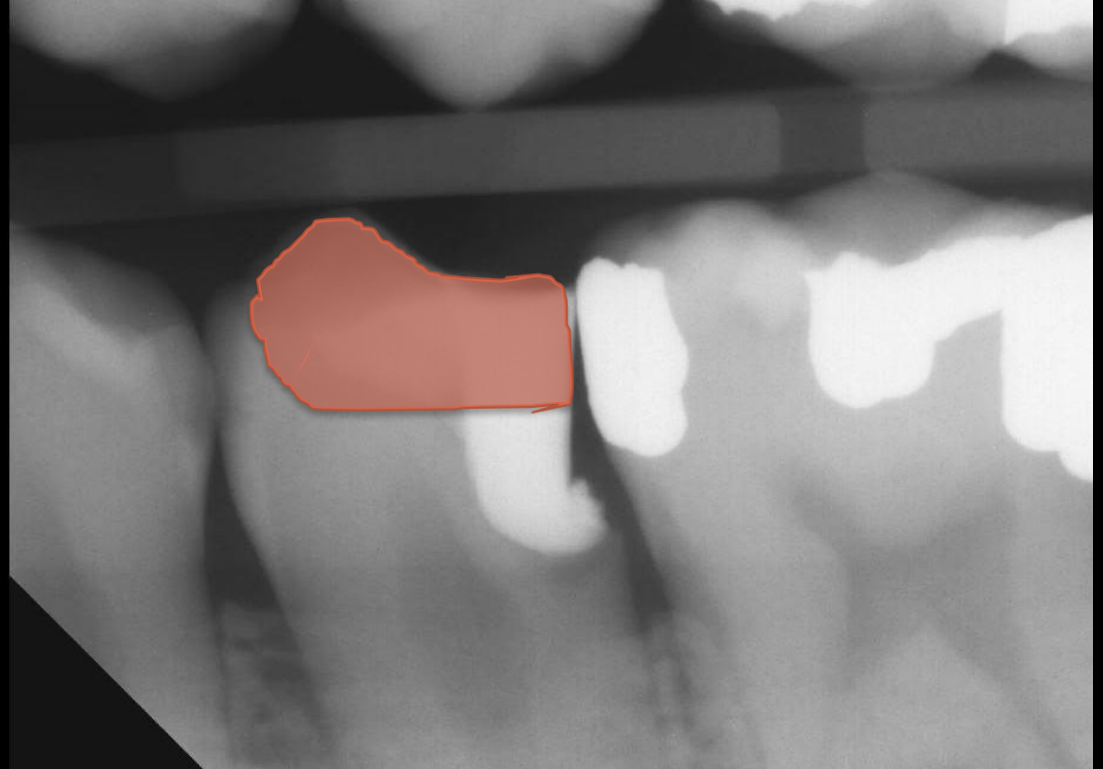
# Ten Steps:

1. Informed consent - fair prognosis
2. Anesthesia, full quadrant rubber dam
3. Disclose and blast entire tooth, pre-wedge



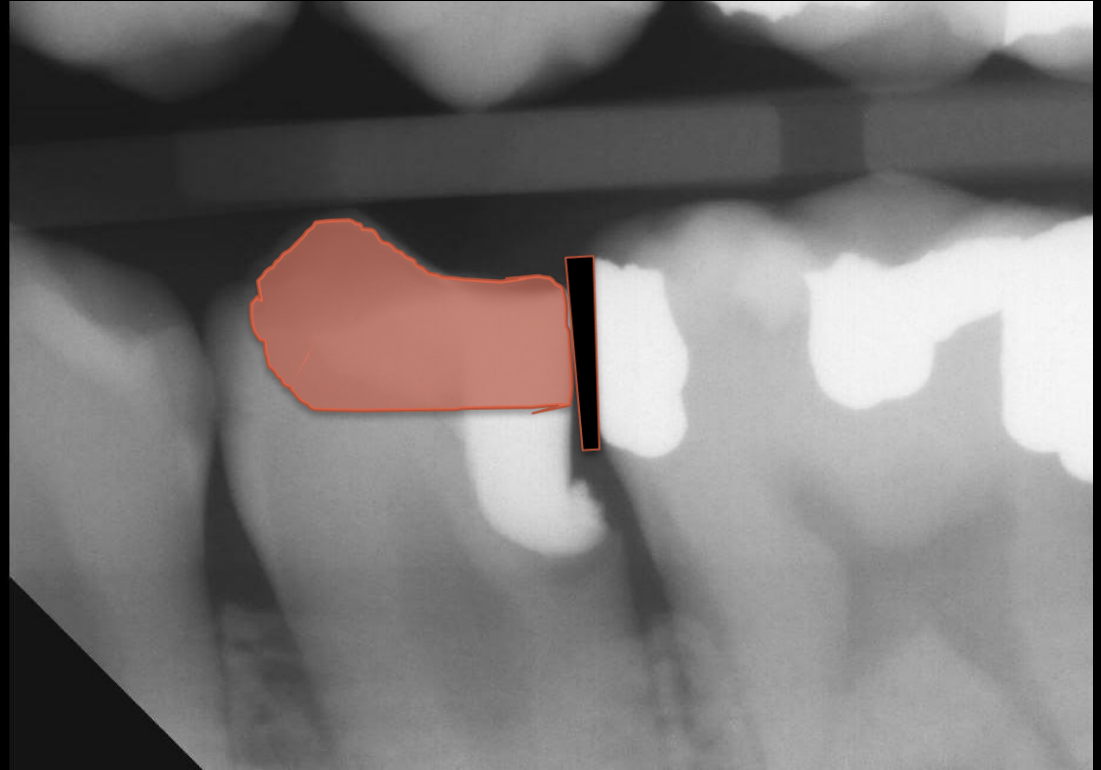
## Ten Steps:<sub>x</sub>

1. Informed consent - fair prognosis
2. Anesthesia, full quadrant rubber dam
3. Disclose and blast entire tooth
4. Cuspal reduction 2-3 mm, leave mesial alone



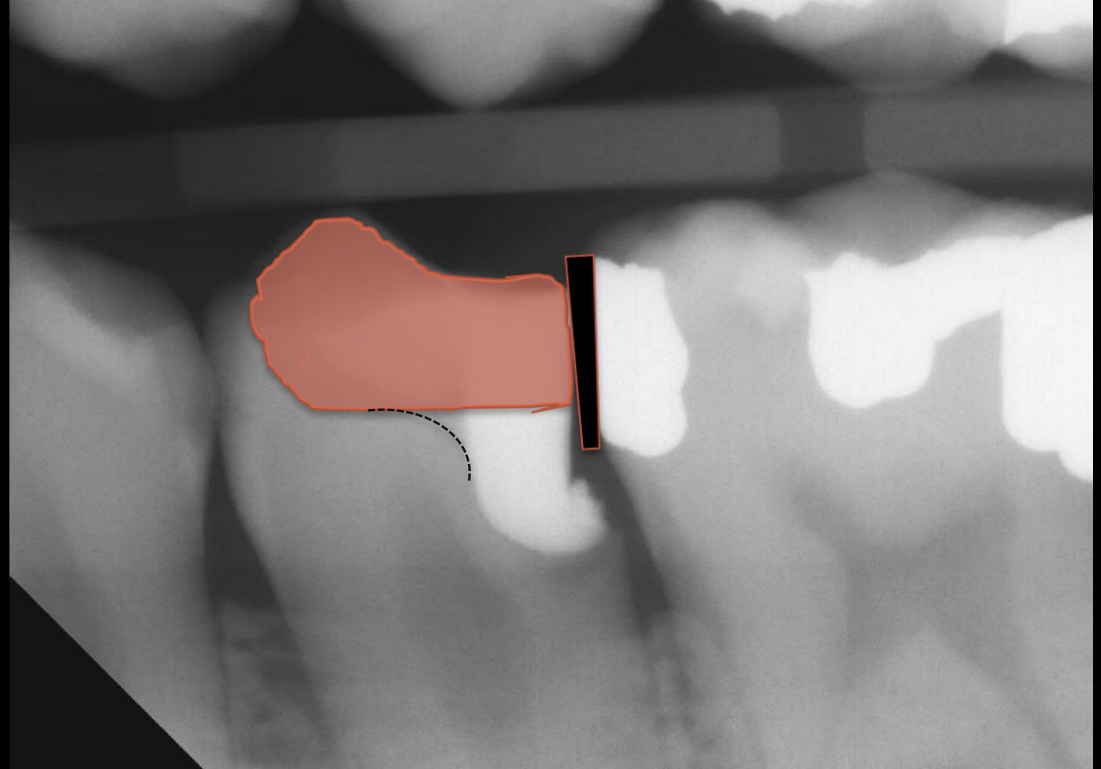
## Ten Steps:<sub>x</sub>

1. Informed consent - fair prognosis
2. Anesthesia, full quadrant rubber dam
3. Disclose and blast entire tooth
4. Cuspal reduction 2-3 mm, leave mesial alone
5. Optimize neighbor



# Ten Steps:

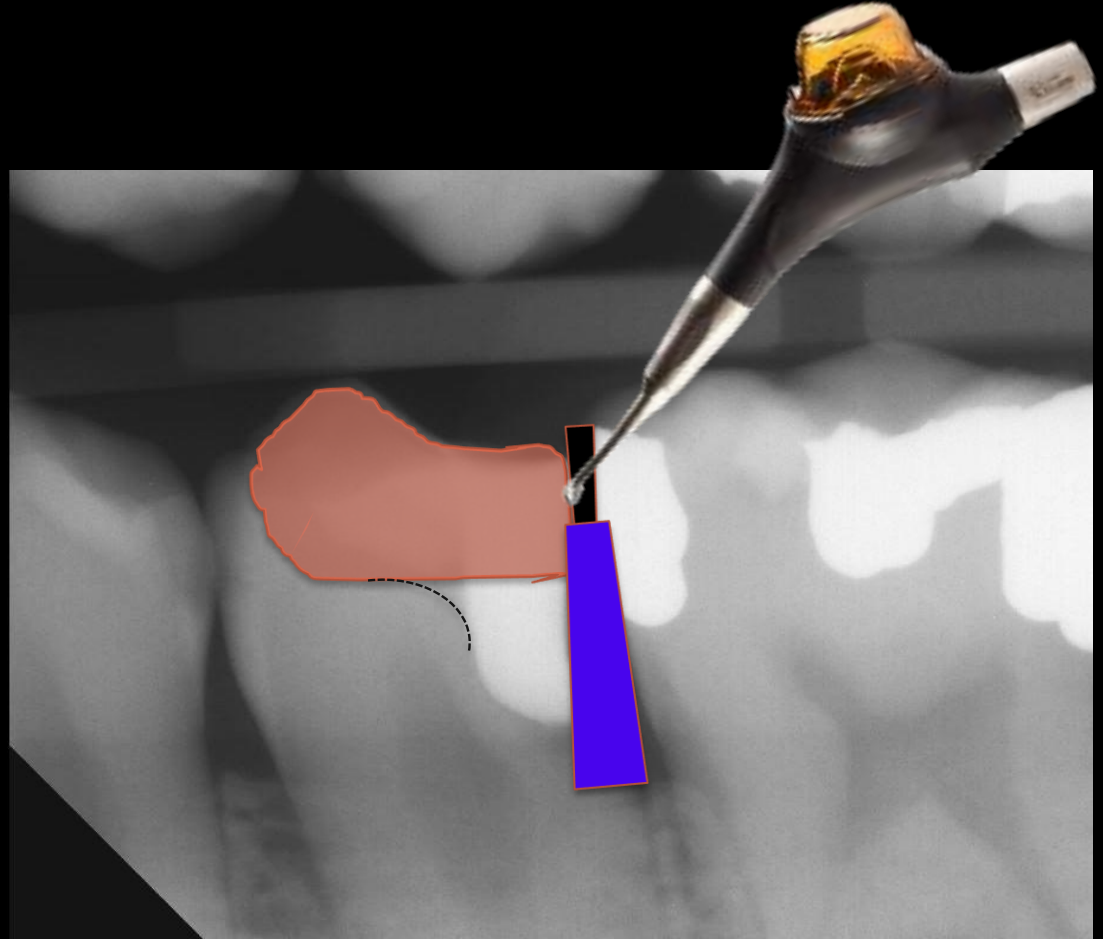
6 Selective caries removal, round the axio-pulpal line angle



# Ten Steps:

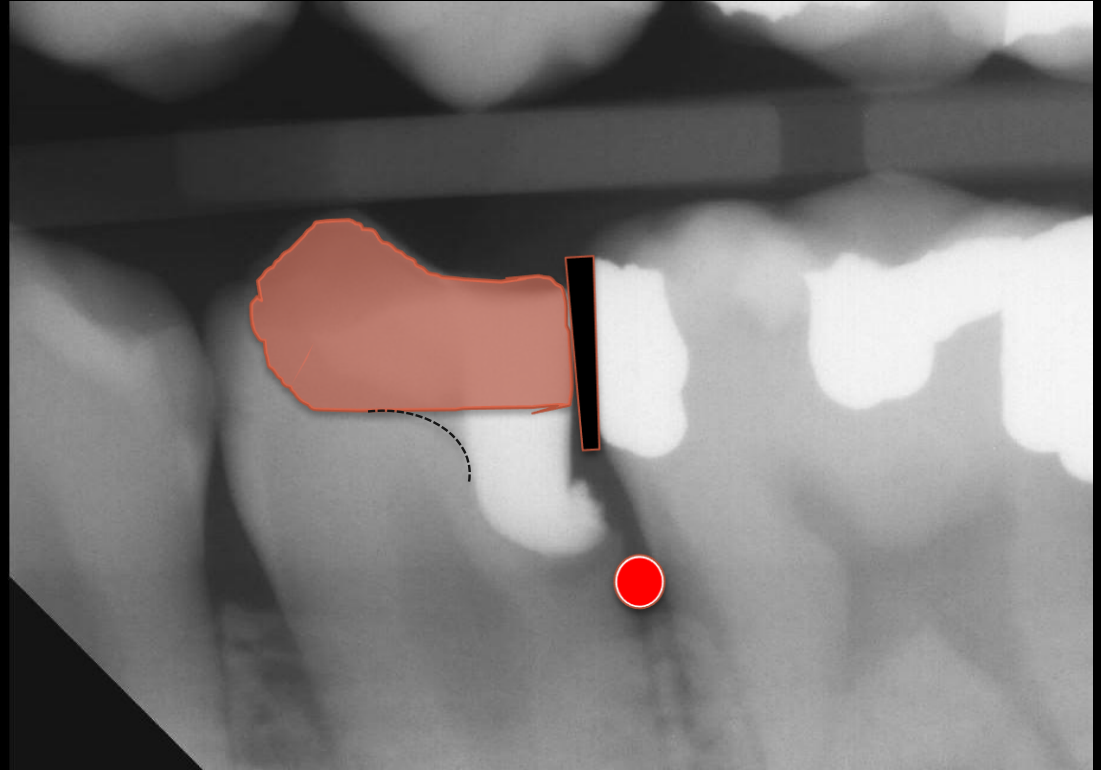
6. Selective caries removal, round the axio-pulpal line angle

7. Remove all the junk, blast the gingival aggressively



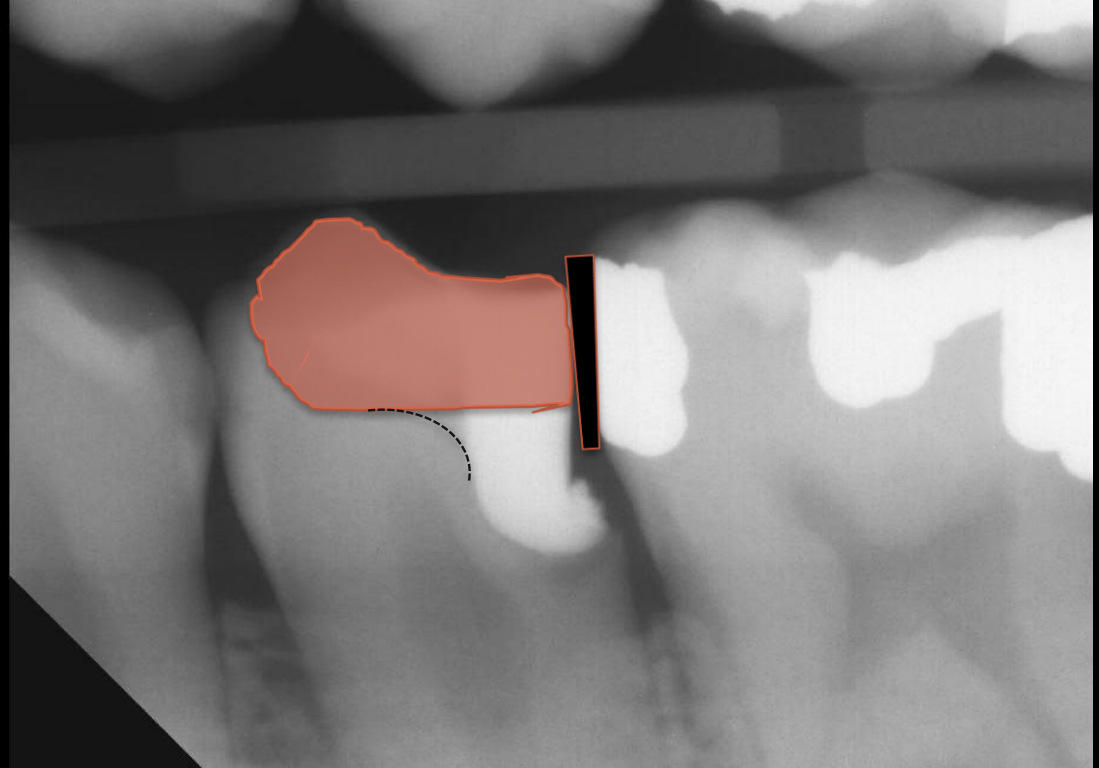
## Ten Steps:

6. Selective caries removal, round the axio-pulpal line angle
7. Remove all the junk, blast the gingival aggressively
8. Pack #3 cord aggressively, soaked in Astringedent X



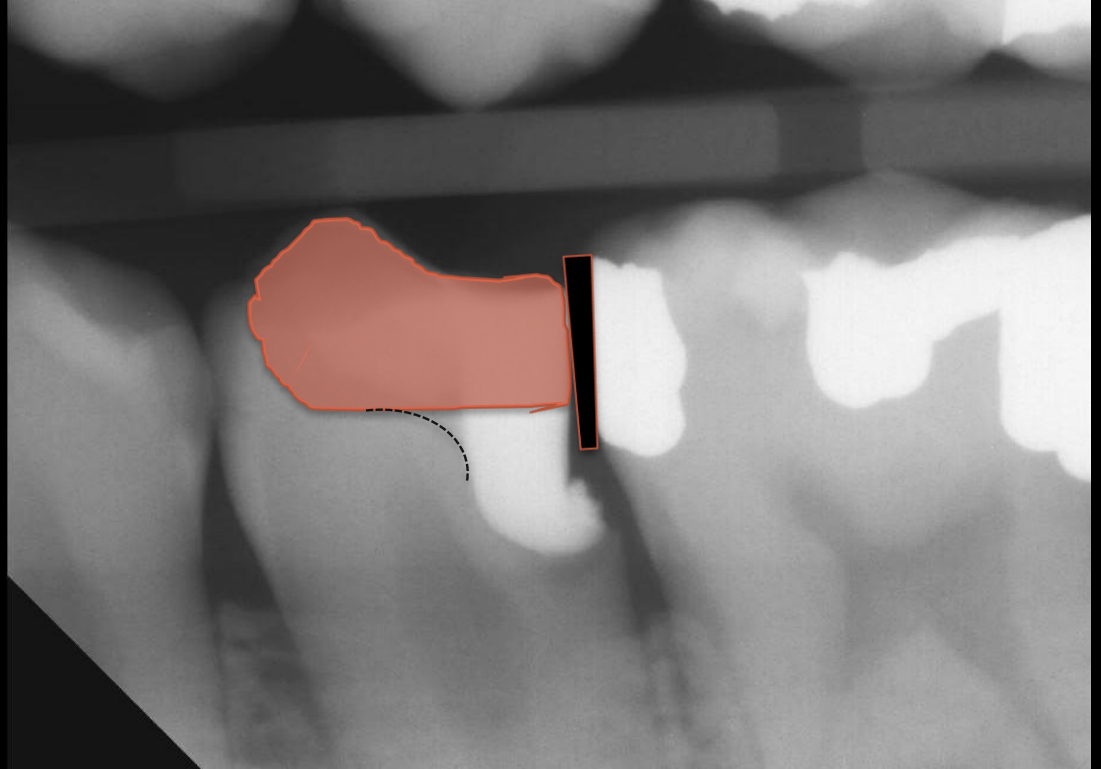
## Ten Steps:

6. Selective caries removal, round the axio-pulpal line angle
7. Remove all the junk, blast the gingival aggressively
8. Pack #3 cord aggressively, soaked in Astringedent X
9. Blast then bevel the gingival and bevel 360 around the prep



## Ten Steps:

10. You will not be able to use a wedge, yes to Twinring separator. You will need the 10 mm premolar matrix



# Modern Method for Composite Restorations

## Clear Anatomic Matrices, Powerful Separation

- Anterior & Posterior Matrices
- Designed to mimic nature

## Preparation Design

- Designed for composite
- Minimizes stress concentration
- Maximizes enamel involvement

## Biofilm Removal

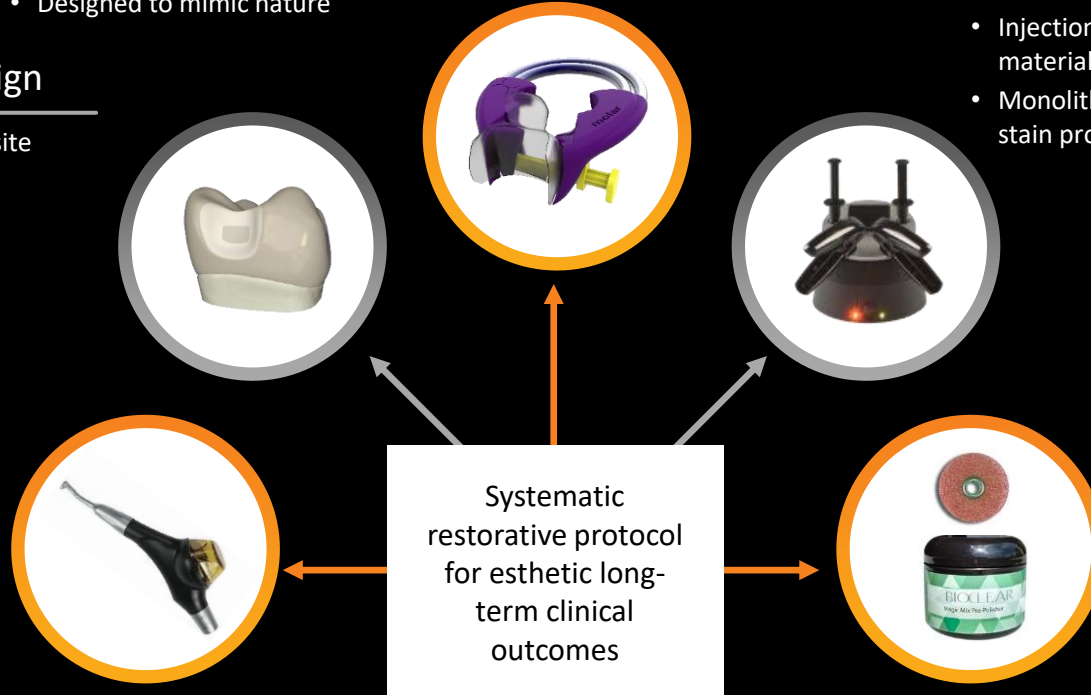
- Remove biofilm before bonding
- Allows bonding to uncut enamel
- Allows infinity edge margins

## Injection Molded Composite

- Injection mold warmed Restorative materials
- Monolithic strength and Infinity Edge stain proof margins

## Final Polish

- “Rock Star” polish with Bioclear Magic Mix & RS Polisher





# THE SCIENCE OF STRONG RESTORED TEETH



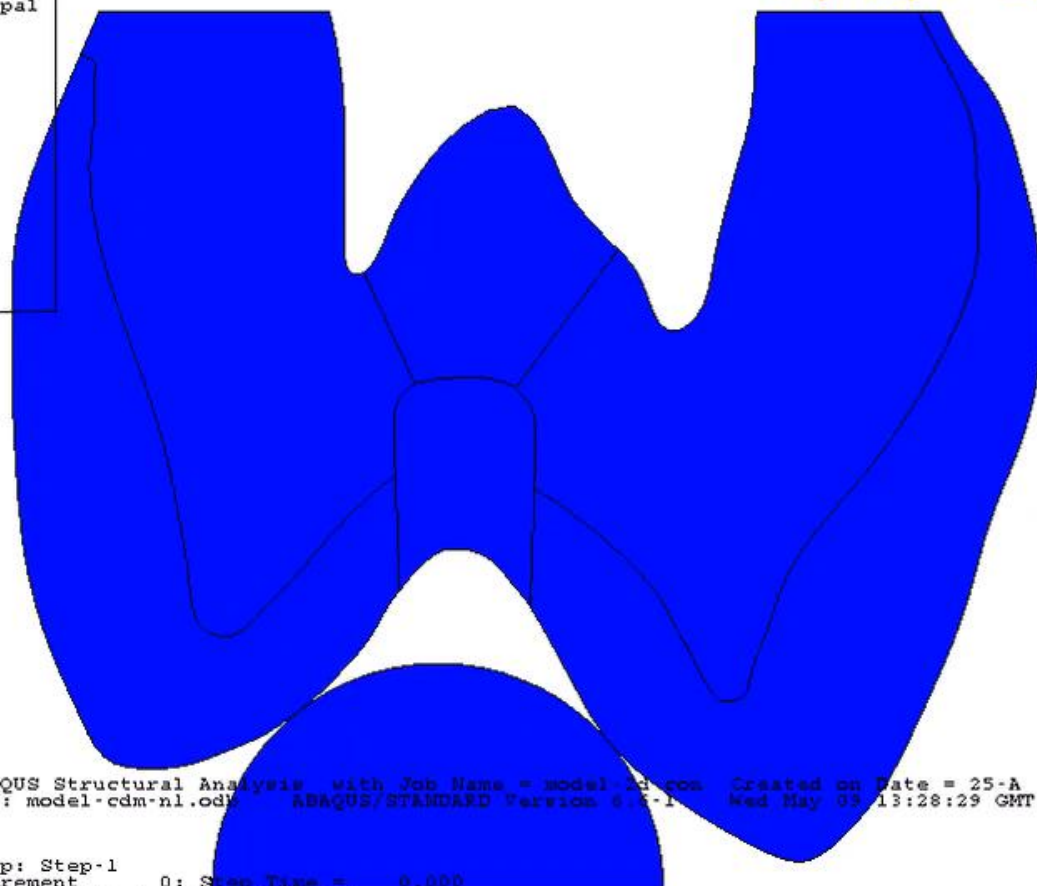
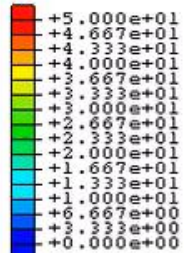
DR. DAVID CLARK



DR. ALEX FOK

Step: Step-1 Frame: 0

S, Max. Principal  
(Avg: 75%)



2  
3  
1

ABAQUS Structural Analysis with Job Name = model-nl-con Created on Date = 25-A  
ODB: model-cdm-nl.odb ABAQUS/STANDARD Version 6.6-1 Wed May 03 13:28:29 GMT Daylight

Step: Step-1  
Increment 0: Span Time = 0.000  
Primary Var: S, Max. Principal  
Deformed Var: U Deformation Scale Factor: +1.000e+01

# Epidemic of Cracked Teeth



“Around” the tooth versus  
“In” the tooth



# Step by Step Guide for Injection Molded Class II

# 1<sup>st</sup> Pillar of Modern Composite

Disclosing of Biofilm, then  
Blasting to remove Biofilm plus  
remove Protein Pellicle

# Part 1 | Biofilm Removal

If you were going to paint a wall that looked like this....



...you'd prepare the surface to receive the paint and have it stay long-term.

Photo courtesy of Dr. David Clark

24 | © 3M 2019. All Rights Reserved.

We need to do the same with teeth...



Clean teeth surfaces allow for

- Better adhesion
- Difference between “Flash” and an infinity edge at the Tooth Restoration Interface

∞ BIOCLEAR

Does 37% phosphoric acid  
(gel etchant)  
remove biofilm?

Composite  
Heating: Trend  
or the future of  
placing the  
material?

Composite Heater pre-set  
to 155° F



# Conclusions

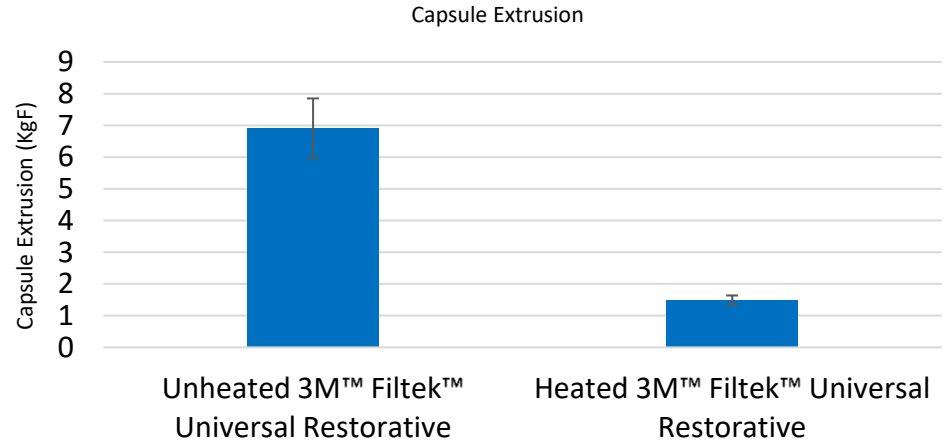
- Preheating a syringe of Filtek™ Bulk Fill Posterior to 60 °C for twenty 1 hour increments does
  - NOT harm mechanical properties such as
    - Diametral tensile strength
    - Flexural strength
  - NOT harm cure properties such as
    - Depth of cure
    - Cusp deflection (polymerization shrinkage stress)
  - NOT harm esthetic properties such as
    - Color and opacity
    - Polish retention

From: Does Preheating a Dental Composite Degrade its Post-Cure Properties?  
T.D. Dunbar et al., *J Dent Res* 95 (Spec Iss A):952, 2016 ([www.iadr.org](http://www.iadr.org)).

# Composite warming

## Why warm?

- Handling preference
- Lowers capsule extrusion force by 75-80%



3M internal data

14% of dentists survey stated they use some type of device to warm their composite prior to placement.

3M Market Research, January, 2018 N=304 Dentists (US, Russia, UK, Brazil, Germany)

Let's go back to 2007...

“Dr. Clark, aren't we supposed to layer everything?”

# Studies do not support layering to mitigate polymerization stress

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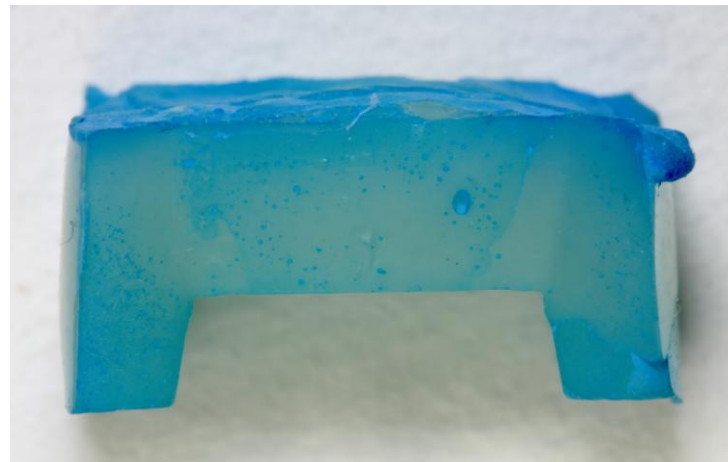
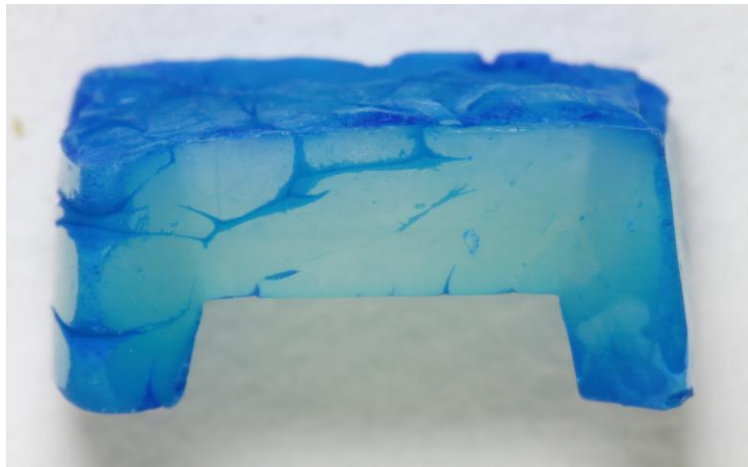
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- ◆ Does Incremental Filling Technique Reduce Polymerization Shrinkage Stresses?  
Versluis A, et.al., J Dent Res March 1996; 75(3): 871-878
- ◆ An In Vitro Study of the Effect of Restorative Technique on Marginal Leakage in Posterior Composites  
Neiva IF, et.al.; Oper Dent 1998, 23:282-289
- ◆ Microleakage and adaptation of Class II packable resin-based composites using incremental or bulk filling techniques  
Gallo JR, et.al., Am J Dent 2000; 13: 205-208
- ◆ The Effects of Adhesive Thickness on Polymerization Contraction Stress of Composite  
Choi KK, et.al., J Dent Res 2000; 79(3): 812-817
- ◆ Microleakage of Posterior Packable Resin Composites with and without flowable liners  
Leevailoj C, et.al., Oper Dent 2001; 26: 302-307
- ◆ Marginal adaptation of Class II resin composite restorations using incremental and bulk placement techniques: and ESEM study  
Idriss S, et.al., J Oral Rehab 2003; 30: 1000-1007
- ◆ A reappraisal of the incremental packing technique for light cured composite resins  
Rees JS, et.al., J Oral Rehab 2004; 31: 81-94
- ◆ Cuspal deflection and depth of cure in resin-based composite restorations filled by using bulk, incremental and transtooth-illumination techniques  
Carlos E. Campodonic, DDS 2011, October 2011 JADA

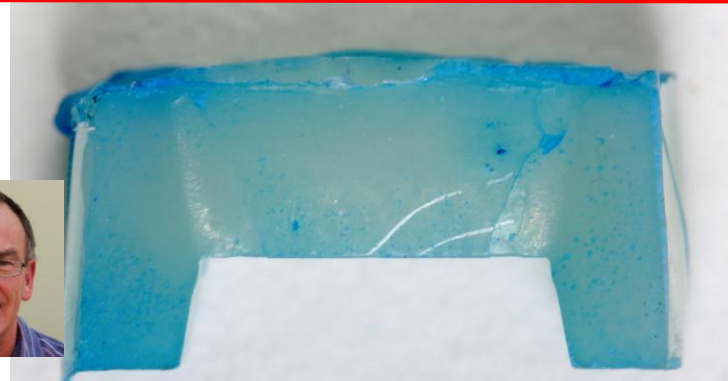
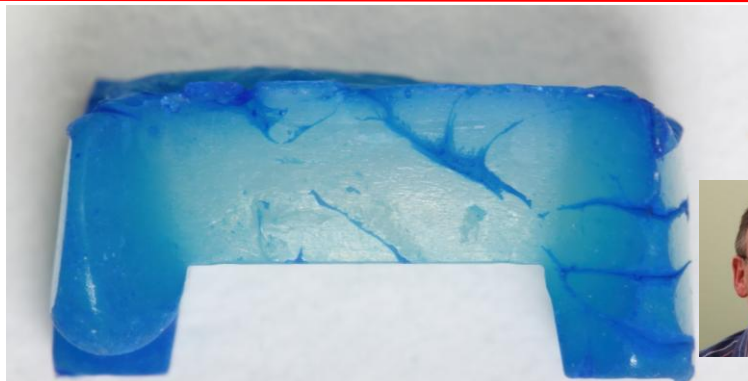
Hand-Packed and Layered

Monolithic and Injection-Molded

Dr. #1



Dr. #2



Courtesy Dr. Richard Price

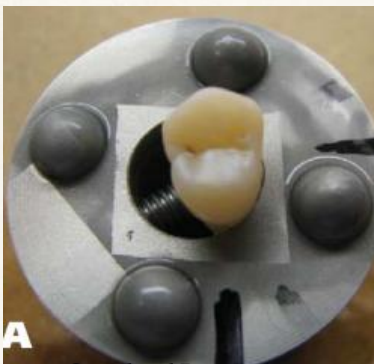
A microscopic image of a tooth with a filling. The filling is a light, textured material. There is a dark, irregular spot at the interface between the filling and the tooth, indicating microleakage. The background is a light, textured surface.

Is layering a good thing or a bad thing?

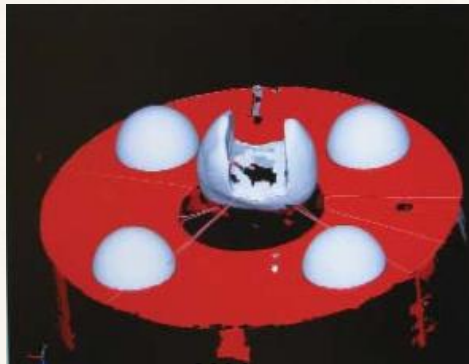
Does layering relieve stress and reduce microleakage? **NO**

# October 2011 JADA

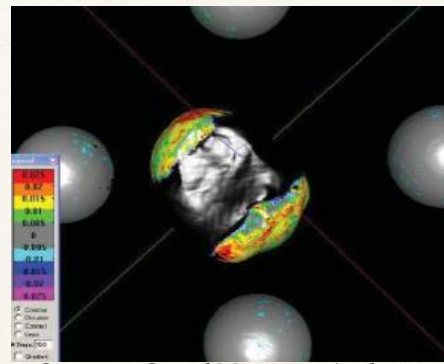
## Cuspal deflection and depth of cure in resin-based composite restorations filled by using bulk, incremental and transtooth-illumination techniques



Completed Restoration



COS Scan



Computer Cuspal Movement Analysis

**"Conclusions:** Cuspal deflection was not affected by filling techniques."

"Filtek Supreme Plus had lower curing values below a depth of 2 mm."

**"Clinical Implications.** When using resin-based composite restorative materials, clinicians should be more concerned about the effect of filling techniques on curing depth than about how these techniques affect shrinkage stresses."

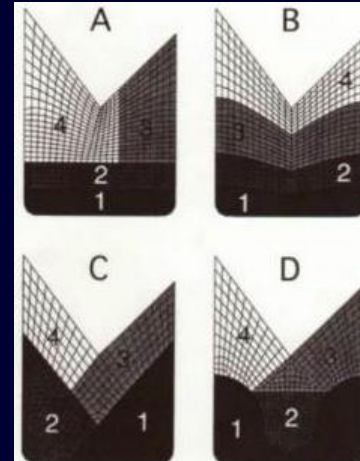
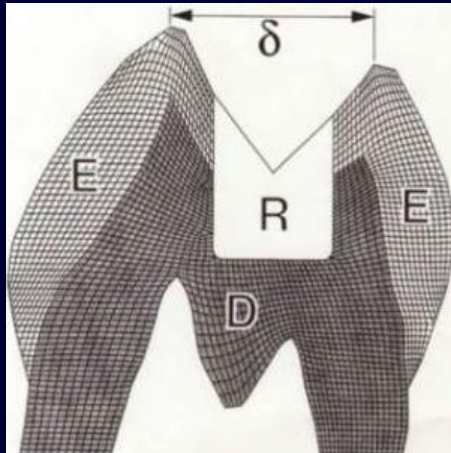
## Does an incremental filling technique reduce polymerization shrinkage stresses?

Versluis A, Douglas WH, Cross M, Sakaguchi RL.

Minnesota Dental Research Center for Biomaterials and Biomechanics, University of Minnesota, Minneapolis 55455, USA.

### Abstract

It is widely accepted that volumetric contraction and solidification during the polymerization process of restorative composites in combination with bonding to the hard tissue result in stress transfer and inward deformation of the cavity walls of the restored tooth. Deformation of the walls decreases the size of the cavity during the filling process. This fact has a profound influence on the assumption—raised and discussed in this paper—that an incremental filling technique reduces the stress effect of composite shrinkage on the tooth. Developing stress fields for different incremental filling techniques are simulated in a numerical analysis. The analysis shows that, in a restoration with a well-established bond to the tooth—as is generally desired—incremental filling techniques increase the deformation of the restored tooth. The increase is caused by the incremental deformation of the preparation, which effectively decreases the total amount of composite needed to fill the cavity. This leads to a higher-stressed tooth-composite structure. The study also shows that the assessment of intercuspal distance measurements as well as simplifications based on generalization of the shrinkage stress state cannot be sufficient to characterize the effect of polymerization shrinkage in a tooth-restoration complex. Incremental filling methods may need to be retained for reasons such as densification, adaptation, thoroughness of cure, and bond formation. However, it is very difficult to prove that incrementalization needs to be retained because of the abatement of shrinkage effects.



# Epidemic of Failing Composites





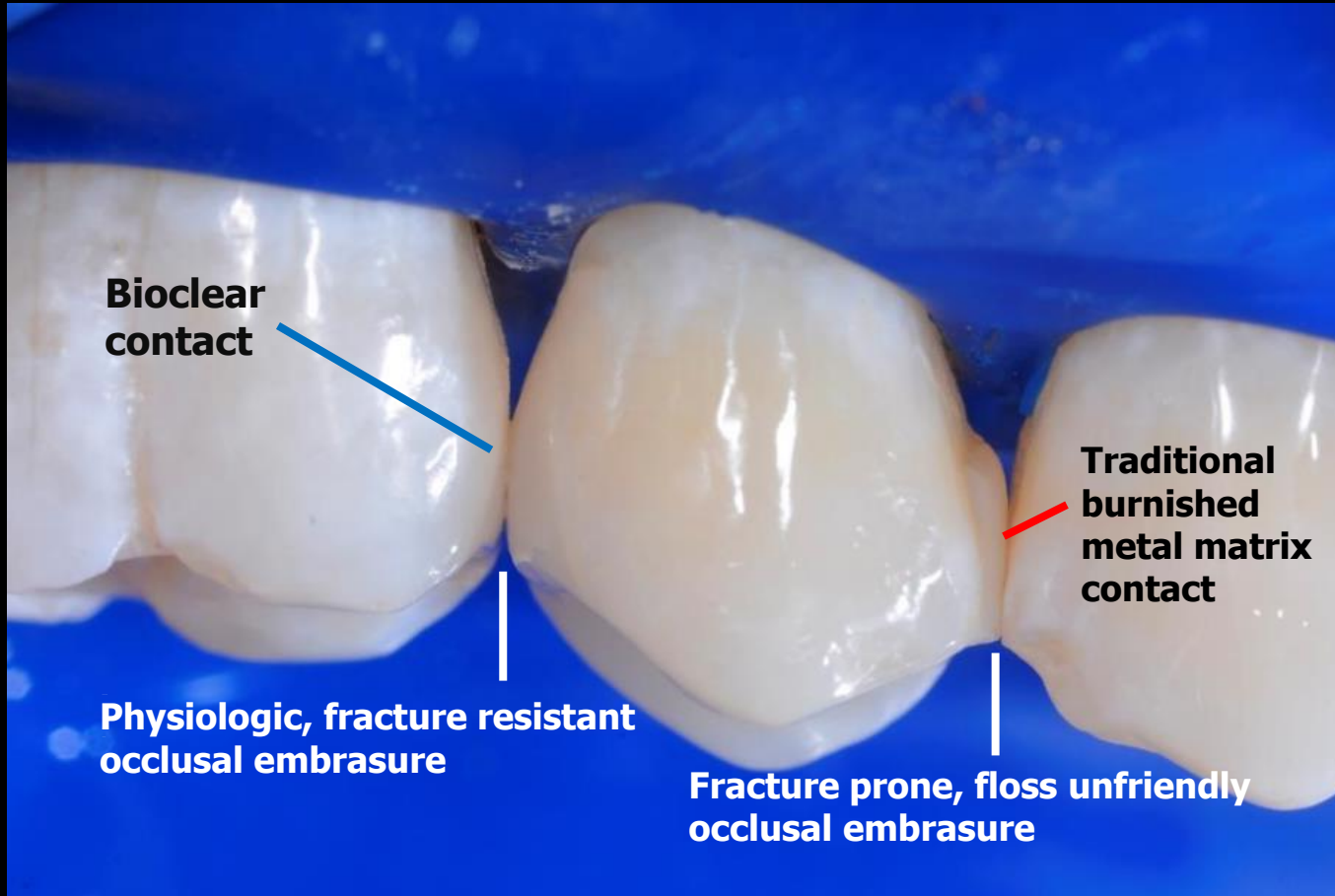
# Let's compare old vs. new

Traditional box prep restoration with staining margins and burnished mediocre shape.



Bioclear restoration with Evolve Matrix, Twin Ring Universal, and Diamond Wedge combined with an infinity edge.

# Buccal View Post-Op



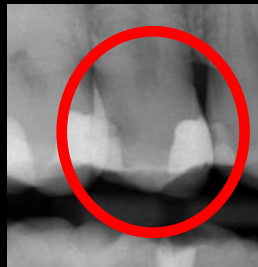
**Bioclear  
contact**

**Traditional  
burnished  
metal matrix  
contact**

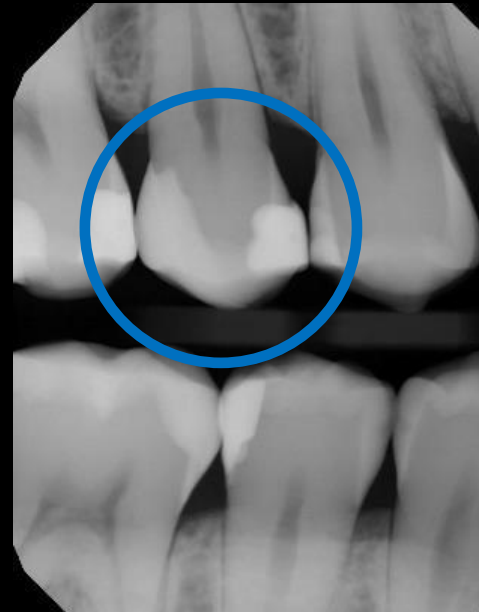
**Physiologic, fracture resistant  
occlusal embrasure**

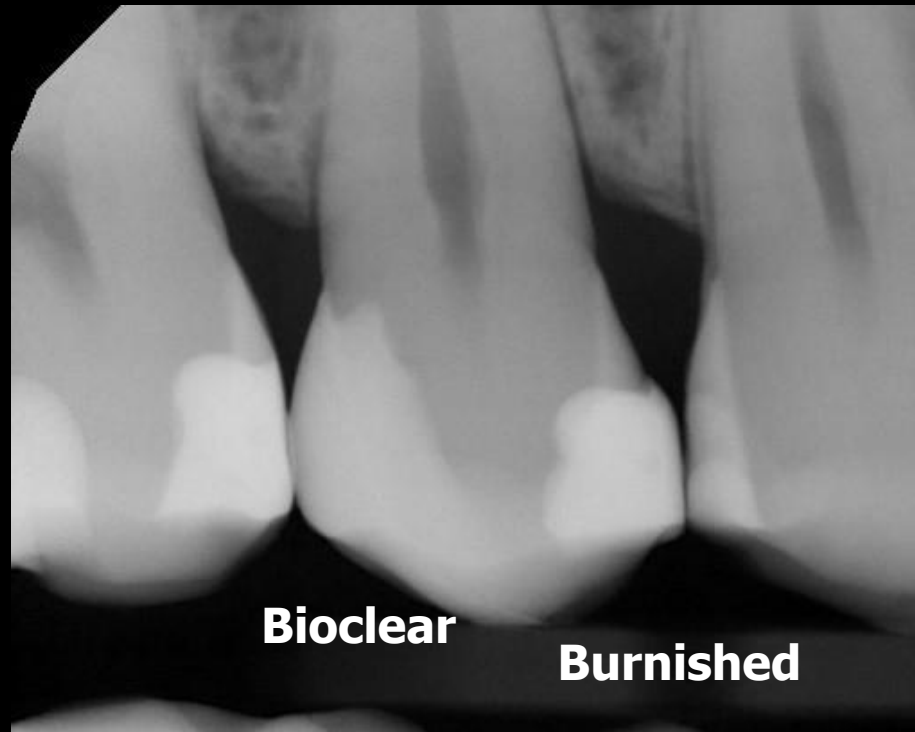
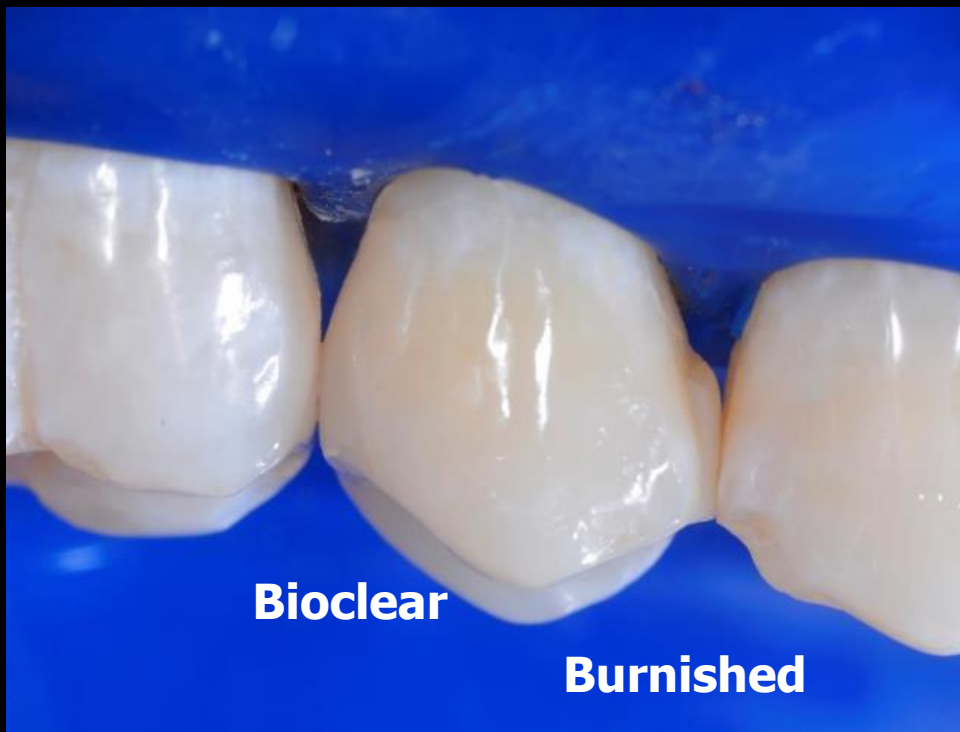
**Fracture prone, floss unfriendly  
occlusal embrasure**

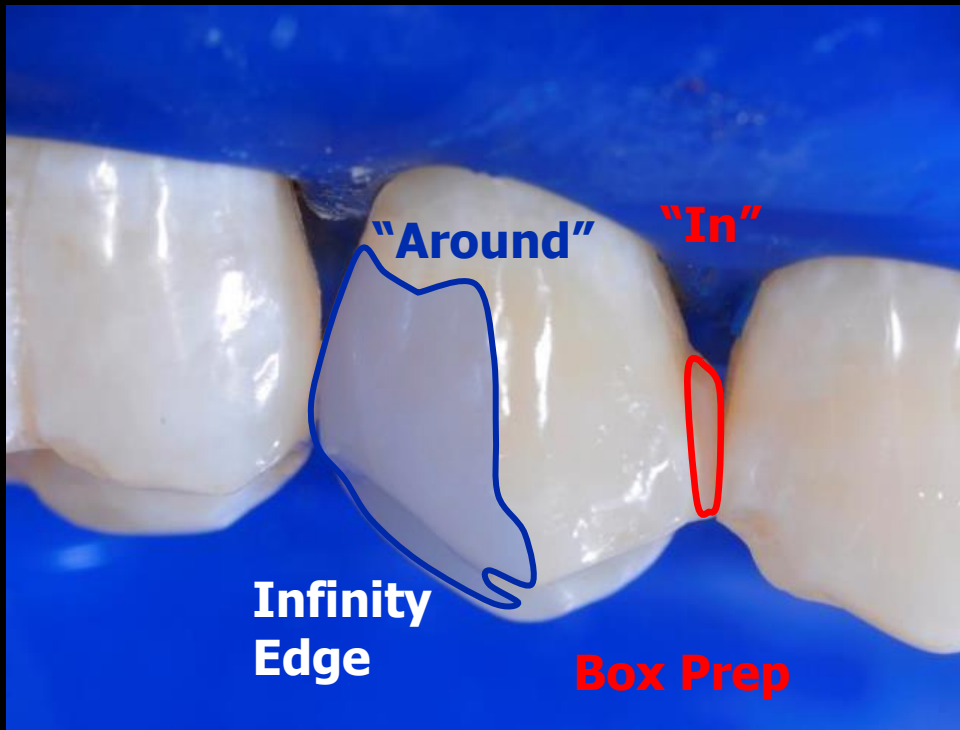
## Pre-Operative Radiographs



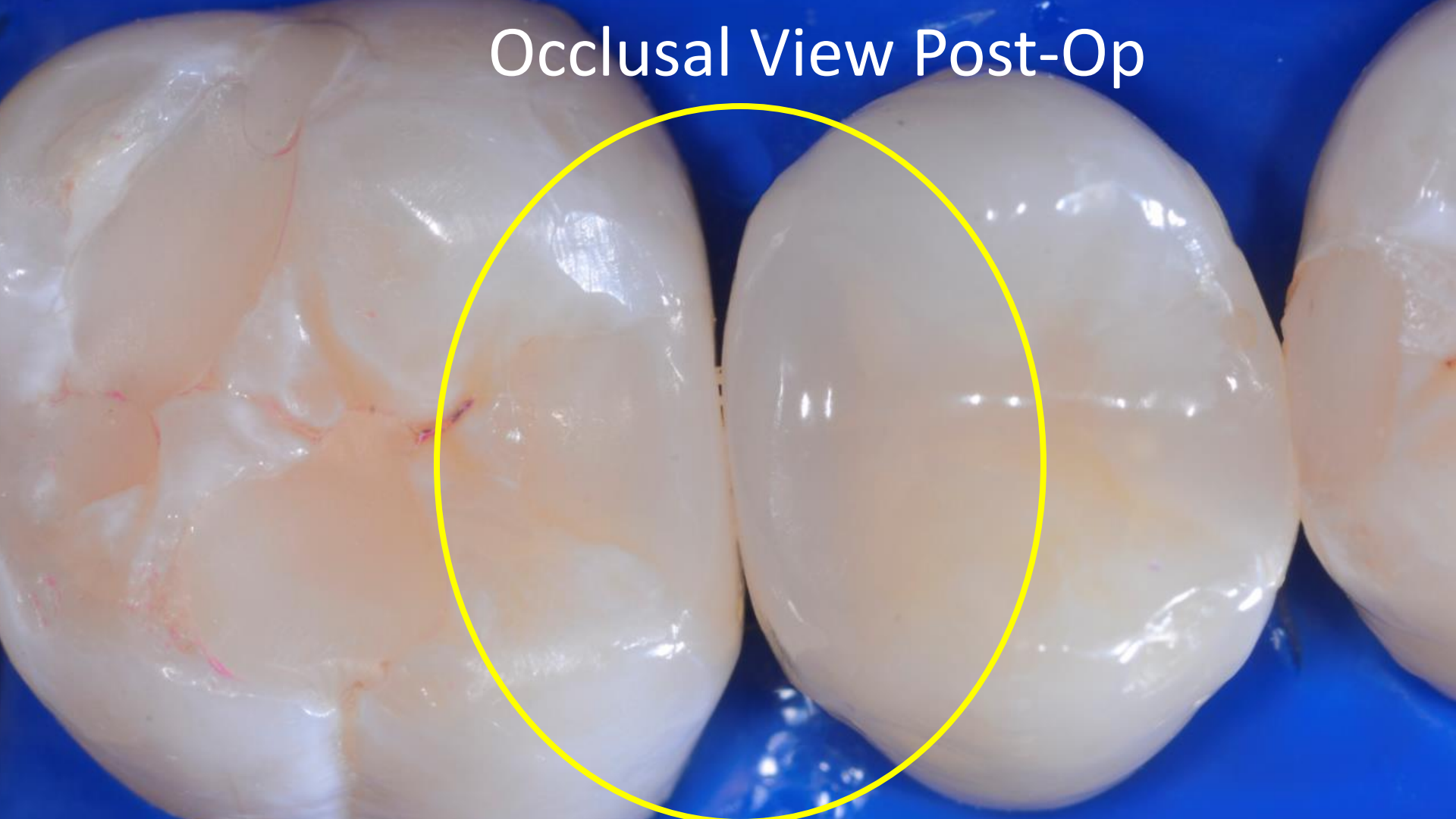
## 1 Year Post-Operative







Occlusal View Post-Op



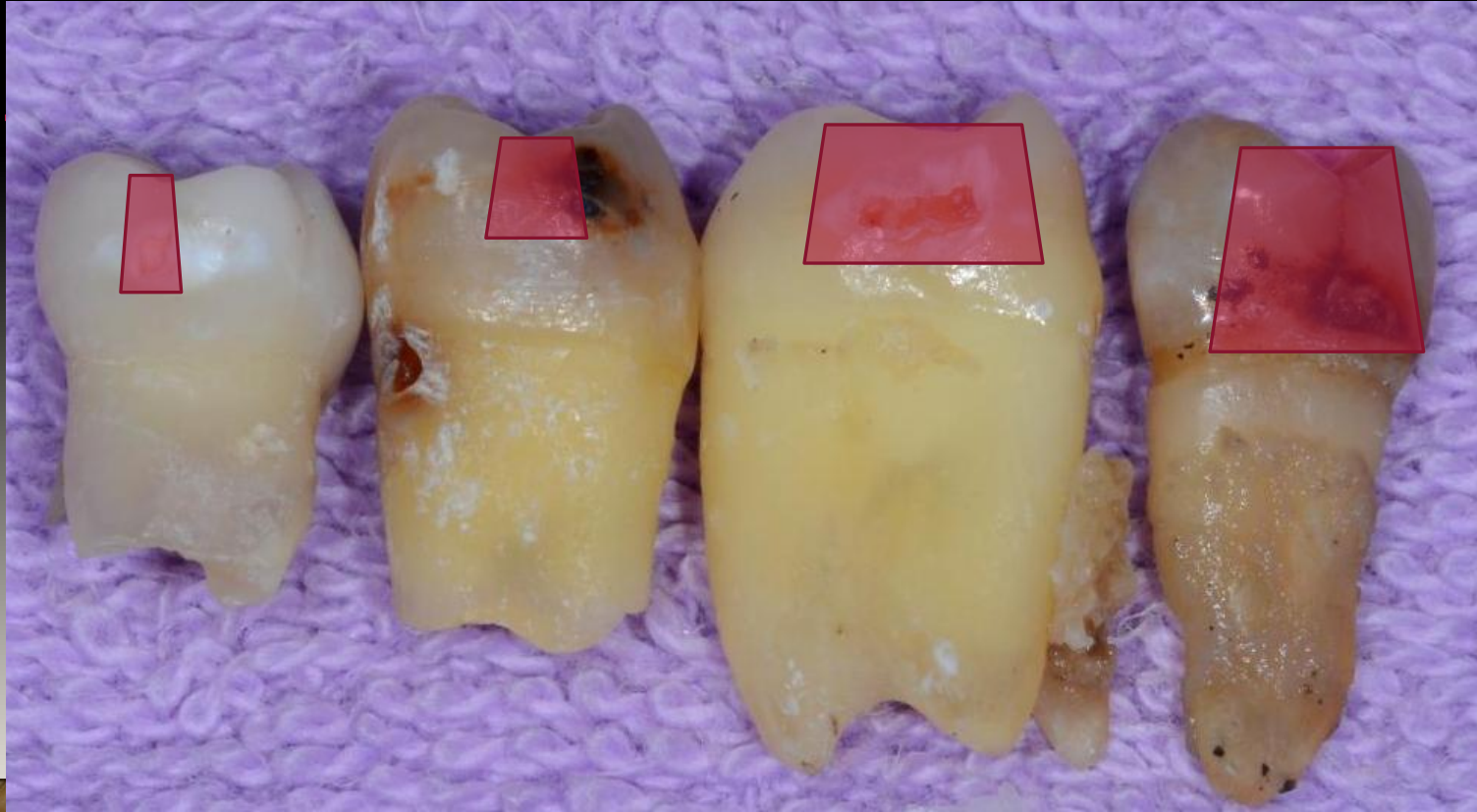
# CAVITATION VS APRISMATIC ENAMEL



WHY WOULD WE PUT A MARGIN IN THE *DISEASE ZONE*?



# FOUR WAYS TO CUT A TRAGIC SLOT PREP



LET'S PUT IT ALL TOGETHER WITH EVOLVE



# The Bioclear Evolve All In One Kit





One of the many  
problems with a Slot  
Prep



One of the many  
problems with a Slot  
Prep



















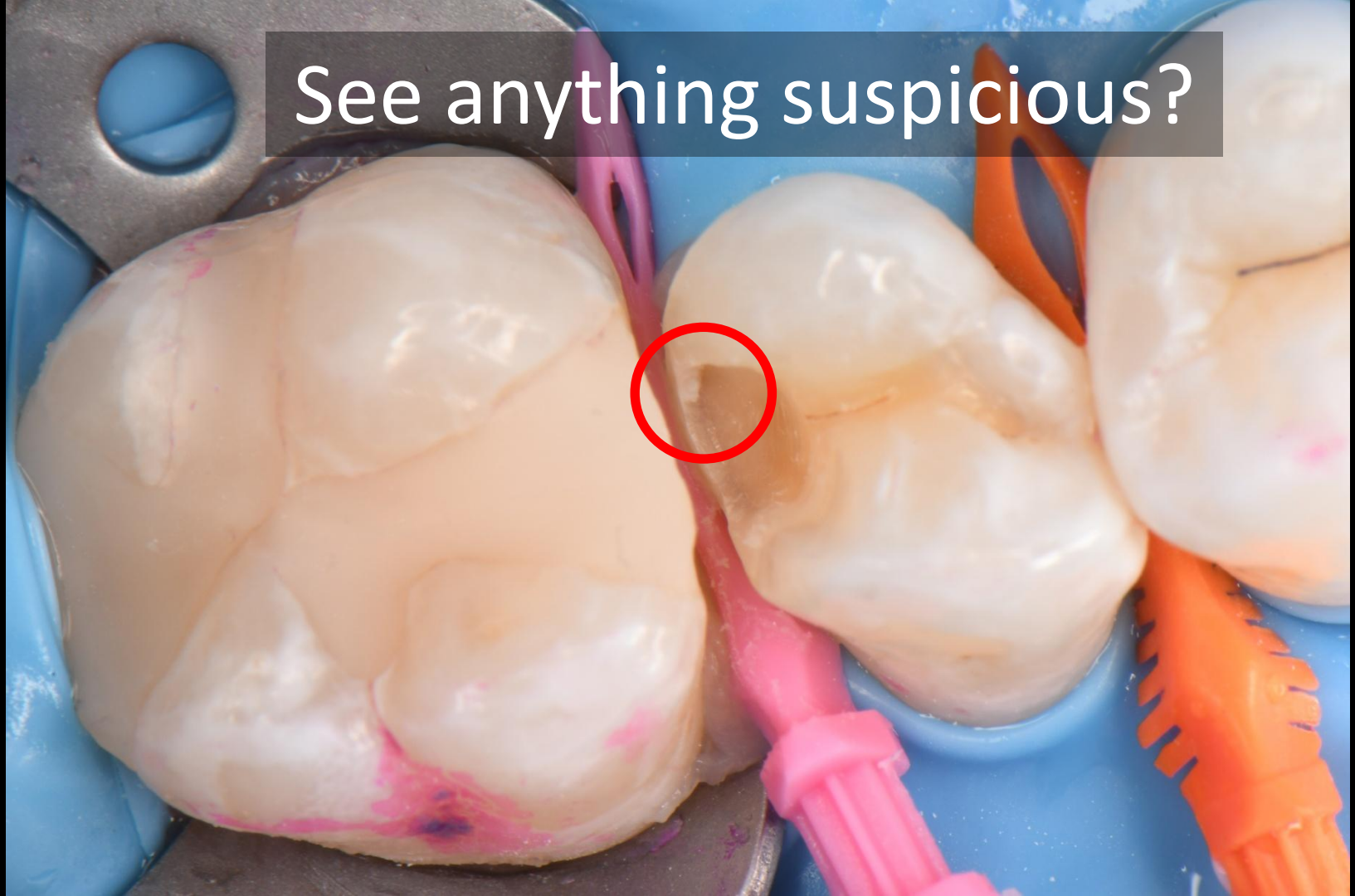








See anything suspicious?









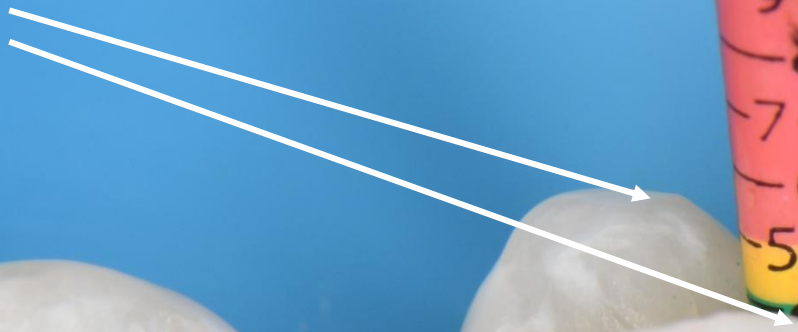


Completed Clark Class II





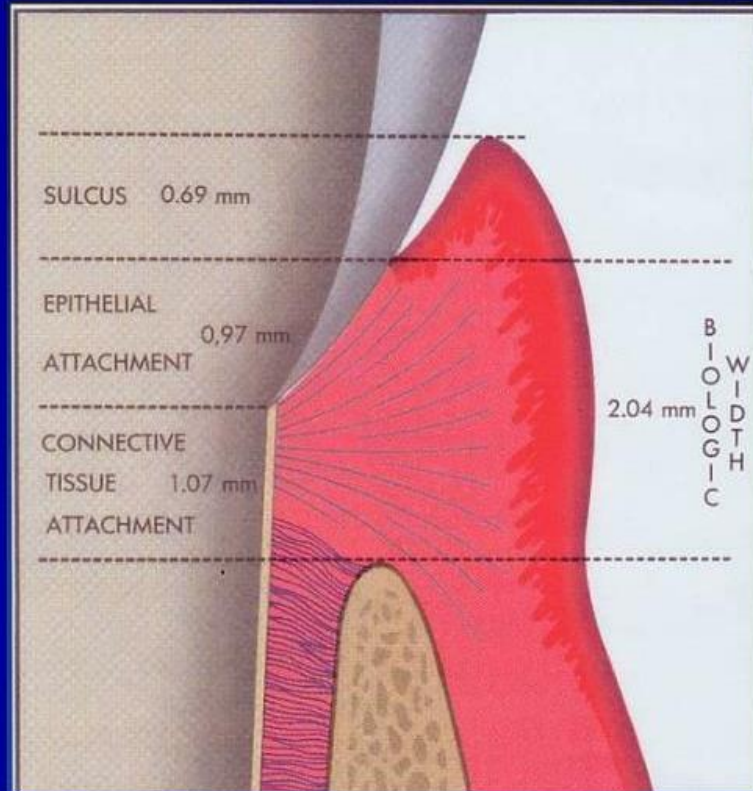
What's my  
reference?

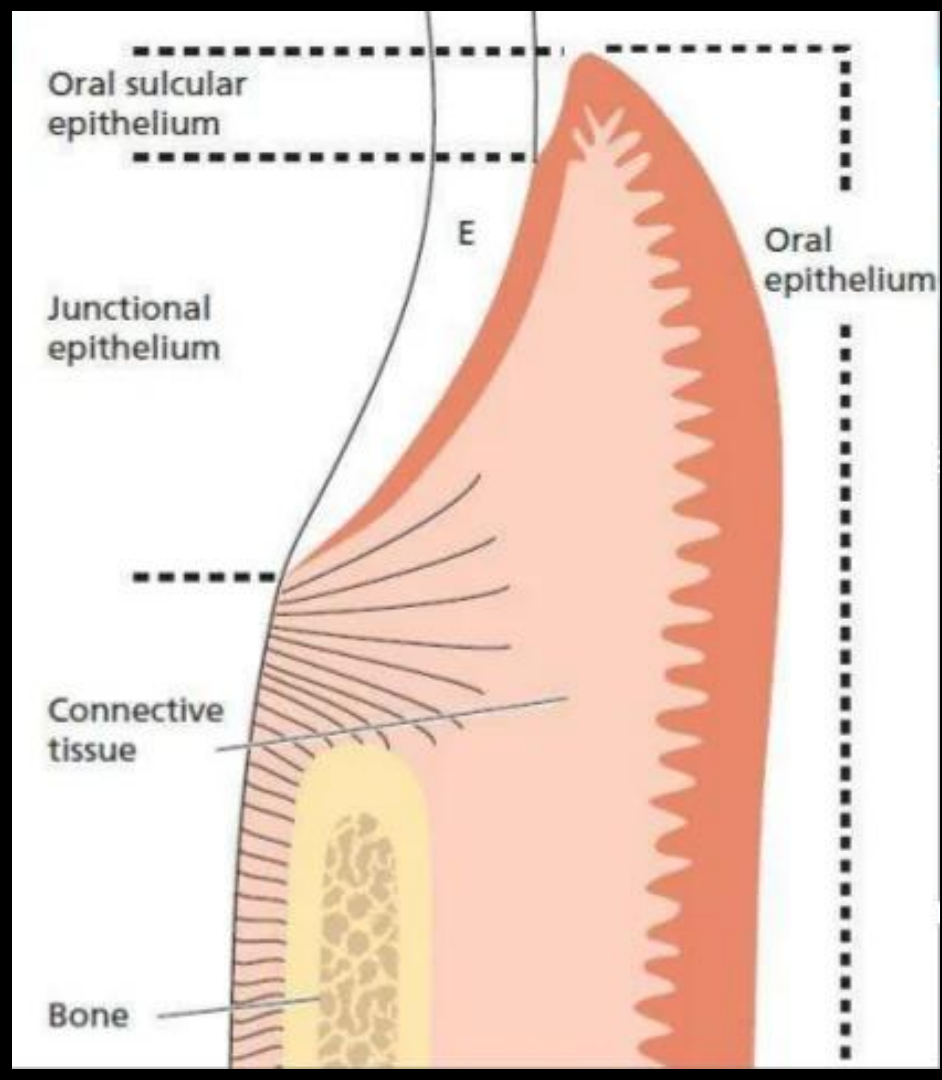
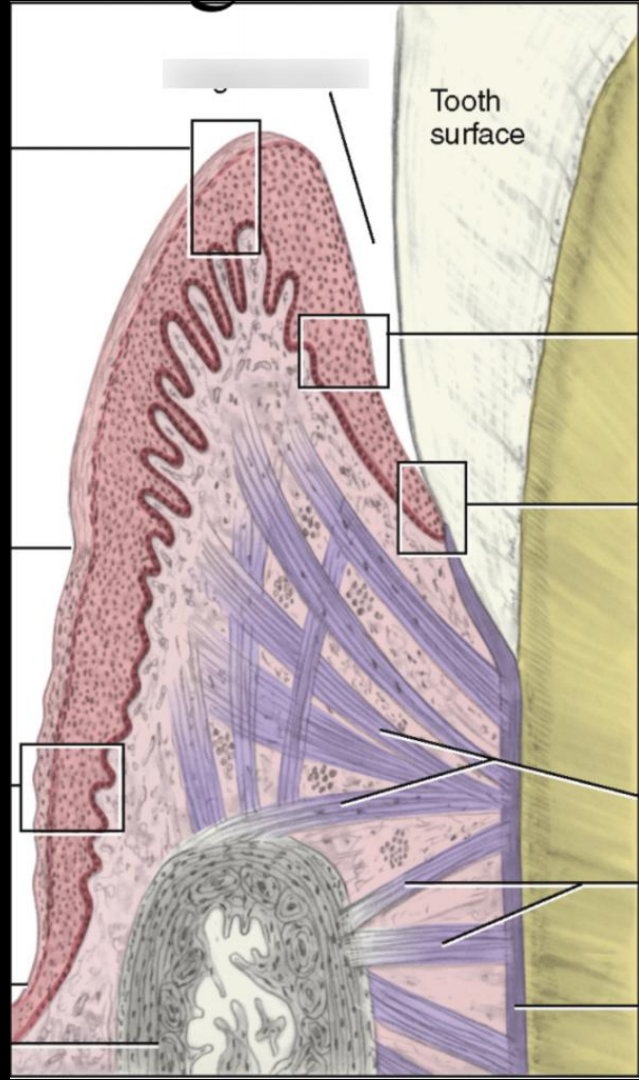


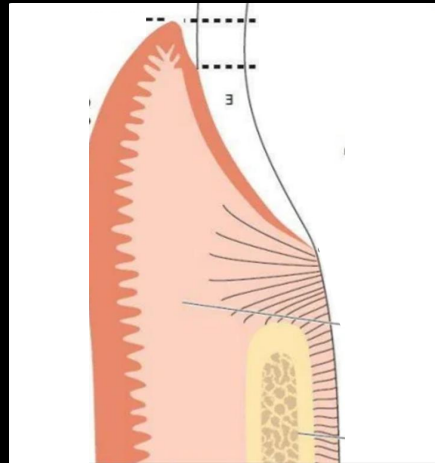
What's my  
reference?

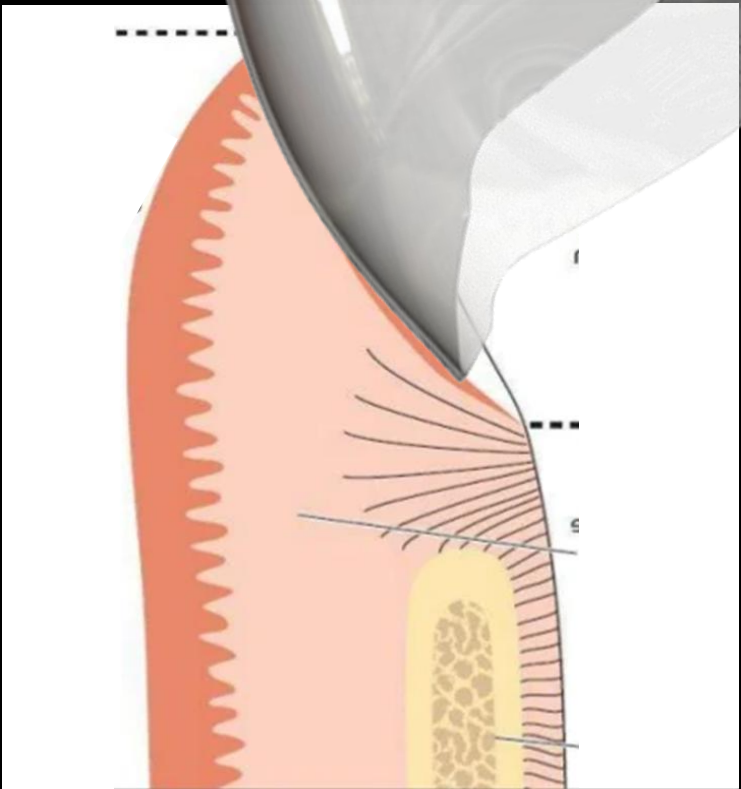


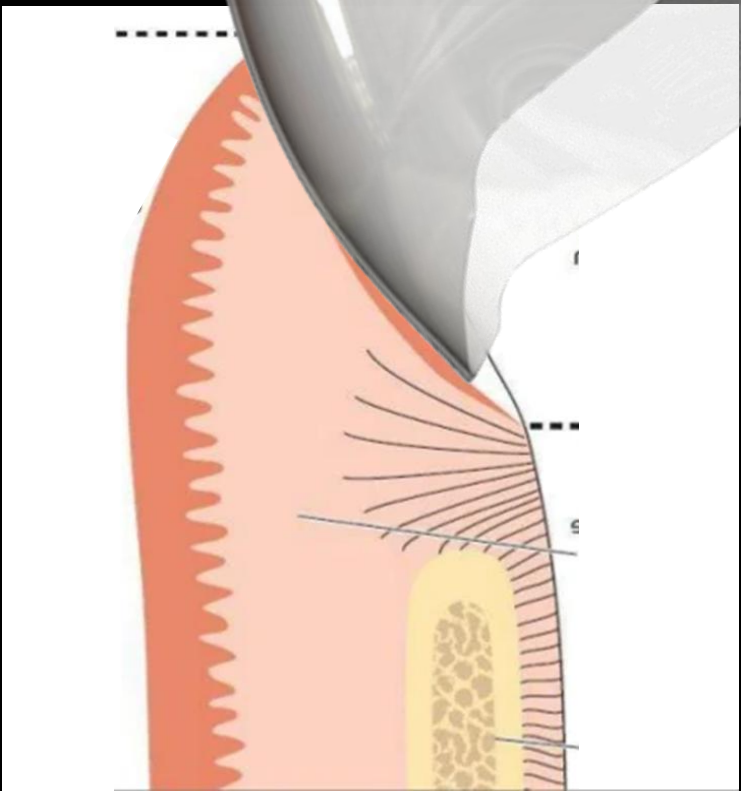


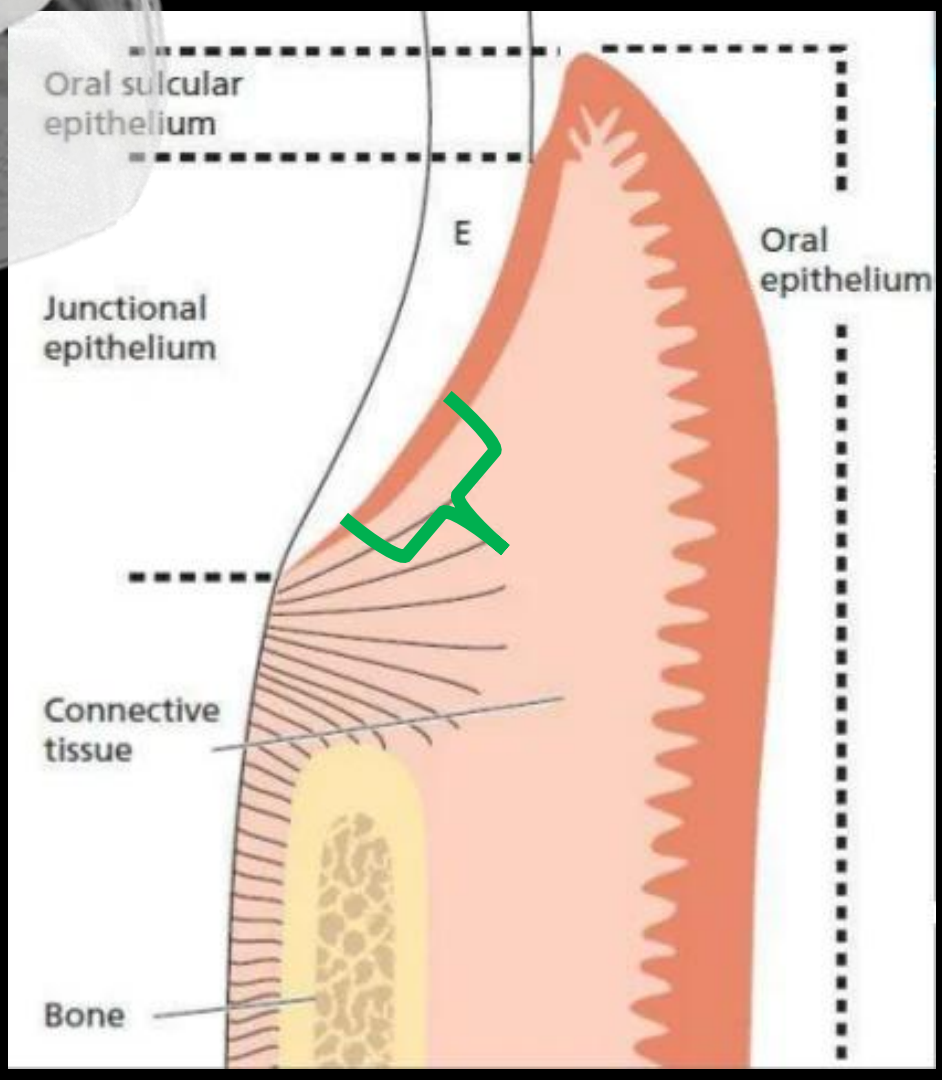
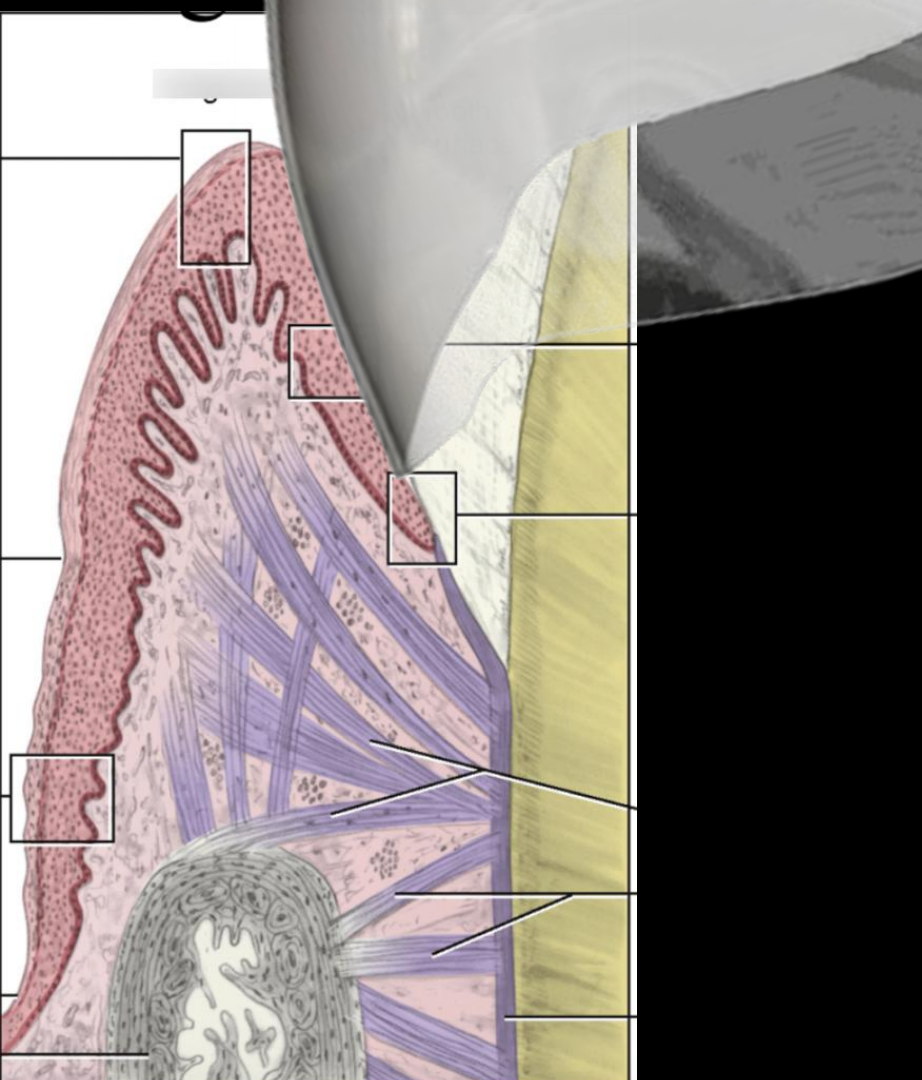












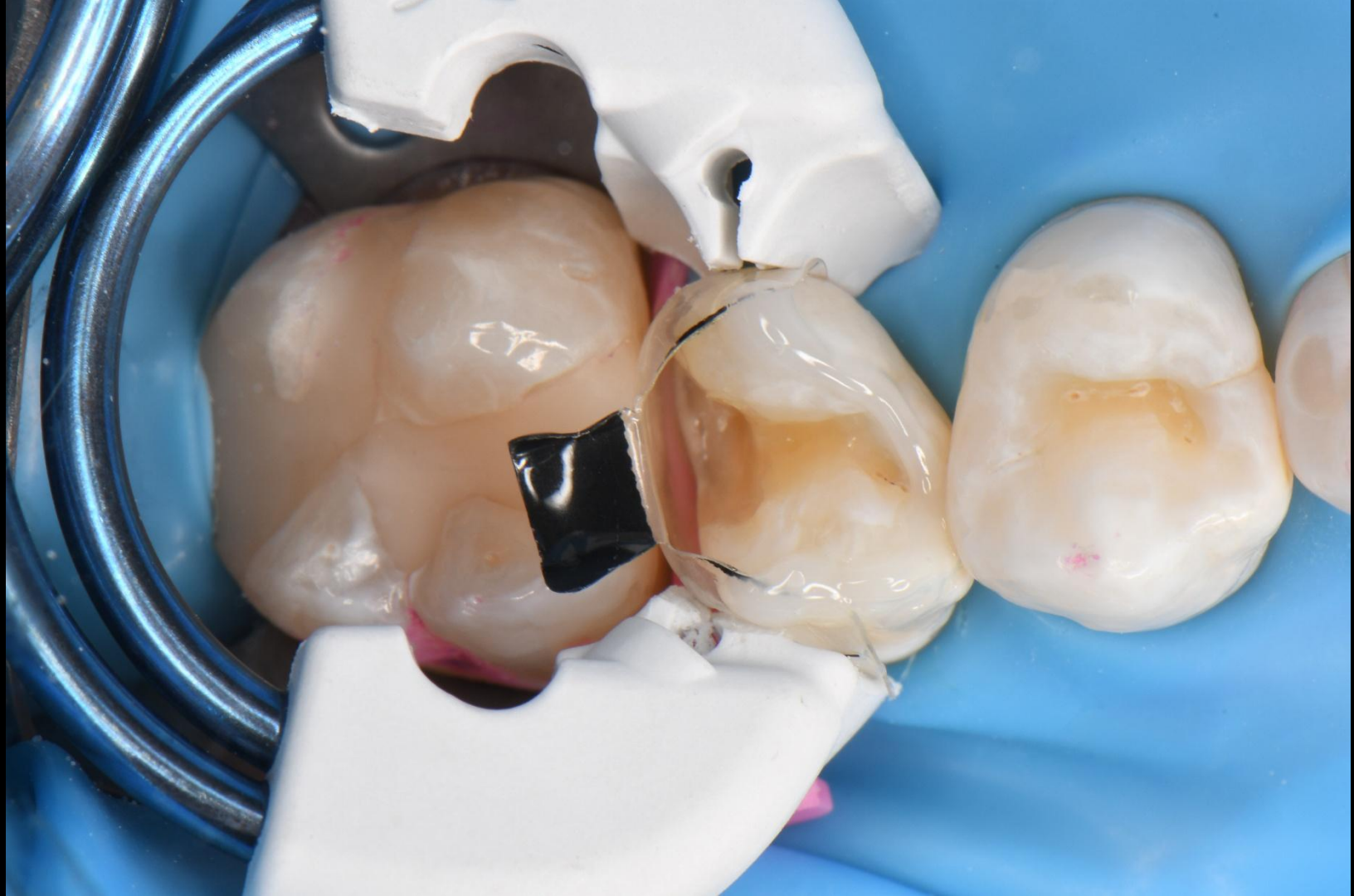


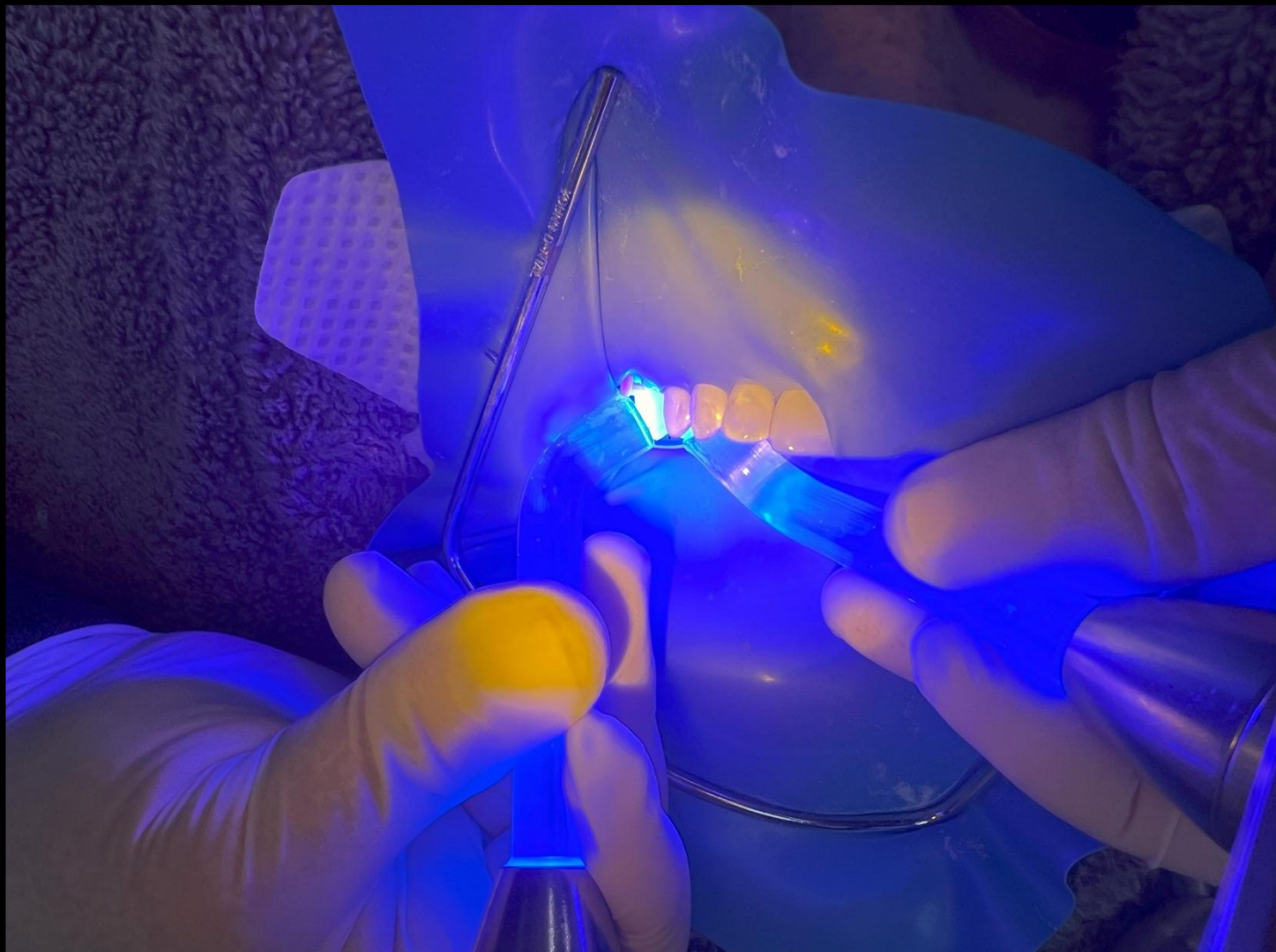




















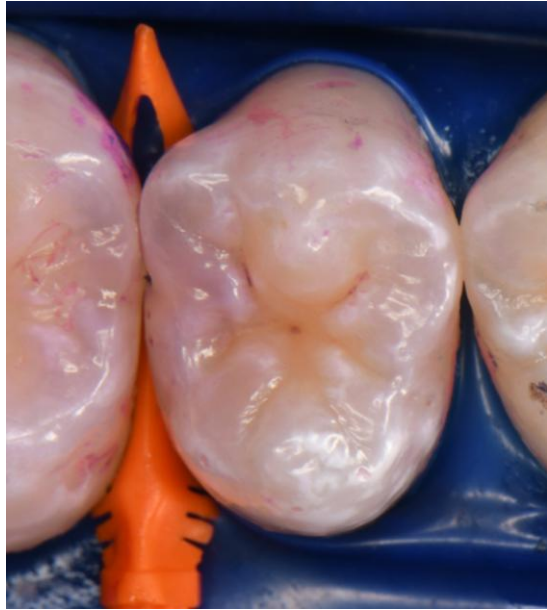
"In the tooth"



"Around the tooth"



# Similar Case: Pre-op, post op, and 3 year follow up



# Monumental changes from 1890

- Adhesive Dentistry
- Engineering
- Fluoride
- Abundance of fermentable carbohydrates
- Doubling of average lifespan

# Common Concerns with Posterior Composite Restorations

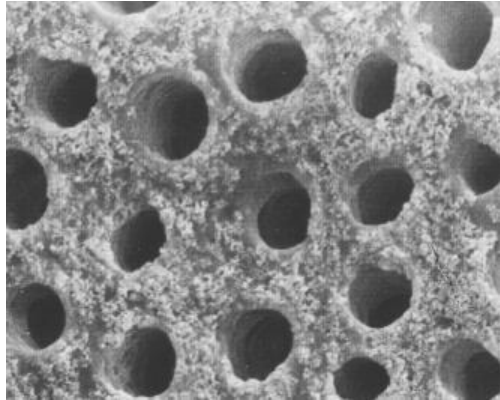
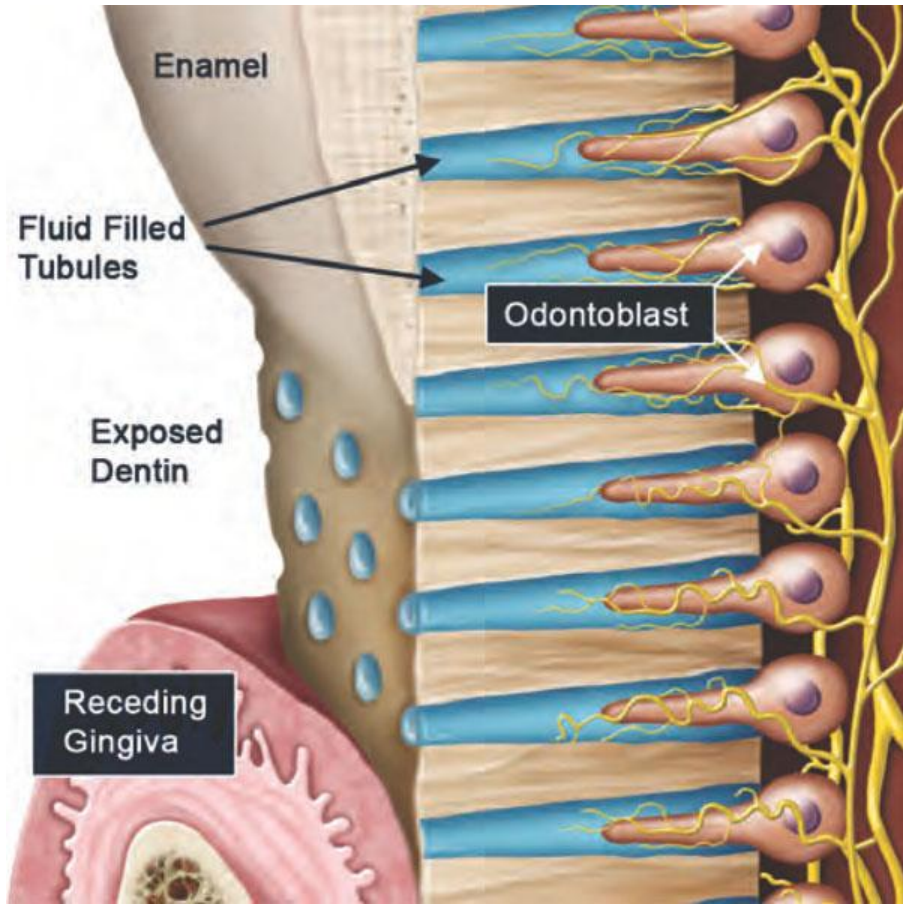
Longevity

Posterior composites in one study showed a  
350% higher failure rate than did  
amalgam restorations

(2.4 years longevity versus 8.9 years for amalgam)

Palotie U, Vehkalahti M. Acta Odontol Scand. 2002 Dec;60(6):325-9. Reasons for replacement and the age of failed restorations in posterior teeth of young Finnish adults.

# Epidemic of Sensitivity



# Contact Issues

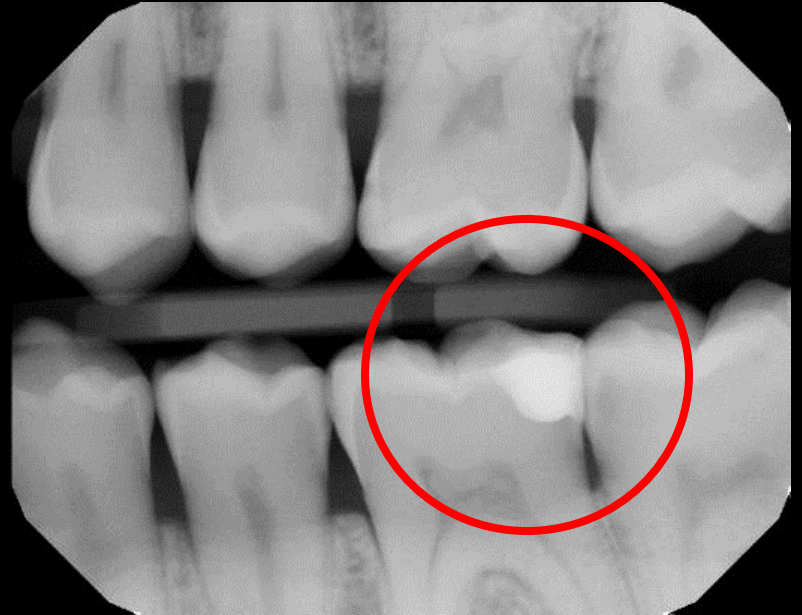
Point contacts

Burnished contacts

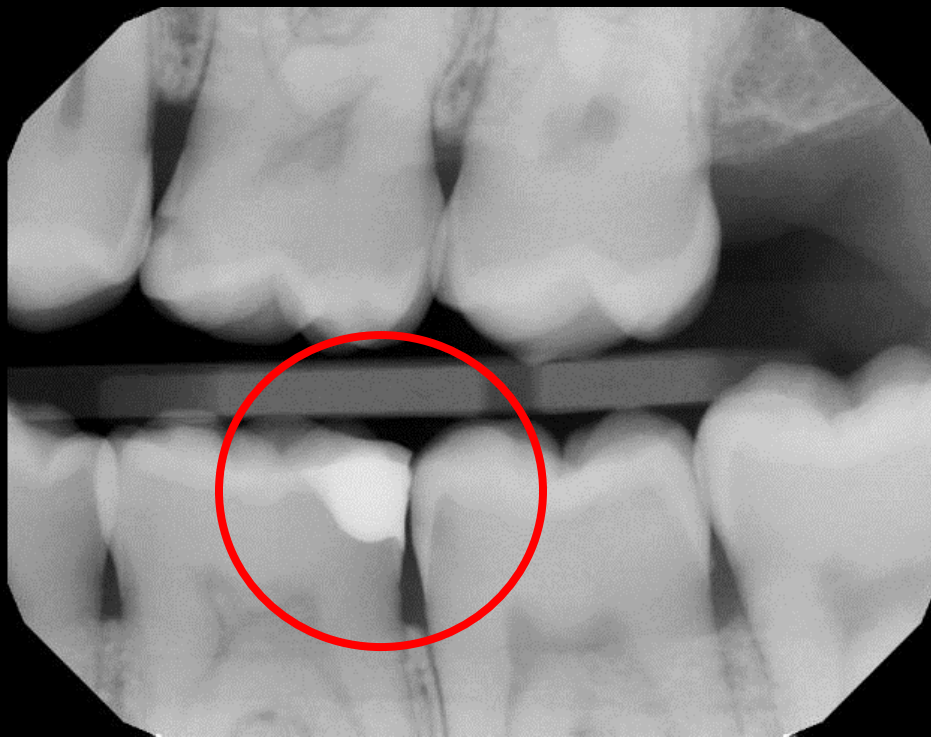
Open contacts

Overhangs

# Contact Issues



# Contact Issues



# Amalgam based matrix





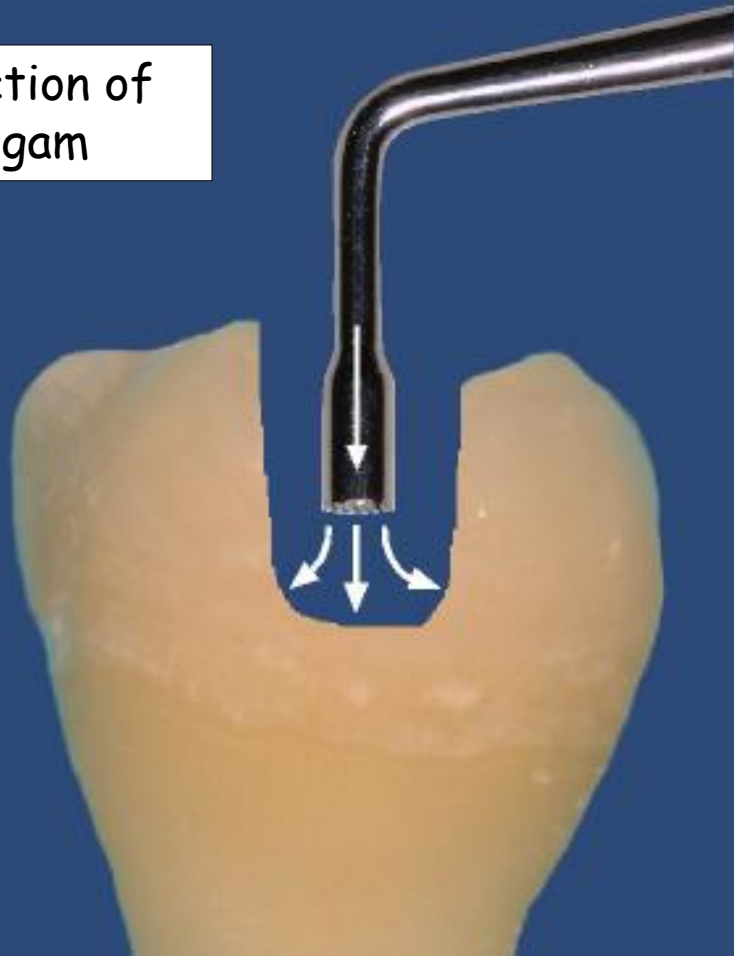
“cone of shame”-Amalgam based matrix



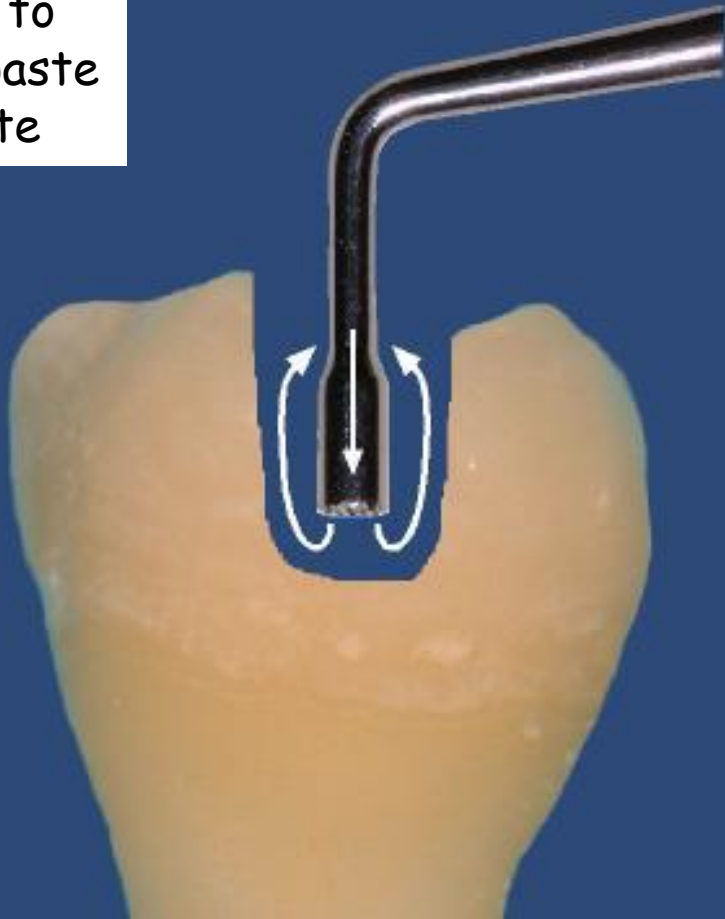
The S.K.K. or...  
**Silly Kissy  
Contact**

Why?

Compaction of  
amalgam

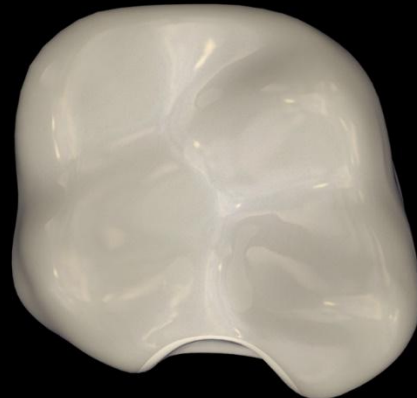
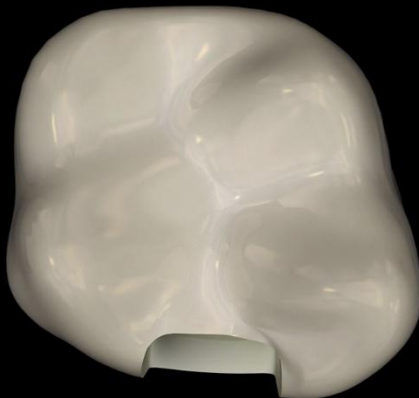


Inability to  
condense paste  
composite



# Modern Class II Cavity Preparation Design

# The Prep?





before

# The Bioclear method





Infinity edge  
of the T.R.I.

# The Bioclear Injection Molding Approach

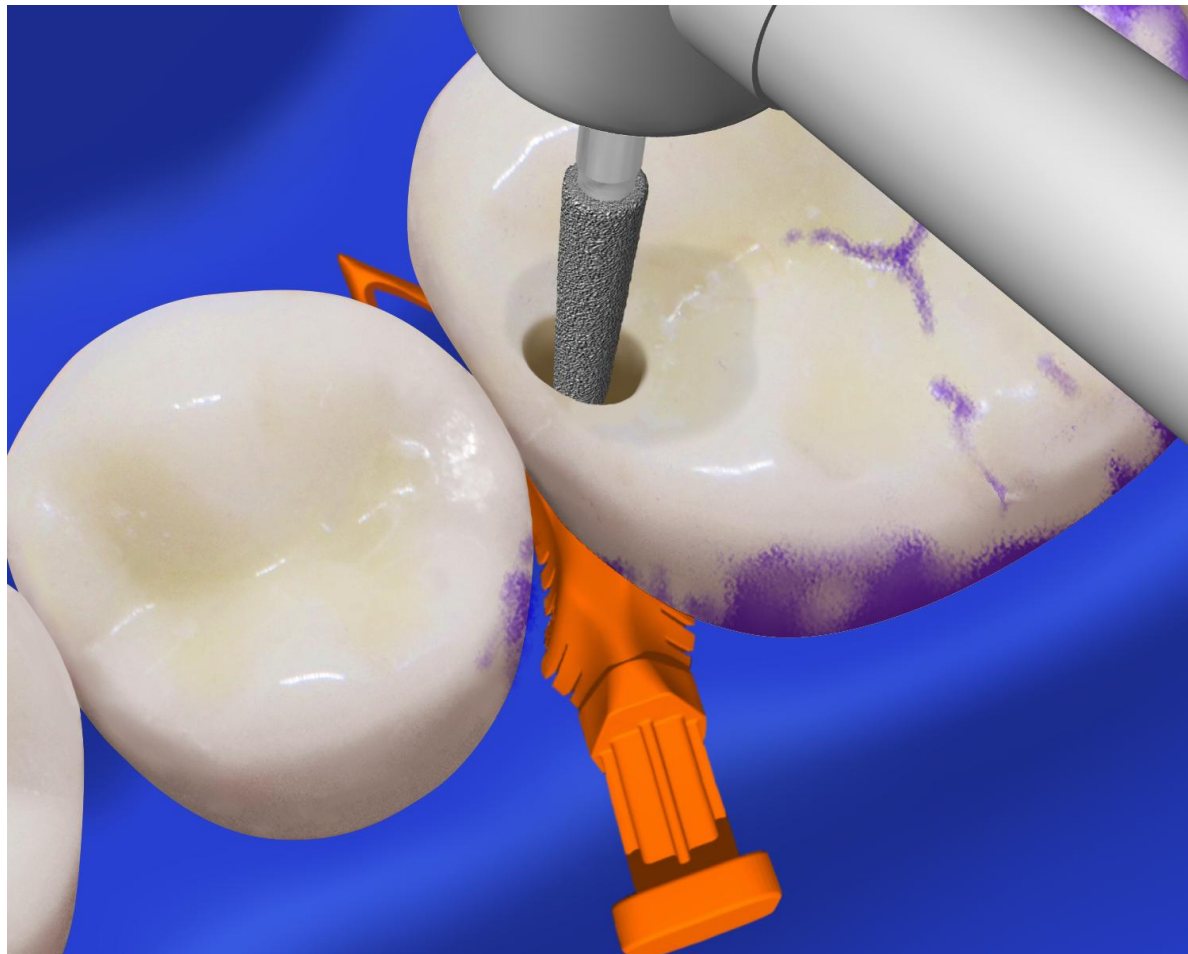


Failing composite;  
traditional preparation

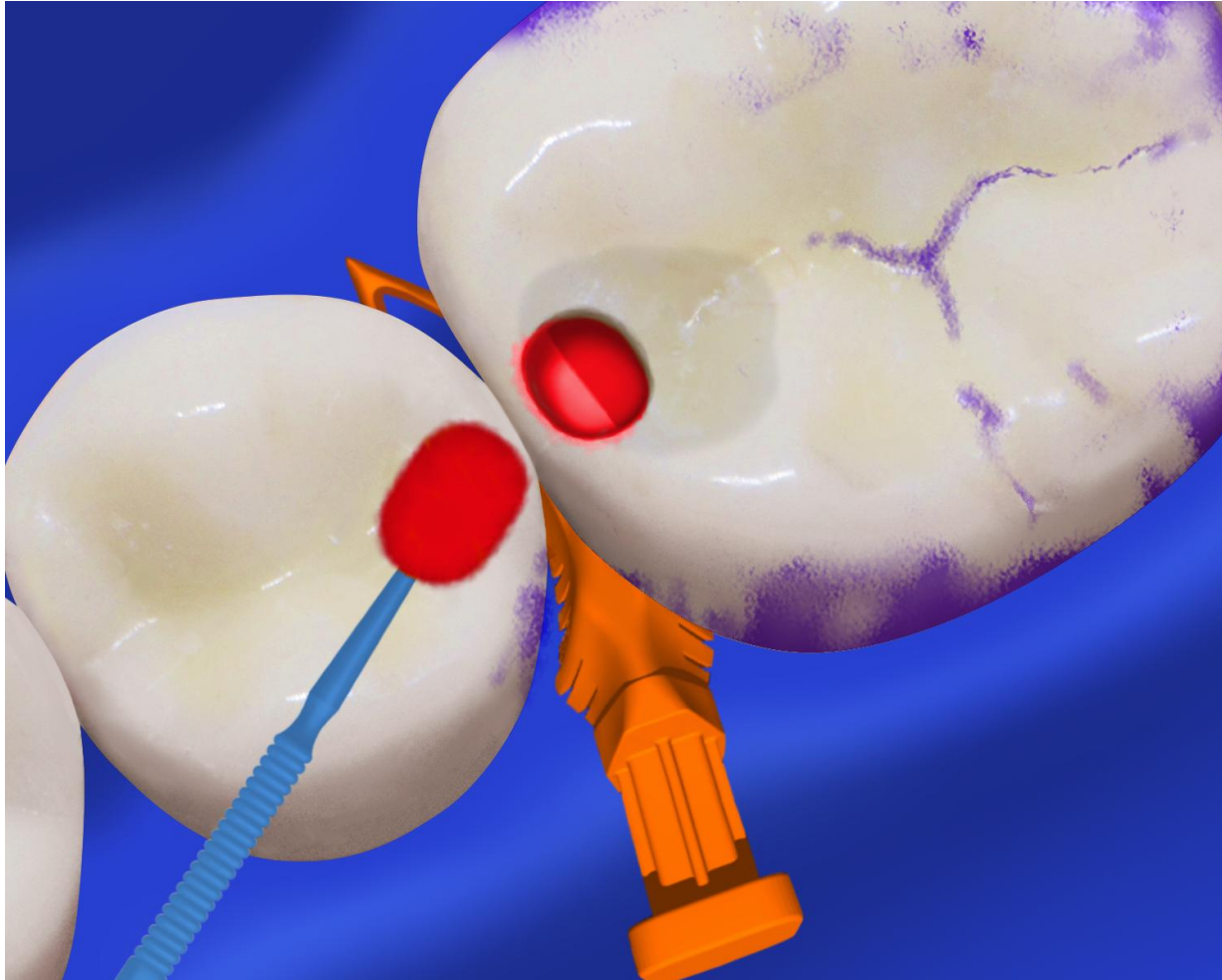


Re-Restored using the  
Bioclear Evolve System and Method

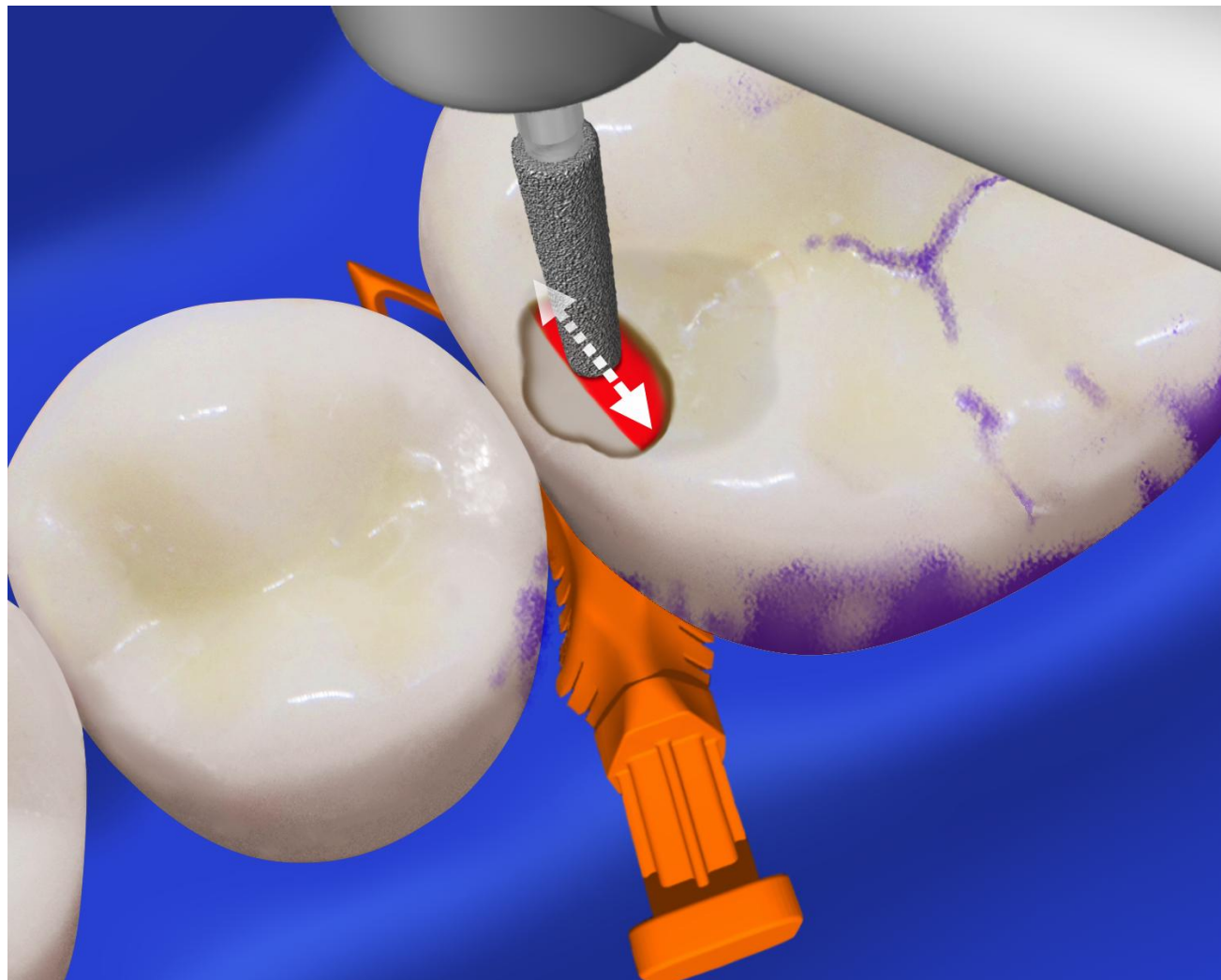
3) SS White Bur #3 is dropped into the at the suspected cavitation area. (Bur is used with water coolant)



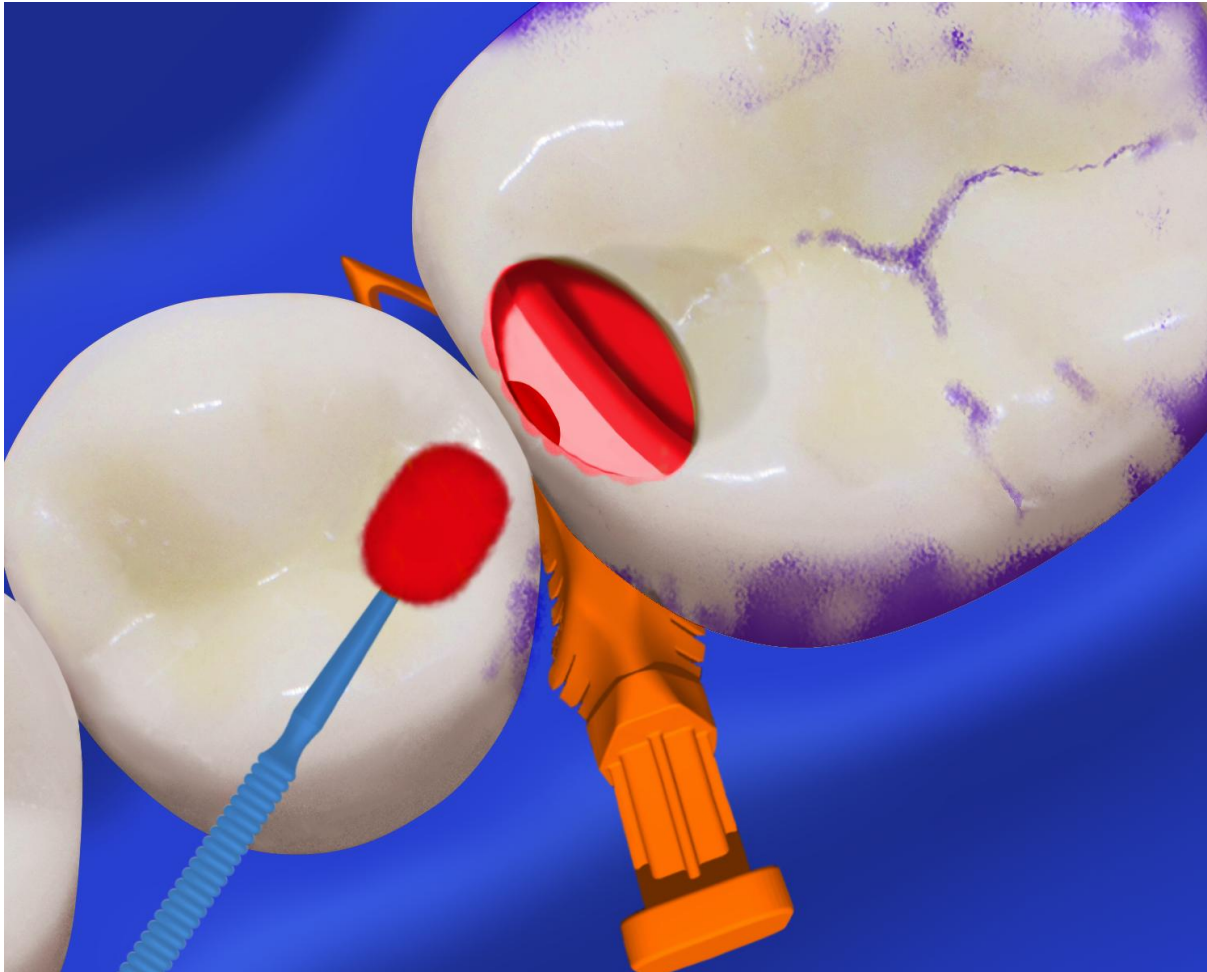
4) Caries indicator identifies dentin caries. Assessment of cavitation and caries to adjust bur movements. Axial dentin caries and healthy DEJ tissue should not be removed.



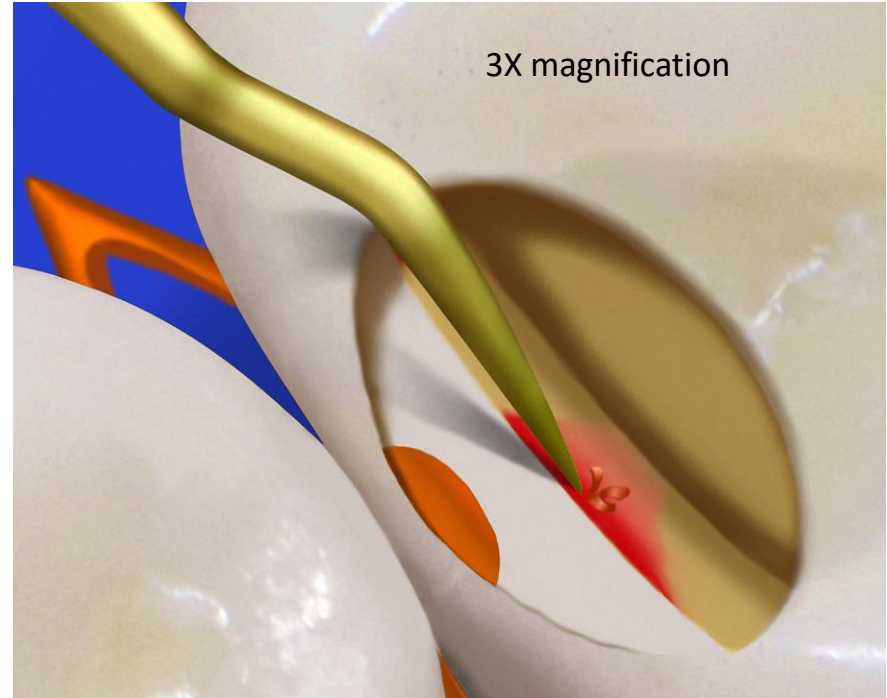
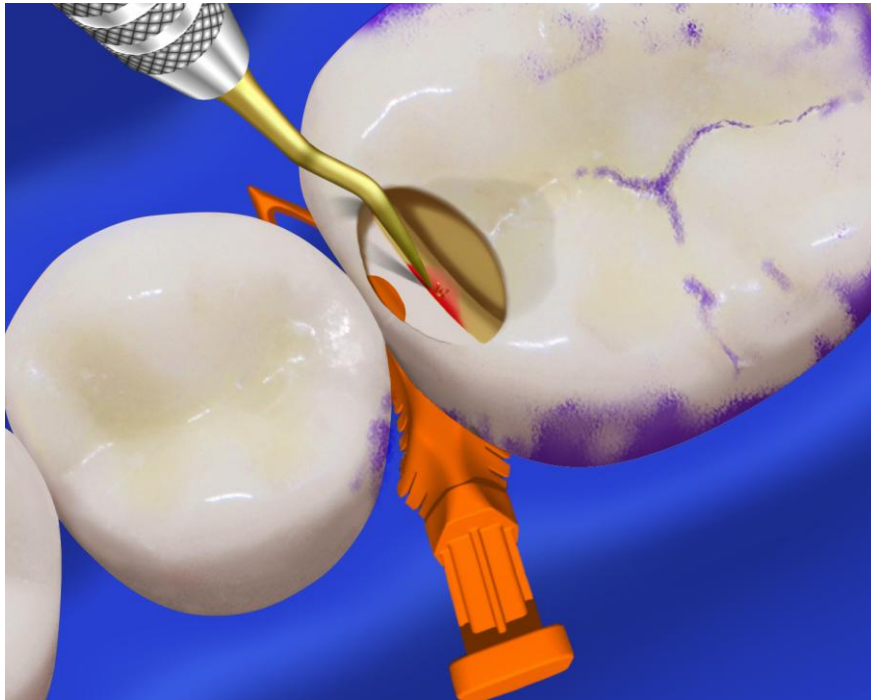
5) SS White bur #3 is kept *inside* of the cavity prep as DEJ caries removal proceeds.



6) Second caries indicator application. indicator application is repeated as needed until a negative stain is produced (clean dentin at the DEJ).

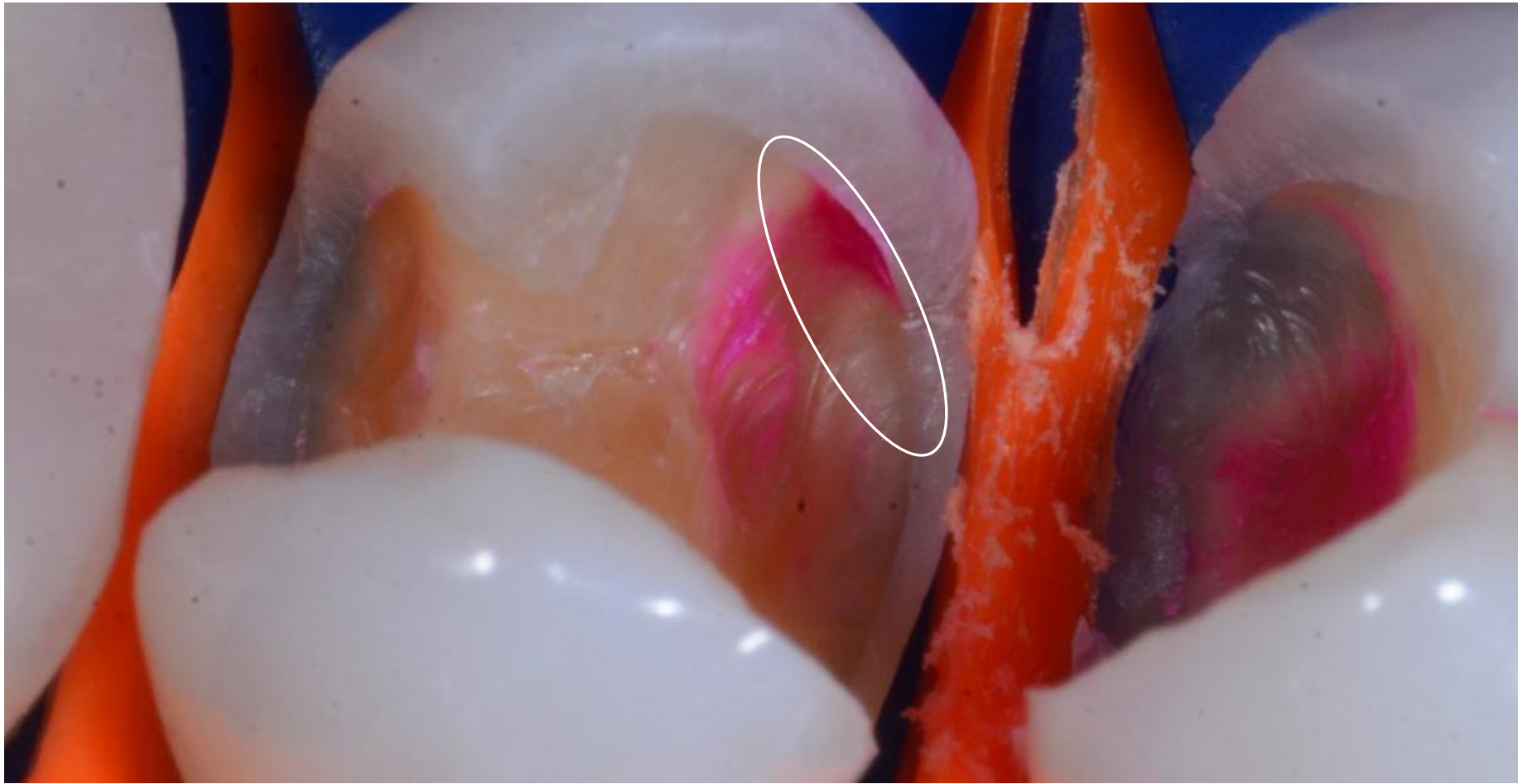


7) Clark explorer is used to achieve tactile test of healthy vs. carious DEJ dentin. Cumulative diagnosis with hardness test and caries indicator is recommended.

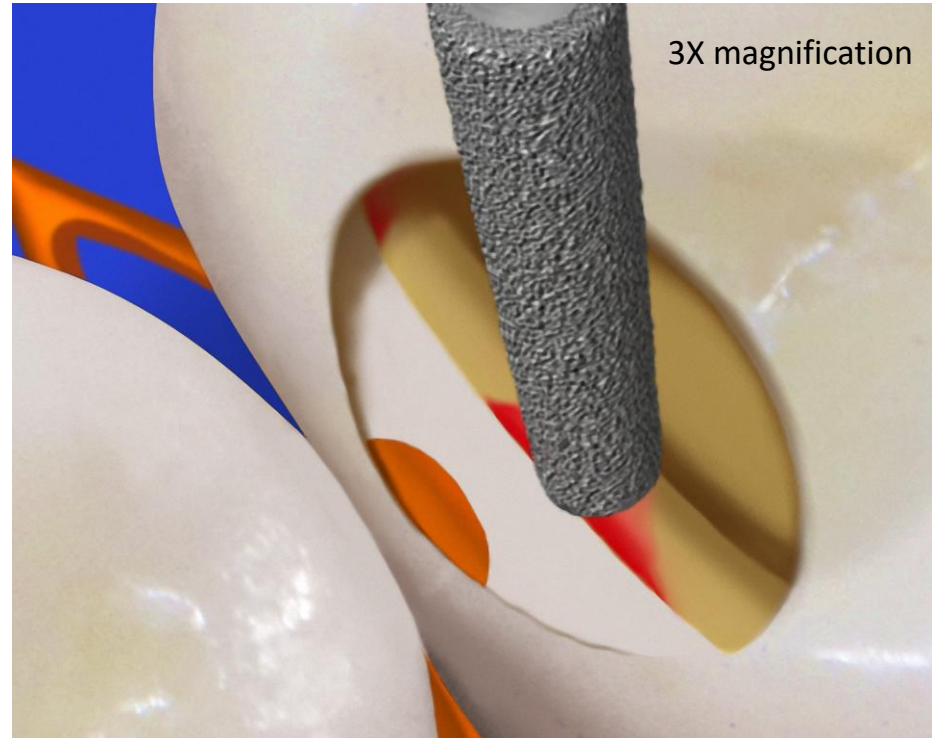
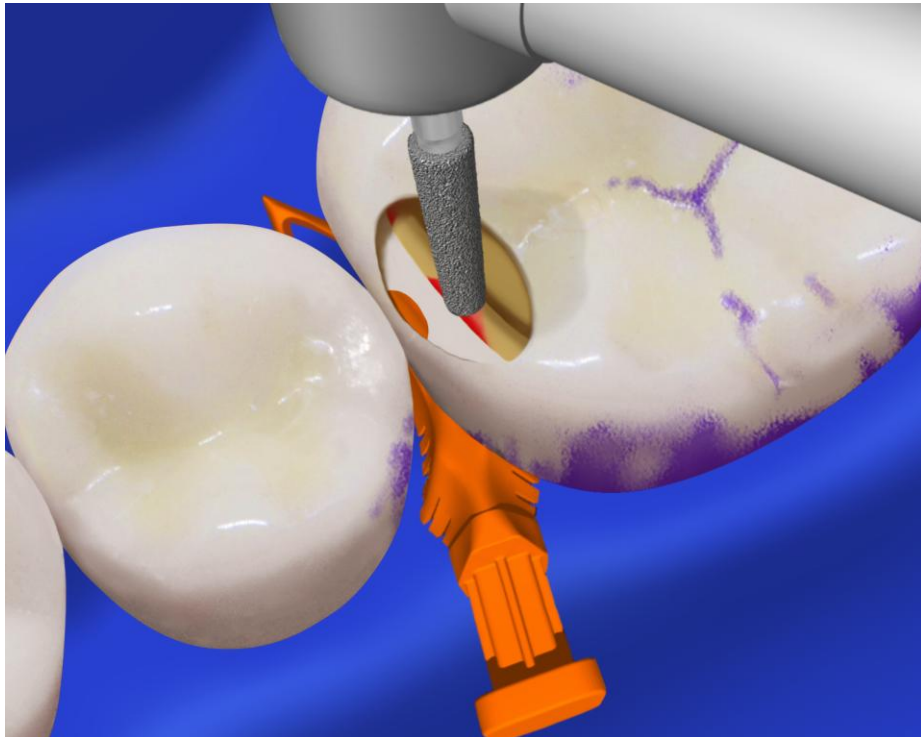




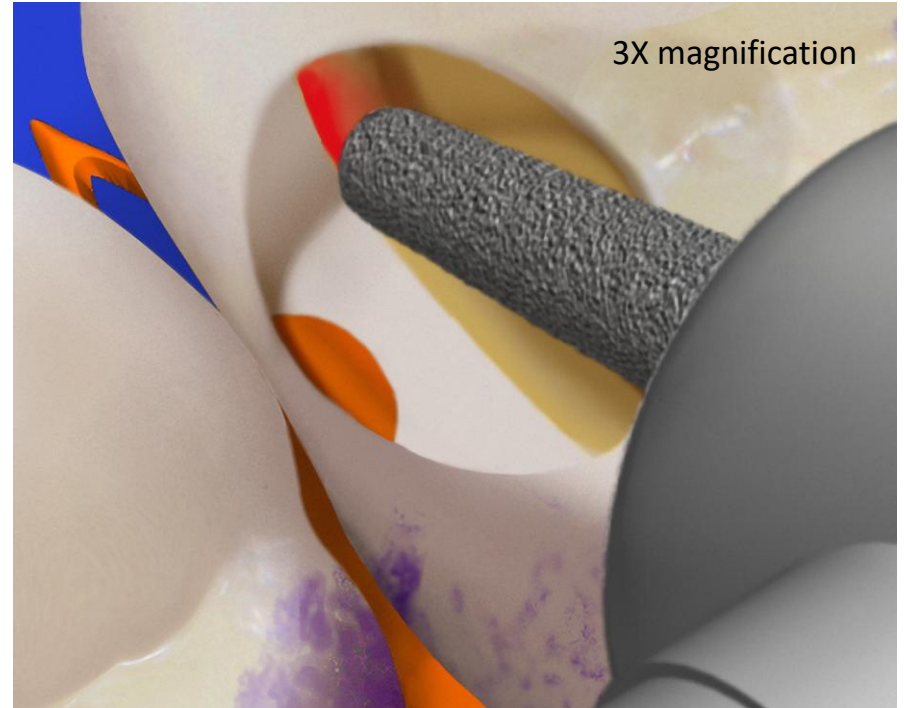
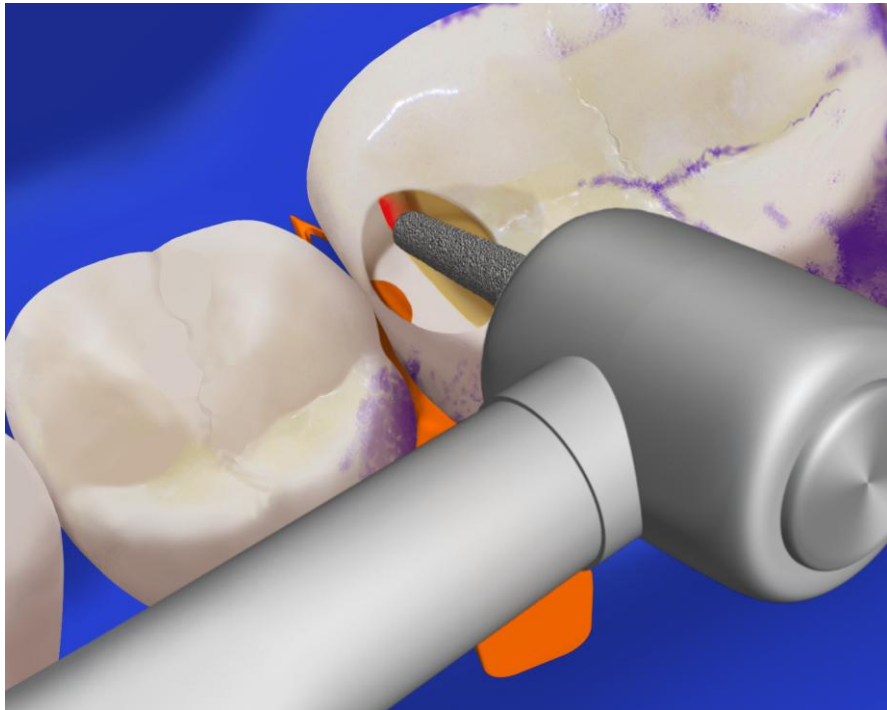




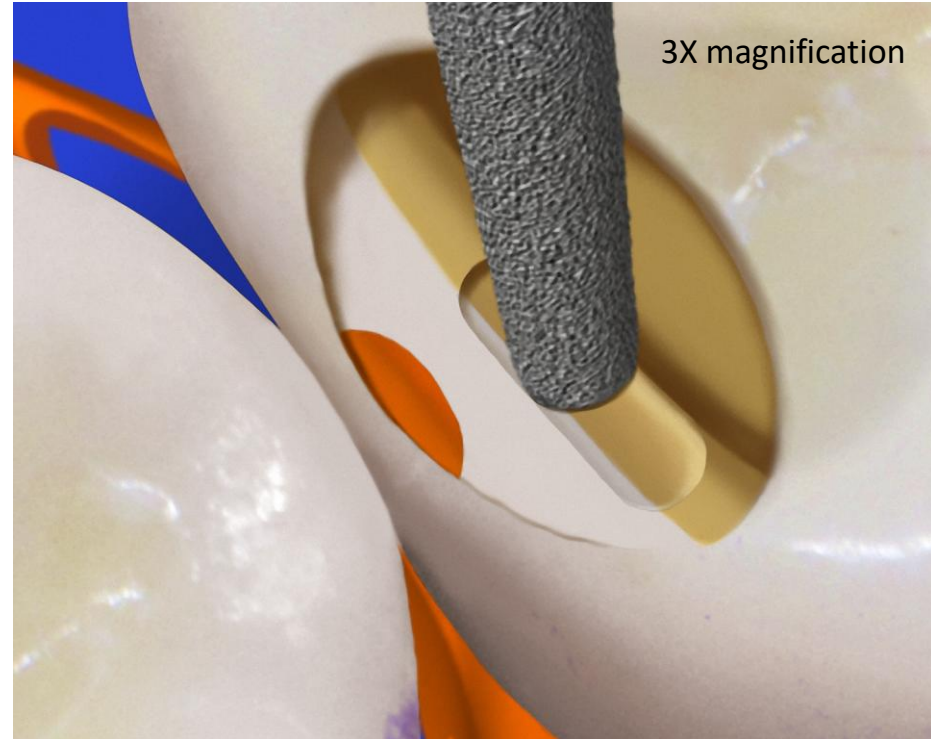
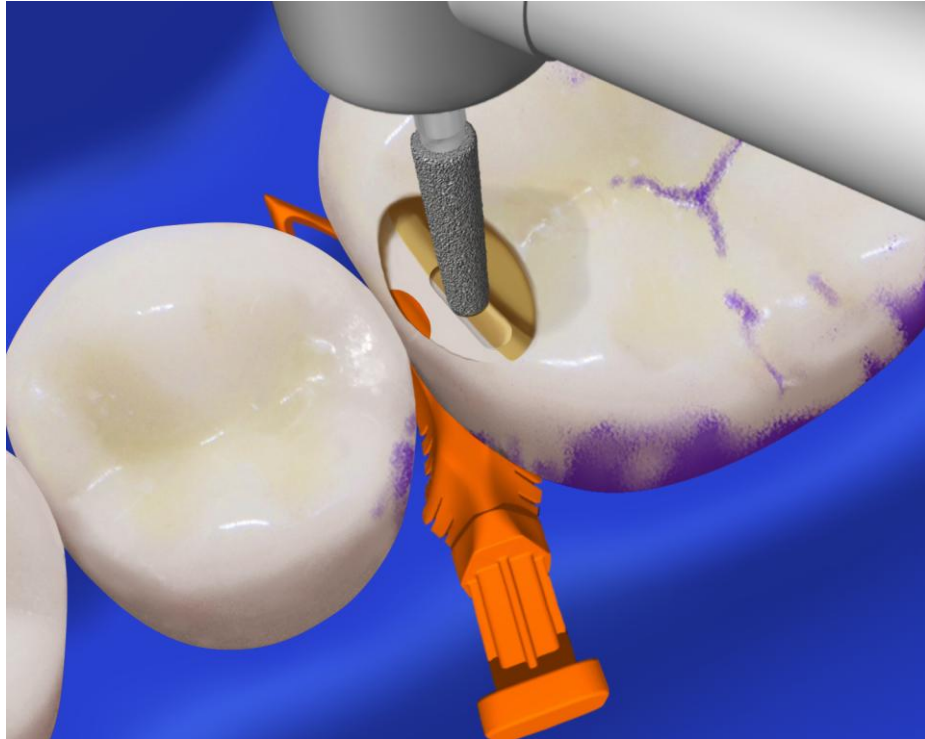
8) Final DEJ caries removal on gingival zone with SS White #3 bur



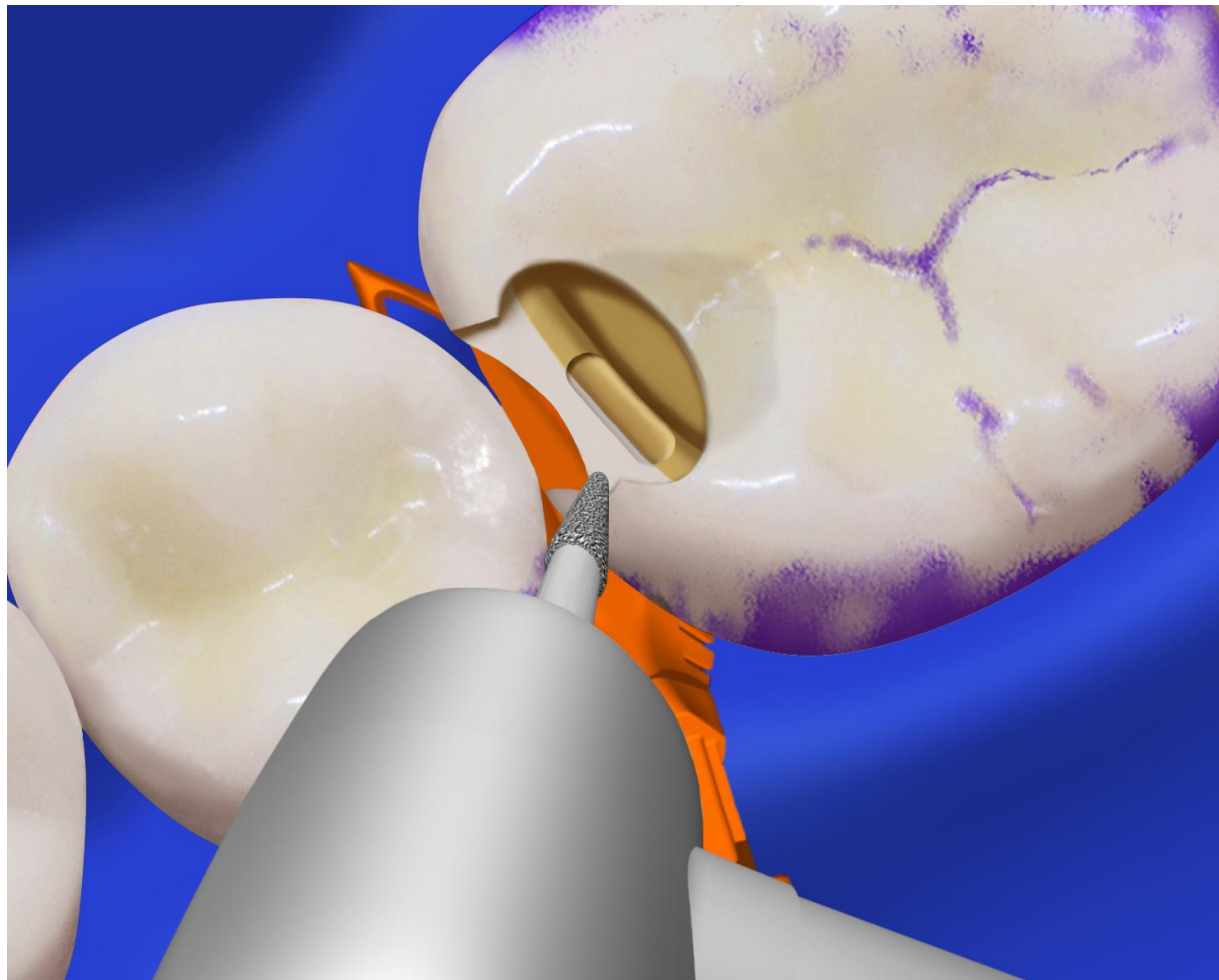
9) Buccal and caries at DEJ is also performed. Angle of bur can be changed for conservative access.



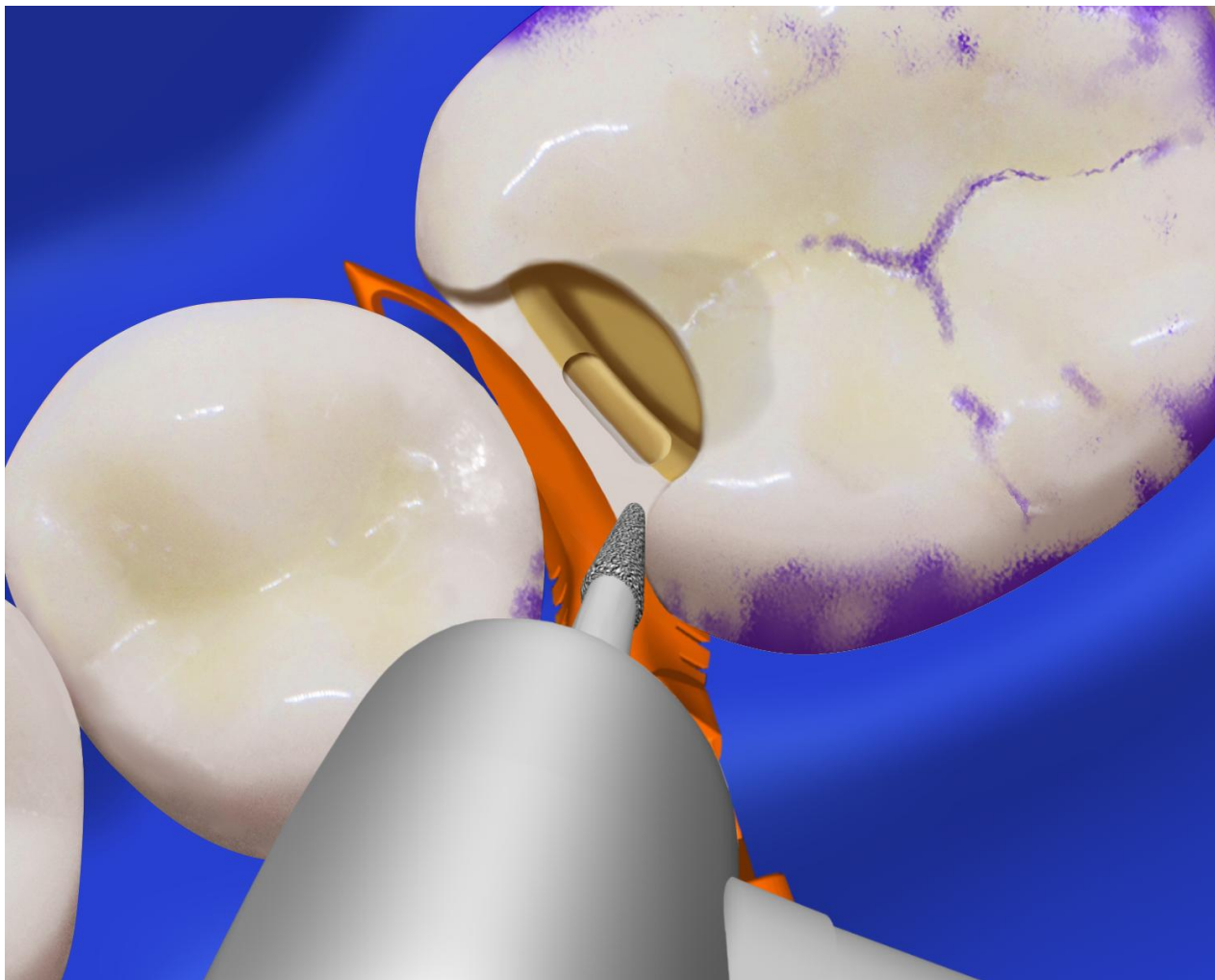
10) Final caries removal at DEJ is shown and natural cavitation area is shown.



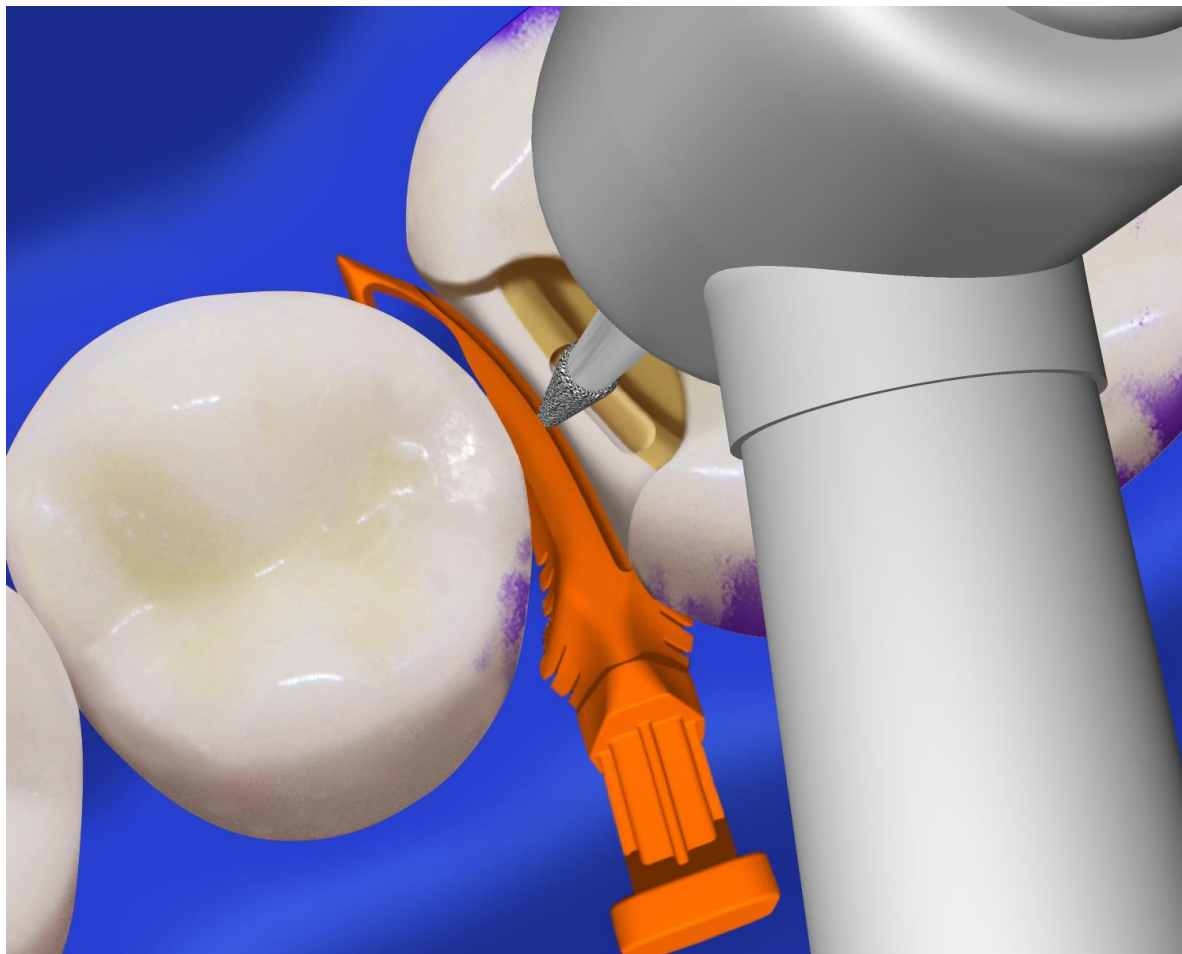
11) SS White Bur #6 is used to break all contacts. Bur can be used either wet or dry)

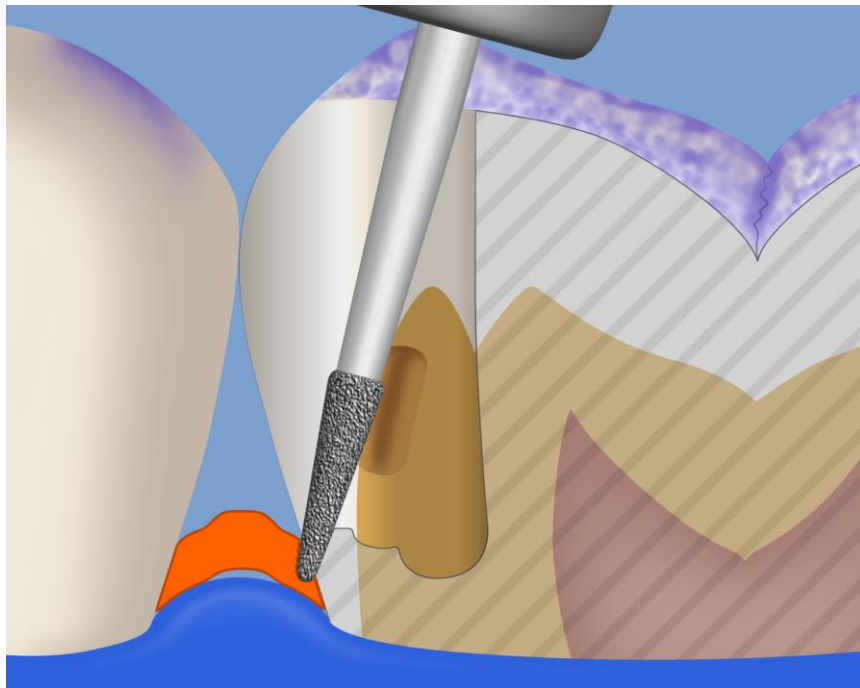


12) SS White bur  
#6 Bur is used to  
create the radius  
bevel.

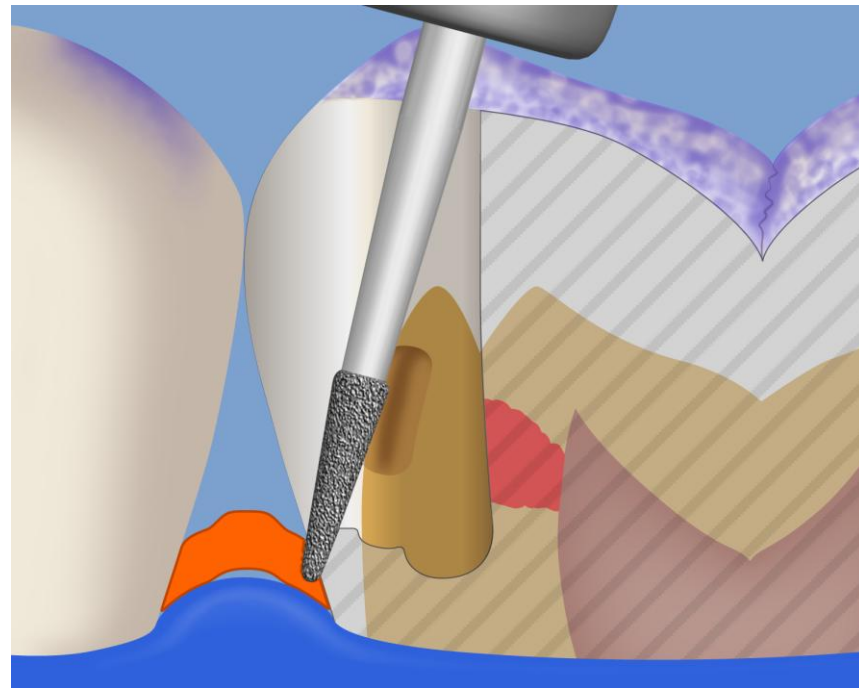


13) Create the gingival bevel.  
Diamond wedge can be removed if wedge is an encumbrance to bur.



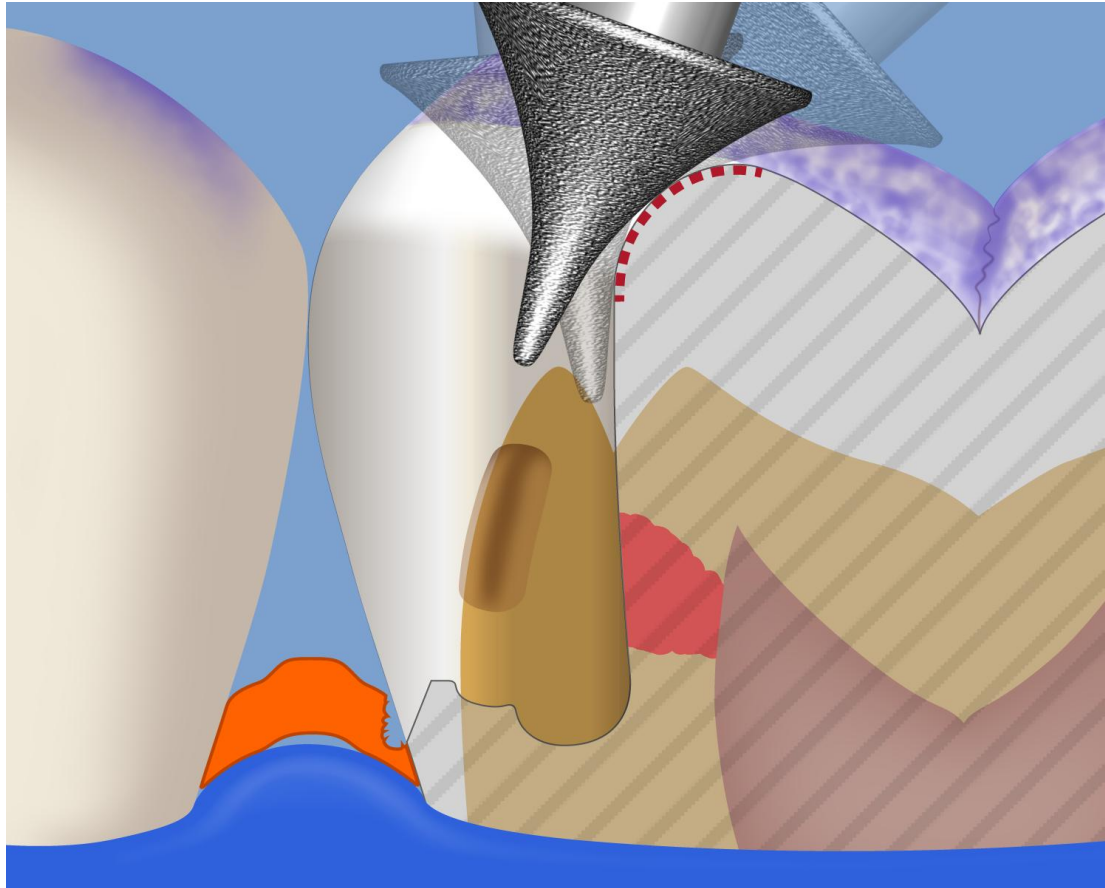


Cross section view of step 13

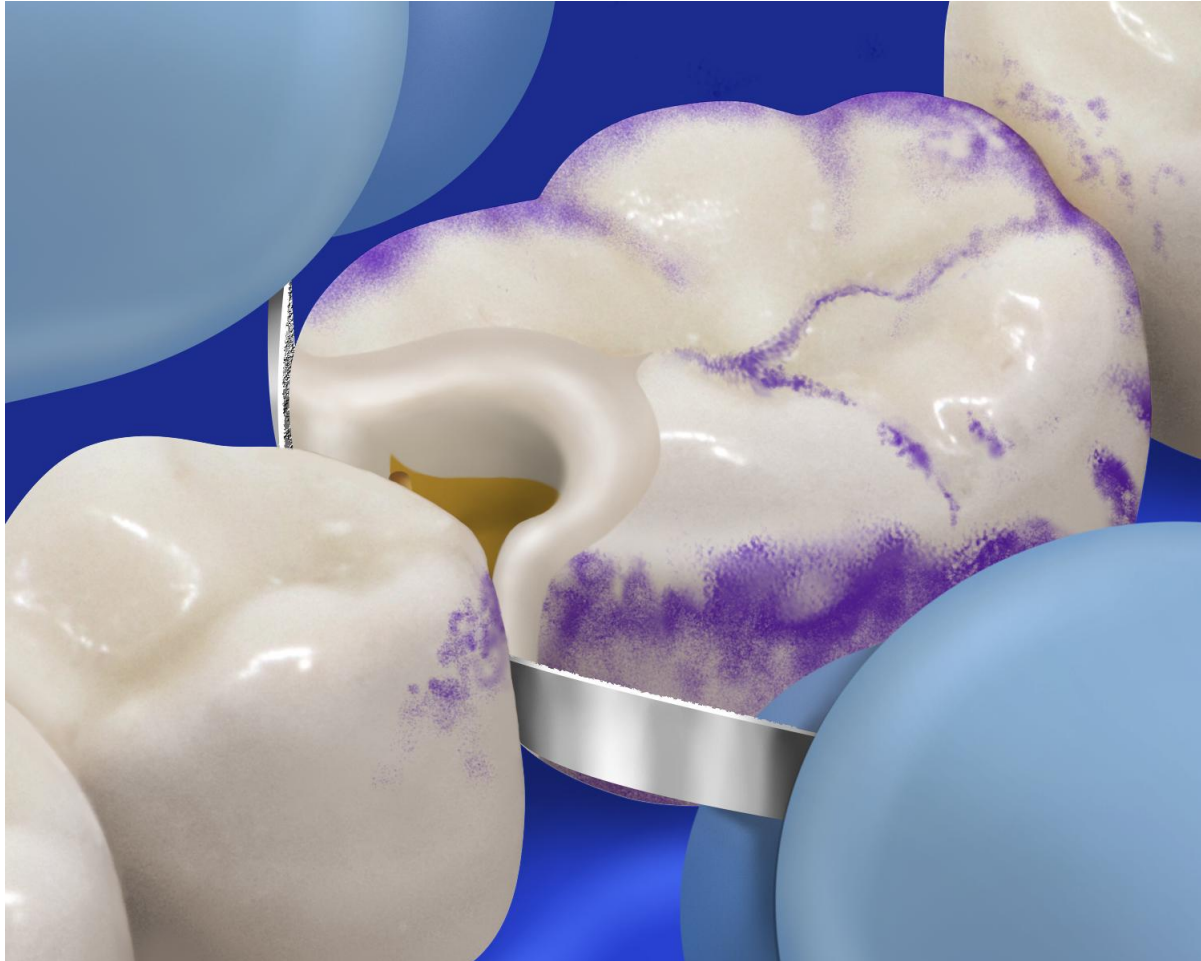


Cross section view of step 13 with  
Selective Caries Removal

14) SS White Calla  
Lily bur #3 is used  
to create radius  
bevel/compression  
joint on occlusal  
enamel.



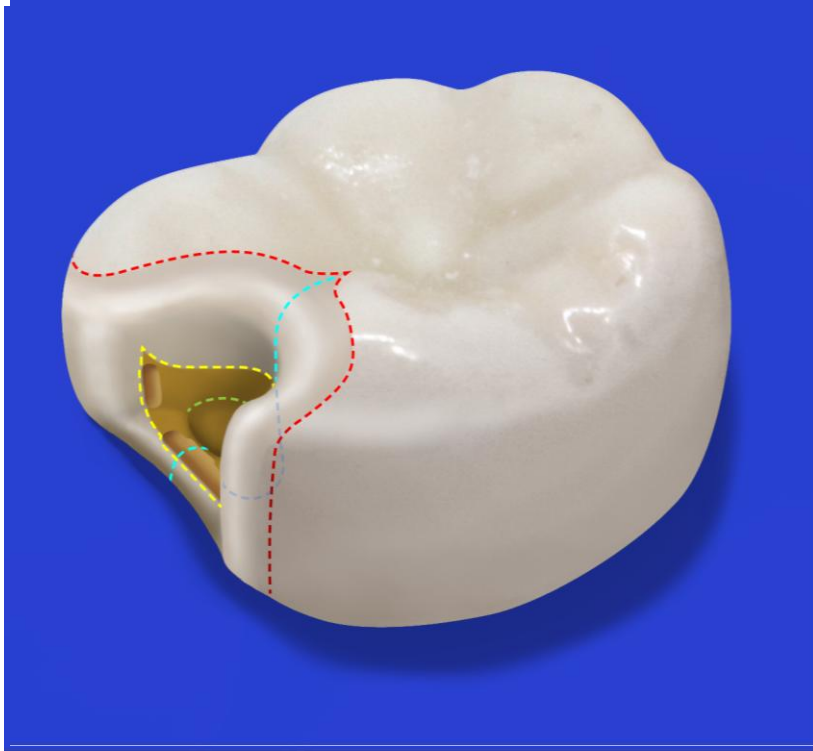
15) SS White strip removes loose enamel rods on entire preparation and hard deposits in the infinity edge area apical to the gingival bevel.



16) Bioclear Blaster with aluminum tri-hydroxide is used to clean inside and outside of preparation.



## Final views of completed Bioclear Class II Preparation.



# Max Planck *Nobel Prize, 1918*



“A new scientific truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it.”

Are all  
Separators  
Equal?

**NO!**



Stretched to 20mm ONCE!!!





And now most of the power is permanently lost

Once the yield of the metal/shape is reached, the metal undergoes plastic deformation

Stretched to 20mm Twenty Times

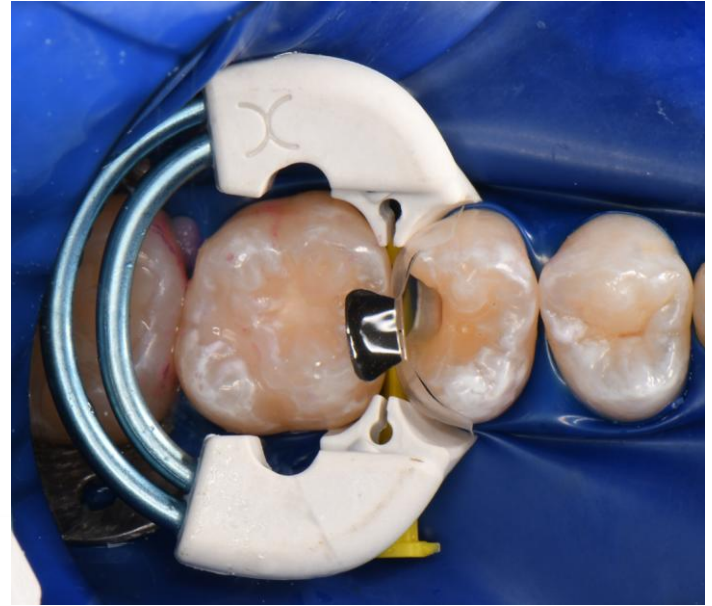
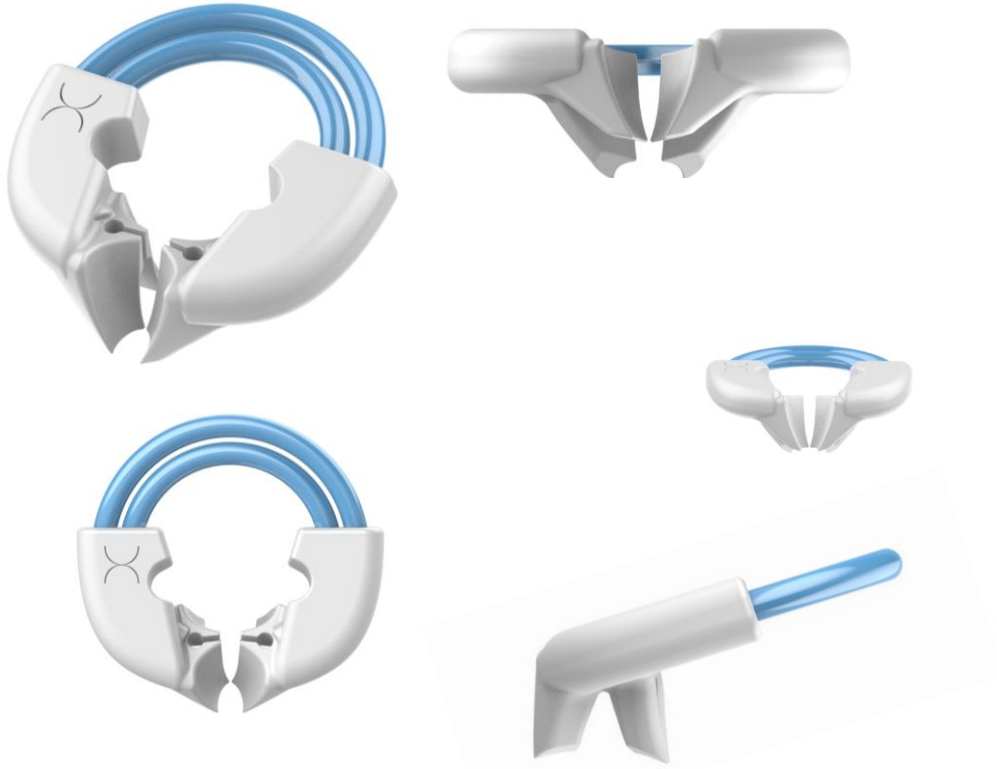


Stretched to 20mm Twenty Times



# TwinRing Universal

∞ BIOCLEAR





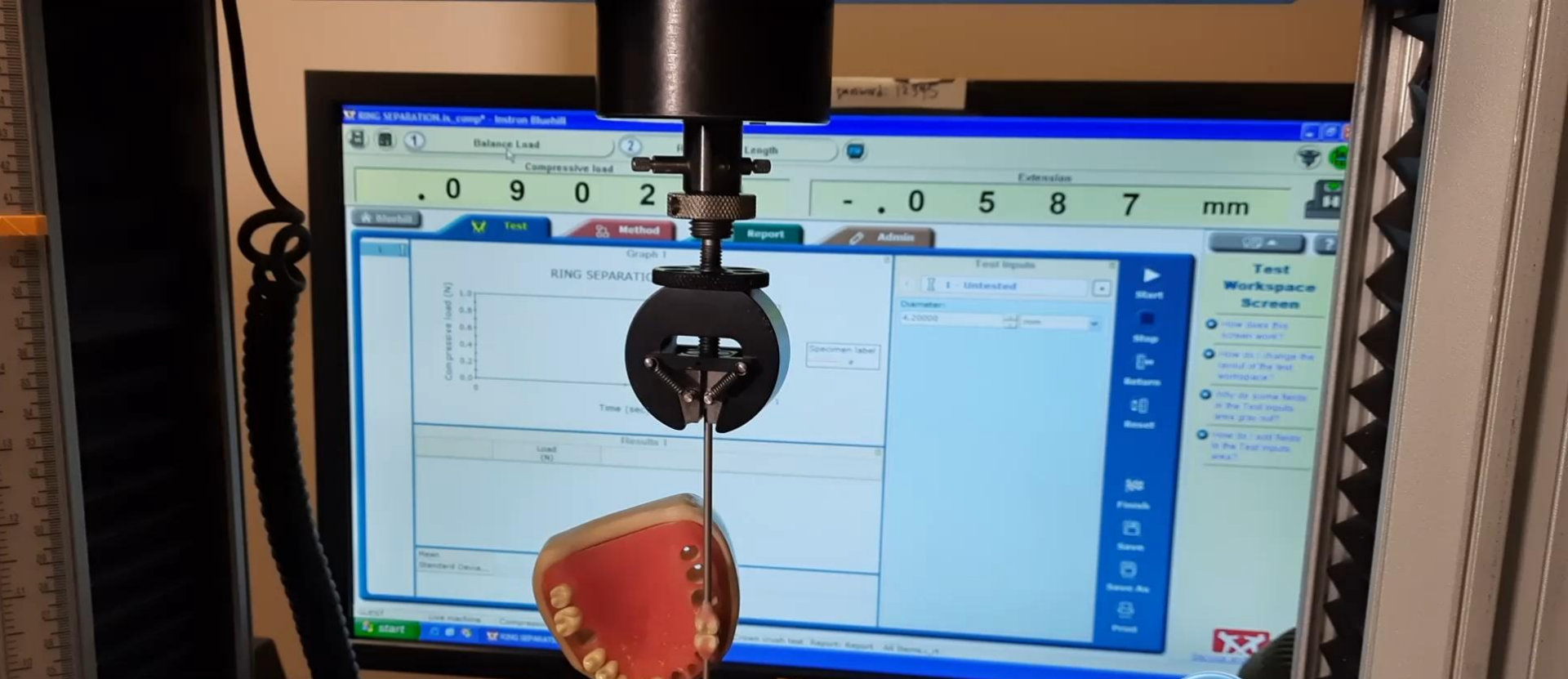
## How do we win the *Snug Contact Game?*

- Power
- Strategy
- Technique



## How do we win the *Snug Contact Game?*

- Power
- Strategy
- Technique



**Nate Lawson DMD PhD**

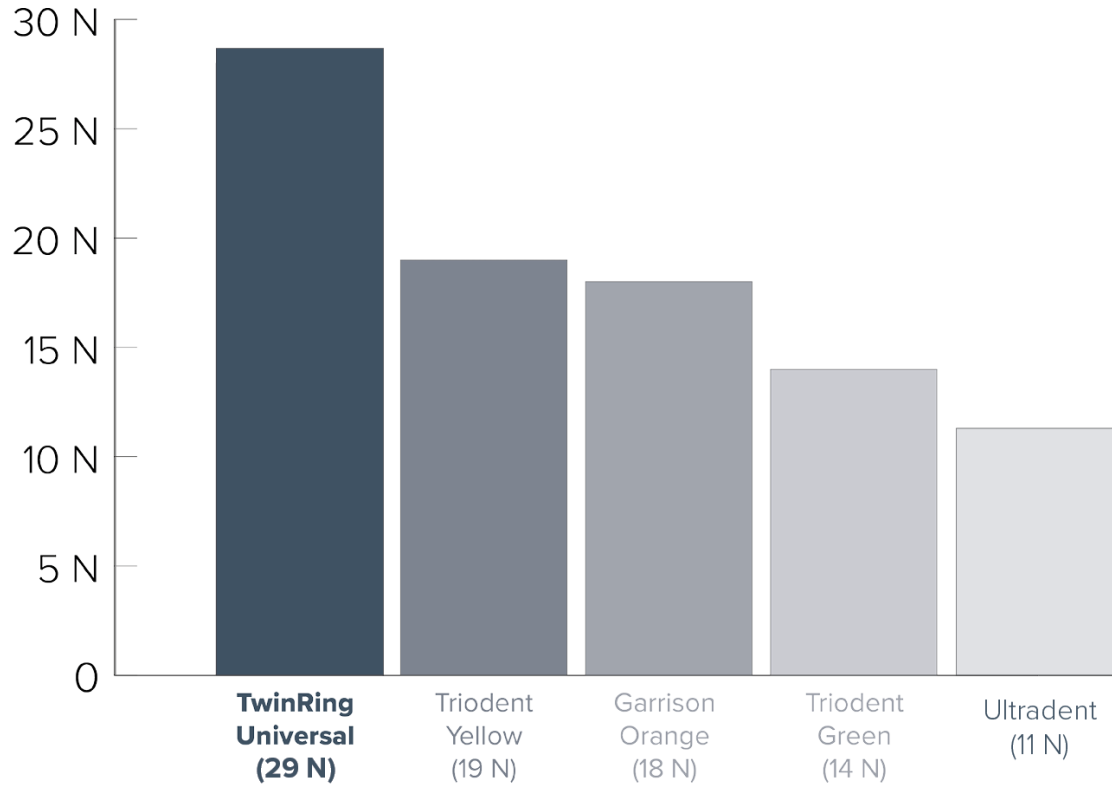
Director of the Division of Biomaterials and Pranit Bora. BDS, MDS.

Resident, Division of Biomaterials UAB School of Dentistry



TwinRing Universal  
28 N

# TwinRing Universal Instron Comparison



Note: Rings tested are not new and some rings stretch out quickly and lose up to half of their power after multiple uses. 1N = 1kg (m/s/s)

∞ BIOCLEAR

# Bioclear Matrices - Posterior





# EVOLVE --- MATRIX

## Premolar



## Molar



EVOLVE  
MATRIX

## Premolar Evolve: Width & Profile

- Evolve premolar matrices come in one width and profile – Black – to fit a variety of premolar tooth shapes

### BLACK EVOLVE

Designed with an aggressively rounded emergence profile. Shaped specifically for premolar teeth, these matrices can be used anywhere you would typically use a Biofit matrix or BT matrices on premolars.

Tip: Rotate the matrix into place.



Premolar Normal  
Width

# Black Premolar Evolve

BIOCLEAR



5 Sizes

5mm

6mm

7mm

8mm

10mm

- Curved profile
- Normal width for a premolar



## 5 Sizes

5mm  
6mm  
7mm  
8mm  
9mm

- Curved profile
- Normal width

# Molar Evolve: Width & Profile

- Evolve matrices come in three widths and profiles – Blue, Orange, and Pink – to fit a variety of posterior tooth shapes

## BLUE EVOLVE

Designed with an aggressively rounded emergence profile and an average width. Blue Evolve is suitable for the majority of posterior cases.

Tip: Rotate the matrix into place.



Normal width

## ORANGE EVOLVE

Features a flatter emergence profile than the Blue Evolve. Orange Evolve is perfect for patients with average-sized molars where the tooth is too flat for the Blue Evolve

Tip: Use the Orange Evolve if the Blue Evolve inverts



Wide Molar



3 Sizes

6mm

7mm

9mm

- Curved/straight profile
- Wider width

# The slip-off test



∞ BIOCLEAR

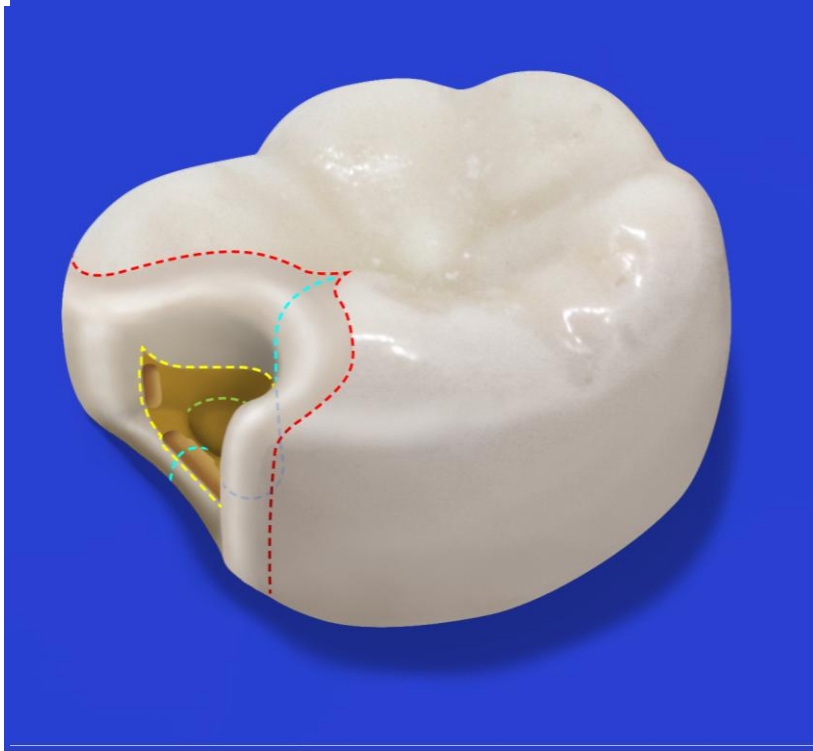
# The Adjustable Push-Pull Instrument

*for Ideal Contacts*



**EVOLVE MATRIX SYSTEM**

# Final views of completed Bioclear Class II Preparation.



Natural Contacts

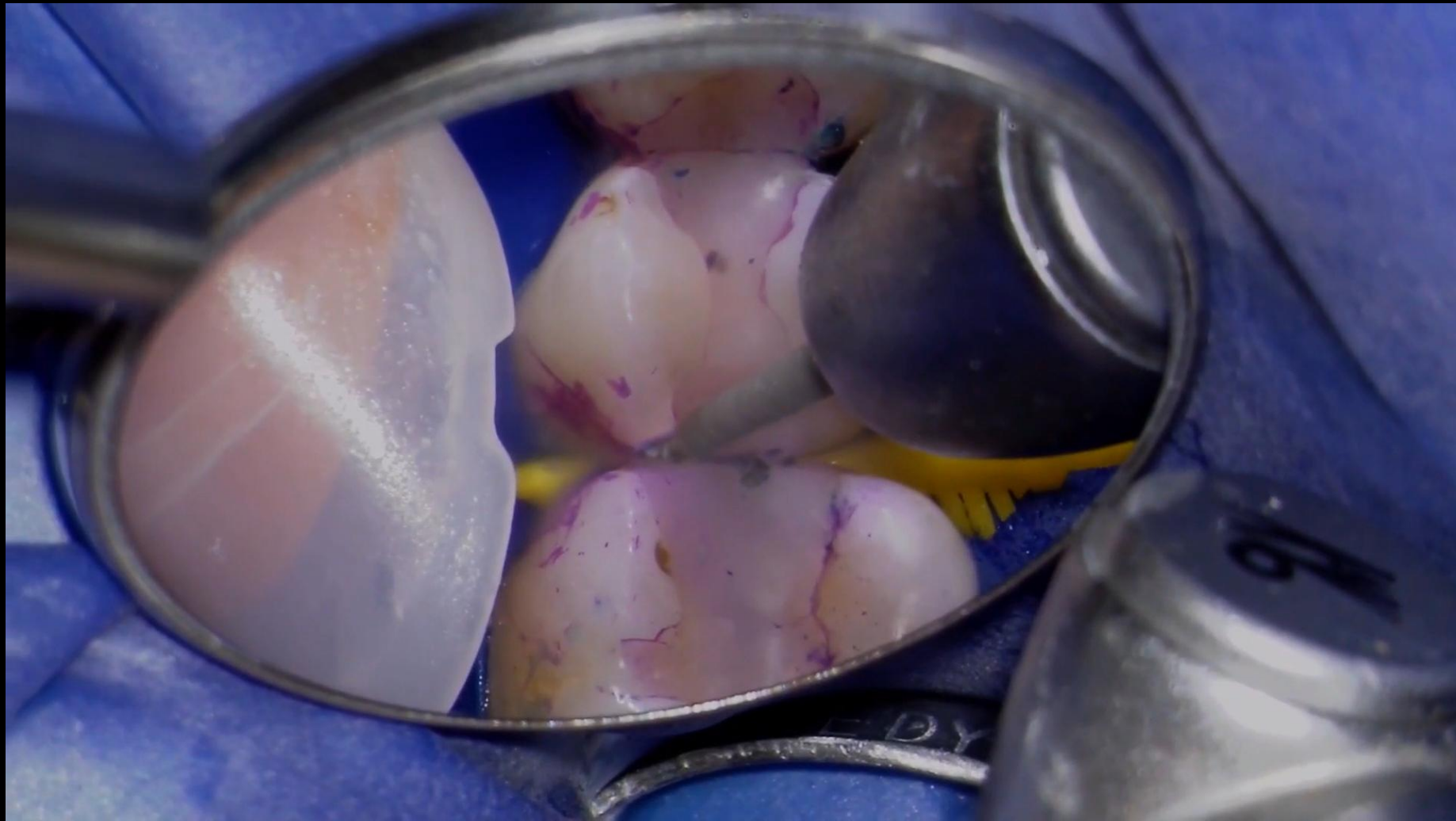


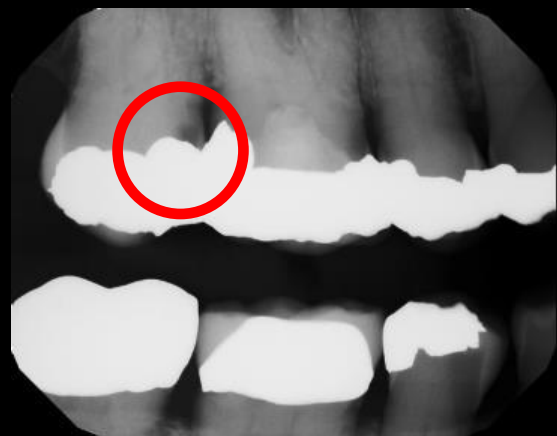
Traditional Composite Contacts



**What about deep decay?**

Three-Point Spot Weld plus  
Deep Margin Acquisition (DMA)  
Clinical Video





## Deep Margin Acquisition (DMA)



Inside the prep to our reference = 6mm

- What Evolve matrix color should you choose and what height?
- What's my reference?











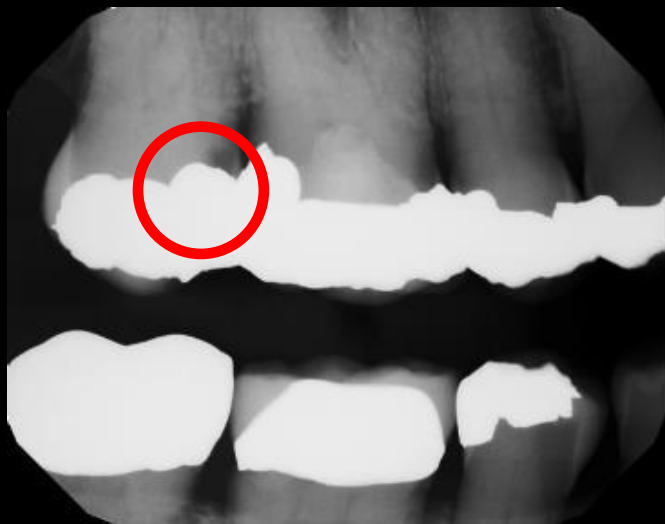




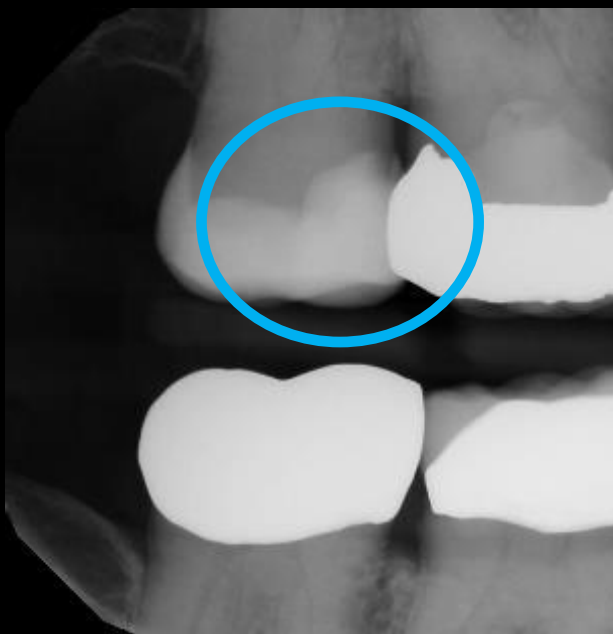




Pre-op



Post-op (two views)

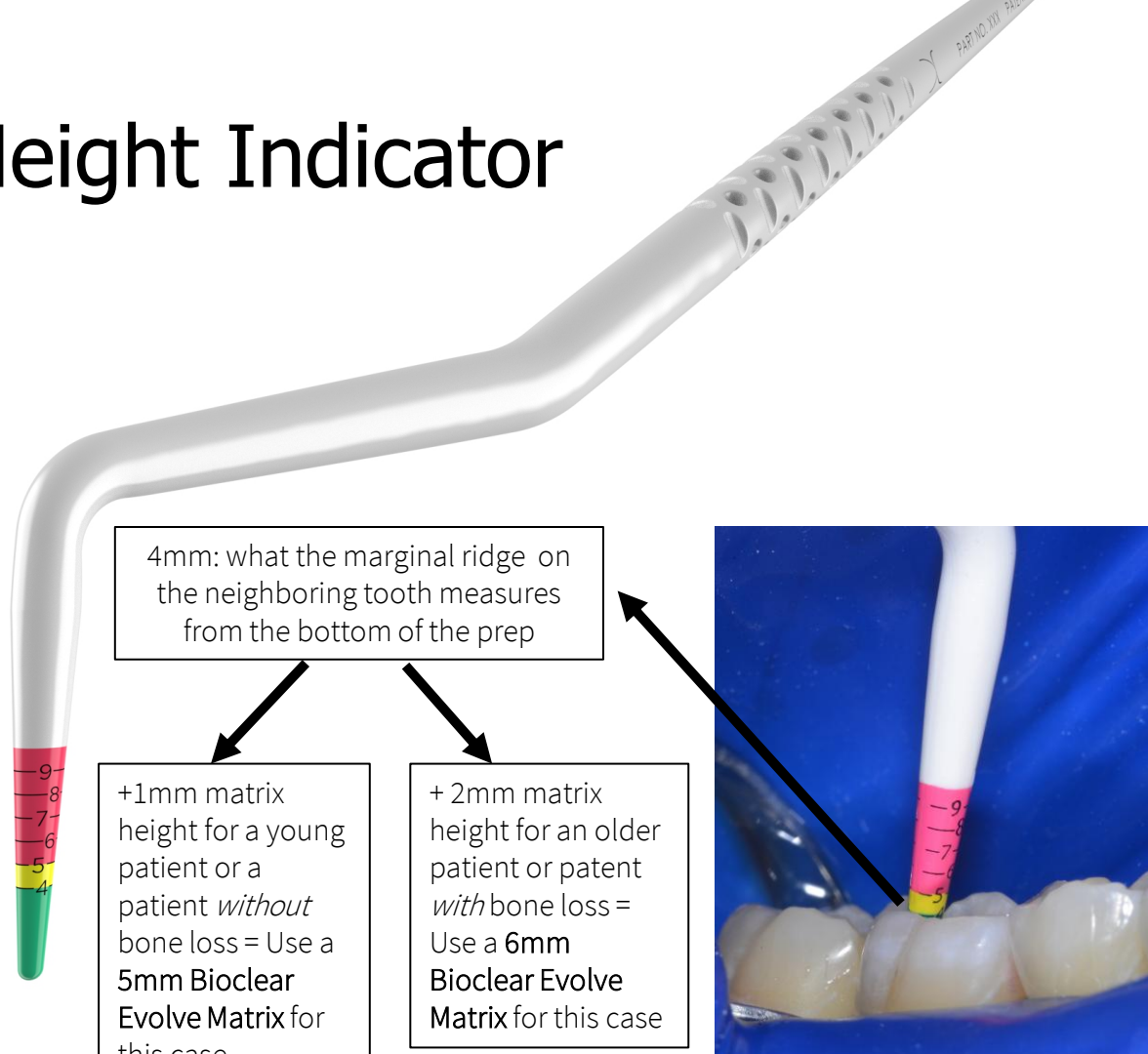


# Evolve Matrix Height Indicator

## Matrix Height Indicator:

Numbers are printed on the indicator so the correct Evolve matrix for a restoration is chosen the first time. This helps reduce waste when incorrect matrices are chosen.

Once you have measured the depth of the cavity in relation to the marginal ridge of the neighboring tooth, you will generally need to add 1-2mm from that reading.



# Evolve Matrix Height Indicator

## Go/No-Go:

The colored tip indicates if a cavity prep can be cured in one layer or if more must be used.

**Red:** NO-GO the composite will be deeper than 5mm

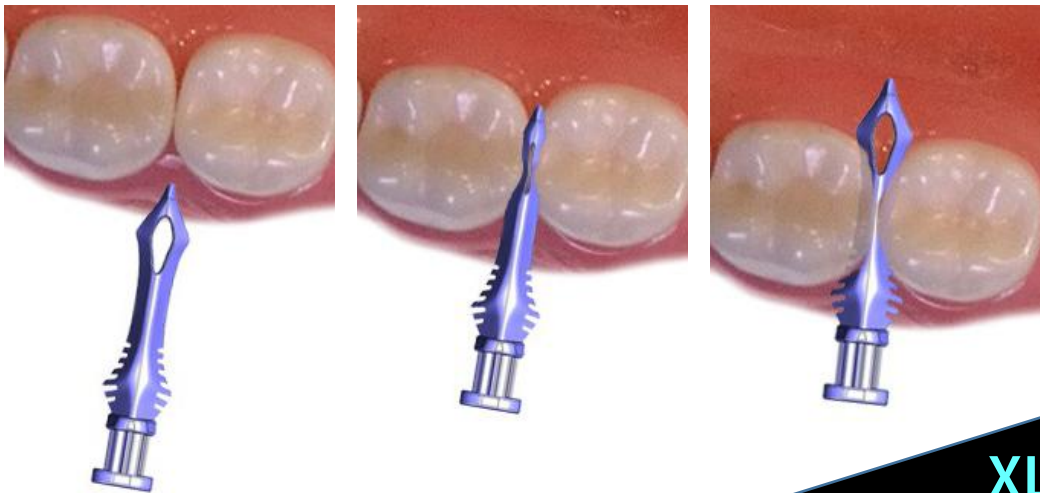
**Yellow:** GO WITH CONDITIONS

**Green:** GO



*Tip: The best reference point is the marginal ridge of the neighboring tooth. If you are doing a back-to-back restoration and no marginal ridge is available, then use the gauge to estimate the height the composite should be when you are finished injection molding but before curing.*



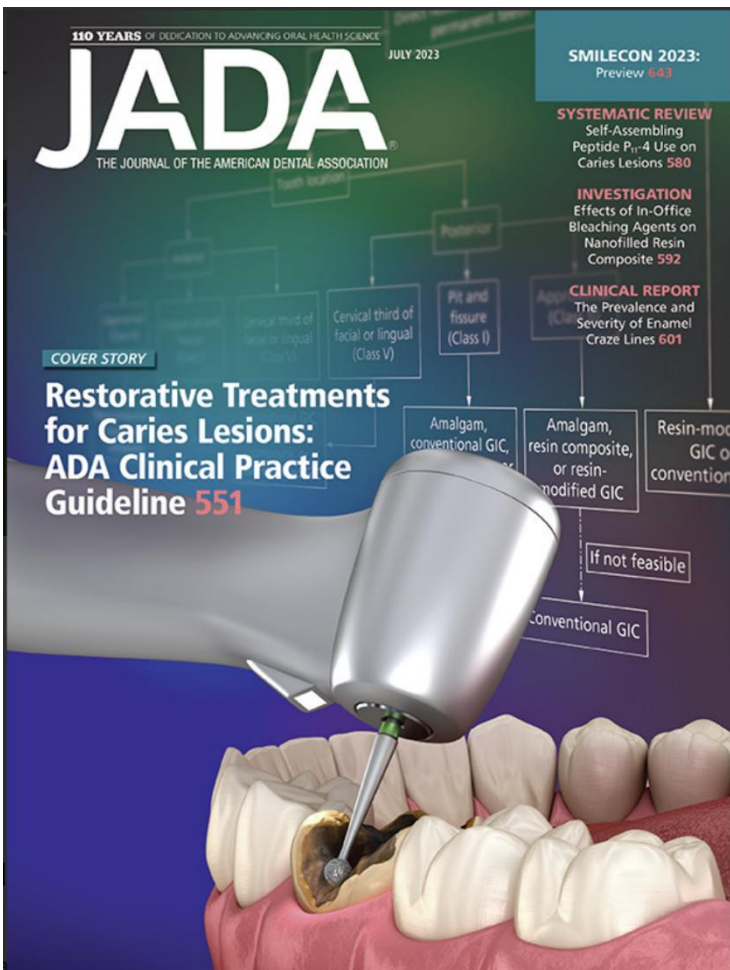


 **DIAMOND**  
WEDGE



# The modern composite procedure

- Adhesion versus mechanical retention
- Preparation design based on engineering
- Compression Joints vs Tension Joints
- Biofilm Removal and the Infinity EdgeTooth Restoration Interface
- **Selective Caries Removal**
- Monolithic injection molding
- Rock Star Polish



**Table 1.** Definitions of carious tissue removal approaches and clinical presentation of caries lesion.

**CARIOUS TISSUE REMOVAL APPROACHES (THAT IS, THE EXTENT OF CARIOUS TISSUE REMOVED)**

<b>Nonselective Caries Removal</b>	Carious tissue is removed until hard dentin is reached. Also known as complete caries removal.
<b>Selective Caries Removal</b>	Carious tissue is removed until soft or firm dentin is reached. Also known as partial or incomplete caries removal.
<b>Stepwise Caries Removal</b>	Carious tissue is first removed until soft dentin is reached and then a temporary restoration is placed. Months later, the restoration and carious tissue are removed until firm dentin is reached and a permanent restoration is then placed. Also known as 2-step caries removal.
<b>No Carious Tissue Removal</b>	No carious tissue is removed prior to the placement of a definitive restoration.

**CLINICAL PRESENTATION OF CARIES LESIONS**

<b>Moderate Caries Lesion</b>	International Caries Detection and Assessment System codes 3 and 4
<b>Advanced Caries Lesion</b>	International Caries Detection and Assessment System codes 5 and 6

**Clinical Practice Guideline**

**Cover Story**

**Evidence-based clinical practice guideline on restorative treatments for caries lesions**

A report from the American Dental Association

Vineet Dhar, BDS, MDS, PhD; Lauren Plicher, MSPH; Margherita Fontana, DDS, PhD; Carlos Gonzalez-Cabezas, DDS, MSD, PhD; Martha Ann Keele, DDS, PhD; Ana Karina Mascarenhas, BDS, MPH, DDPH; Marcelle Nascimento, DDS, MS, PhD; Jeffrey A. Platt, DDS, MS, Gregory J. Sabino, DDS, PhD; Rebecca Stavitt, DDS, PhD; Norman Trautloff, DDS, MS; Douglas A. Young, DDS, EdD, MBA, MS; Domènec T. Zoro, DDS, MS; Sarah Parke, MS; Olivia Longhart, MPH; Kelly K. O'Brien, MD; Alonso Carrasco-Labra, DDS, MSc, PhD

**ABSTRACT**

**Background.** An expert panel convened by the American Dental Association (ADA) Council on Scientific Affairs together with the ADA Science and Research Institute's program for Clinical and Translational Research conducted a systematic review and developed recommendations for the treatment of moderate and advanced cavitated caries lesions in patients with vital, non-endodontically treated primary and permanent teeth.

**Types of Studies Reviewed.** The authors searched for systematic reviews comparing carious tissue removal (CTR) approaches in Ovid MEDLINE, Embase, Cochrane Database of Systematic Reviews, and Trip Medical Database. The authors also conducted a systematic search for randomized controlled trials comparing direct restorative materials in Ovid MEDLINE, Embase, Cochrane Central Register of Controlled Trials, ClinicalTrials.gov, and the World Health Organization International Clinical Trials Registry Platform. The authors used the Grading of Recommendations Assessment, Development, and Evaluation approach to assess the certainty of the evidence and formulate recommendations.

**Results.** The panel formulated 16 recommendations and good practice statements: 4 on CTR approaches specific to lesion depth and 12 on direct restorative materials specific to tooth location and surfaces involved. The panel conditionally recommended for the use of conservative CTR approaches, especially for advanced lesions. Although the panel conditionally recommended for the use of all direct restorative materials, they prioritized some materials over the use of others for certain clinical scenarios.

**Practical implications.** The evidence suggests that more conservative CTR approaches may decrease the risk of adverse effects. All included direct restorative materials may be effective in treating moderate and advanced caries lesions on vital, nonendodontically treated primary and permanent teeth.

**Key Words.** Evidence-based dentistry; clinical practice guideline; direct restorative materials; caries; general dentistry; pediatric dentistry; American Dental Association.

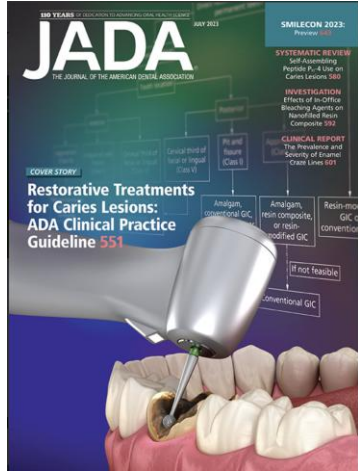
JADA 2023;154(7):551-566  
<https://doi.org/10.1016/j.jada.2023.04.011>

Restorative dentistry is integral to managing caries.<sup>1</sup> The decisions involved in restoring teeth are complex and based on the balance of several factors such as prognosis, caries risk and activity assessment, and clinical or radiographic signs of caries.<sup>2,3</sup> When indicated, various carious tissue removal (CTR) approaches (that is, the extent of carious tissue removed) and direct restorative materials are available to restore moderate and advanced (Table 1) caries lesions on vital, nonendodontically treated primary and permanent teeth.

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JADA 154(7) • <http://jada.ada.org> • July 2023

551



**Table 1.** Definitions of carious tissue removal approaches and clinical presentation of caries lesion.

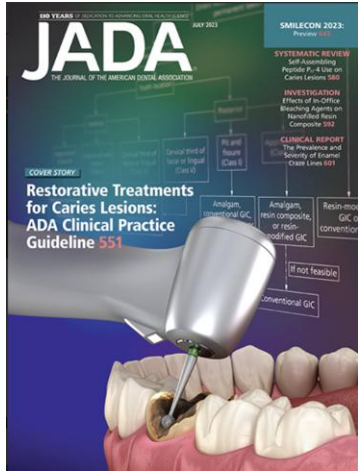
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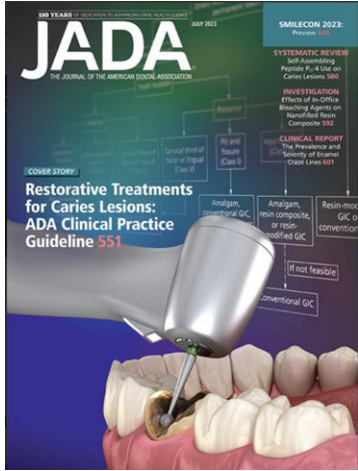
“To treat **moderate caries lesions** of vital permanent teeth, the panel suggests prioritizing the use of SCR over nonselective i.e., complete caries removal.”

Evidence to Decisions: 1) Desirable and **undesirable effects**, 2) Values and preferences, 3) Cost, 4) Acceptability, 5) Feasibility



**“Undesirable effects of traditional caries removal: Patient discomfort during treatment, pulp exposure, pulp necrosis, pulpal complications due to infection, and tooth loss.”**

July 2023



# Selective Caries Removal (SCR) is the new standard of care

# BOOM!\*

\*Just one hundred and thirty-three years later

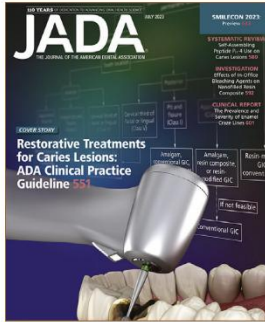
# JCDA article the next month (August 2023)

## ADA Publishes Guideline on Restorative Treatments for Caries Lesions

A new American Dental Association (ADA) clinical practice guideline suggests conservative methods to treat tooth decay in primary and permanent teeth could lead to better outcomes when used with common restorative materials. An expert panel of dentists developed guidelines on this topic after extensive review of approximately 300 published studies.

The guideline, published in the July 2023 issue of *The Journal of the American Dental Association*, contains 16 recommendations regarding treatment of moderate and advanced tooth decay in primary and permanent teeth that have not received orthodontic treatment. It suggests that conservative carious tissue removal (CTR) is less likely to result in adverse outcomes like nerve exposure or a failed filling. The recommendations also identify selective CTR as an effective treatment option in most cases of moderate or advanced decay in primary and permanent teeth.

This is the ADA's second clinical practice guideline in a series on caries treatment. The new restoration guideline, and existing recommendations on non-restorative treatment for tooth decay, are available at: [ada.org/cariesguidelines](http://ada.org/cariesguidelines) \*



“An expert panel developed guidelines after an extensive review of 300 published studies.”

“(SCR) is less likely to result in adverse outcomes...”

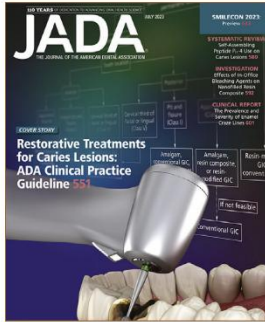
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“(SCR) Could lead to better outcomes with **ordinary restorative materials** (i.e. no more liners or bases)”

# Selective Caries Removal plus Deep Margin Acquisition clinical case





“Your website says you are a Certified Bioclear Provider offer the Selective Caries Technique (Modified Hall) as an alternative to root canals”

“My current office recommends endo, post, buildup & crown, but I have no pain”



11/10/20	BIO	2999A	Selective Caries Removal	13	\$175.00	\$0.00	\$175.00
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<b>Subtotal for This Phase:</b>					\$175.00	\$0.00	\$175.00
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11/10/20	BIO	299.8	BIOCLEAR POSTERIOR OVERLA	13	\$1,032.00	\$0.00	\$1,032.00
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<b>Subtotal for This Phase:</b>					\$1,032.00	\$0.00	\$1,032.00
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**\$1,207.00**









**Simplification of dentin zones for restorative dentist:**

- 1) **Loose Dentin**
- 2) **Smooth Soft Dentin**
- 3) **Affected Dentin:  
hard-ish and funny color**
- 4) **Sound Dentin**



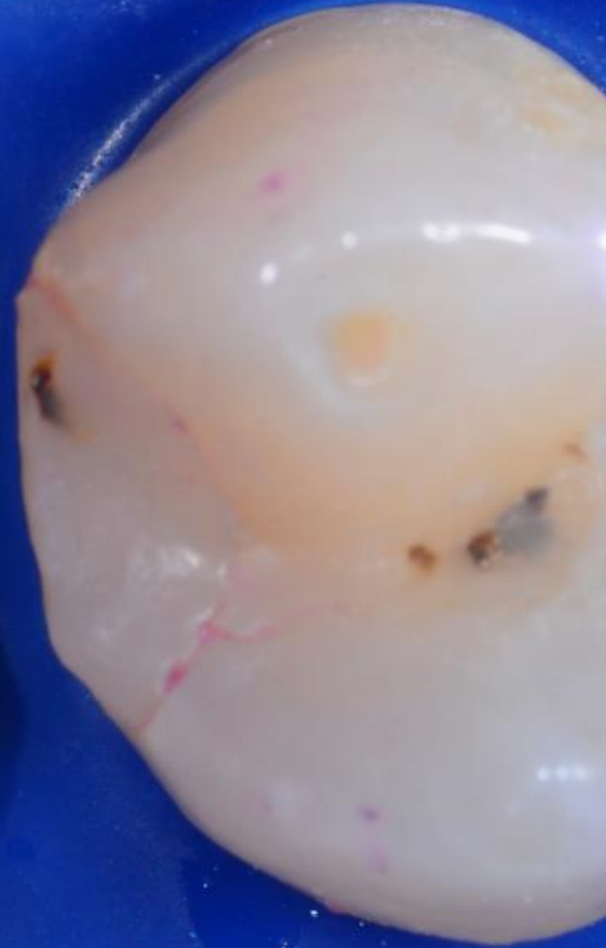
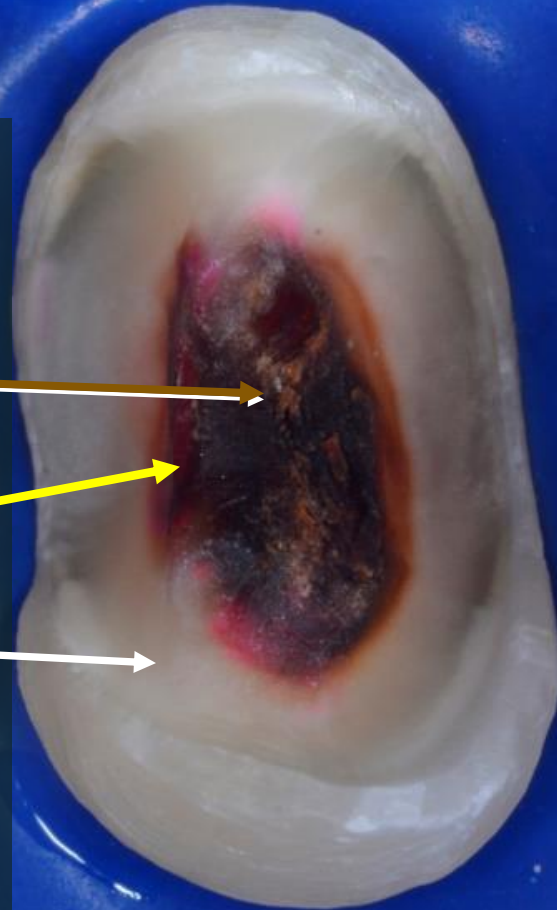
**Simplification of dentin zones for restorative dentist:**

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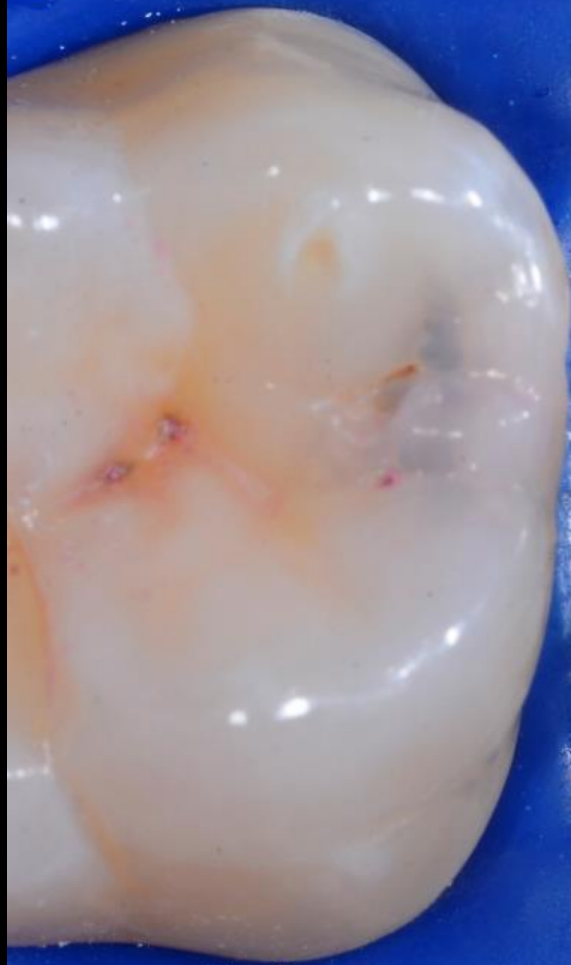
2) **Smooth Soft Dentin**

3) **Affected Dentin:  
hard-ish and funny color**

4) **Sound Dentin**

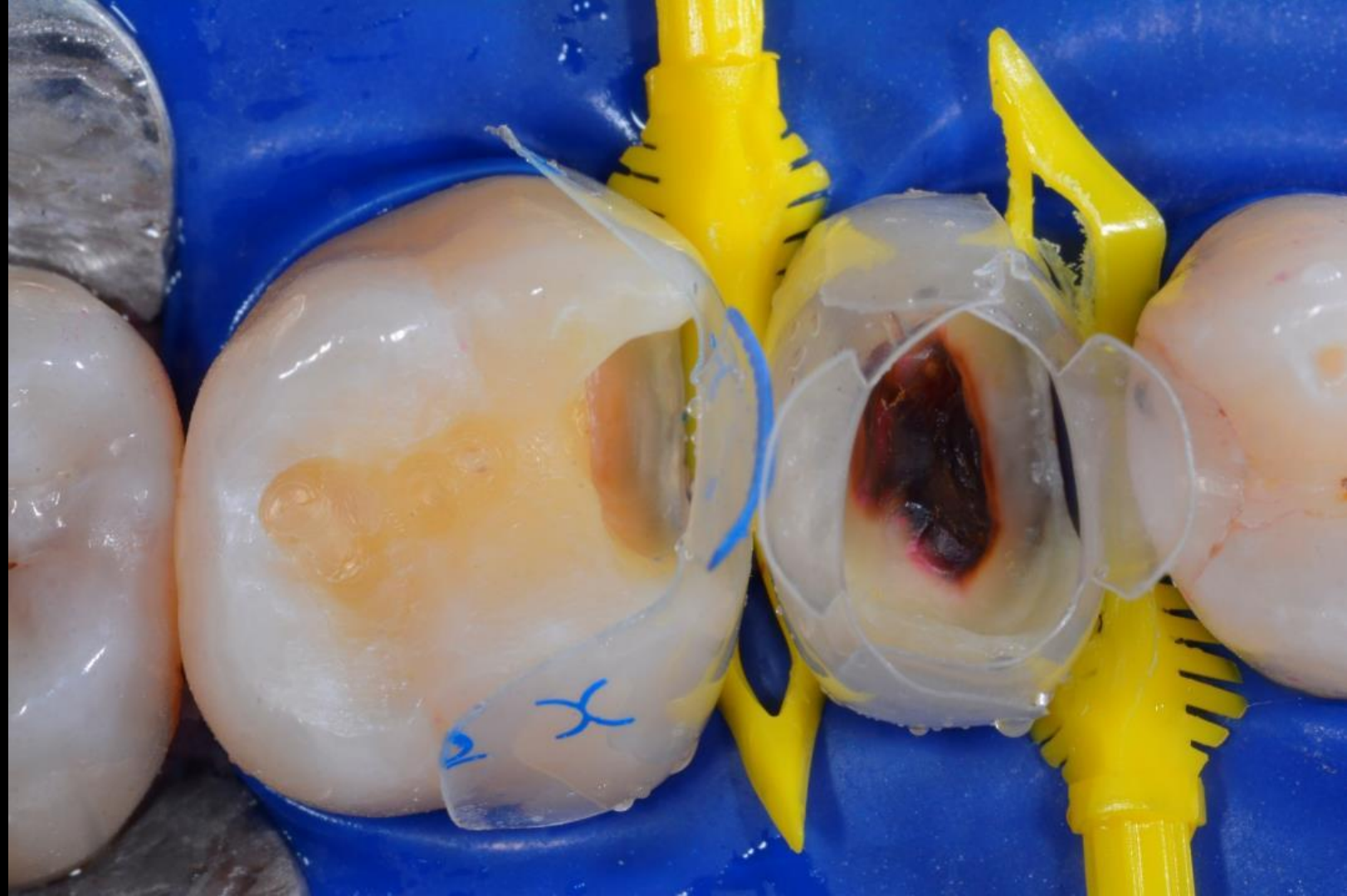










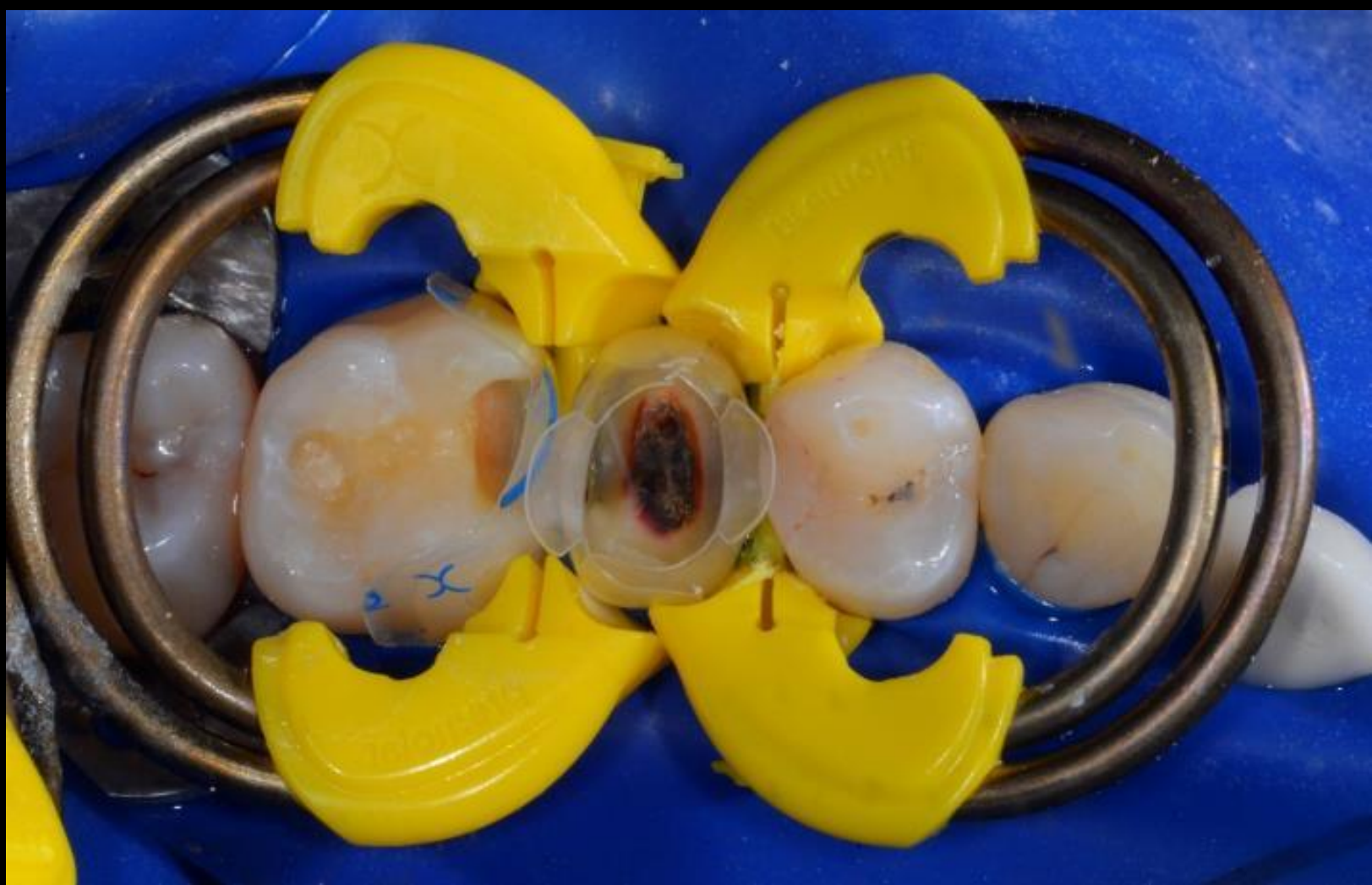






## 8 keys to ideal contacts with Injection Molding

- ✓ Change the Prep
- ✓ Pre-wedging
- ✓ Choose the correct matrix height
- ✓ Optimize the neighboring contact
- ✓ Progressive wedging
- ✓ Place separator like a rubber dam clamp
- ✓ Spot Weld Push/Pull.. Rehearse first★
- ✓ Quadrant Strategy Do the unilateral contact last













2018



2020



2020 post op



hopeless



hopeful

# 2 week follow up



# 3-year follow up



Mid treatment



post-op



3-year follow up



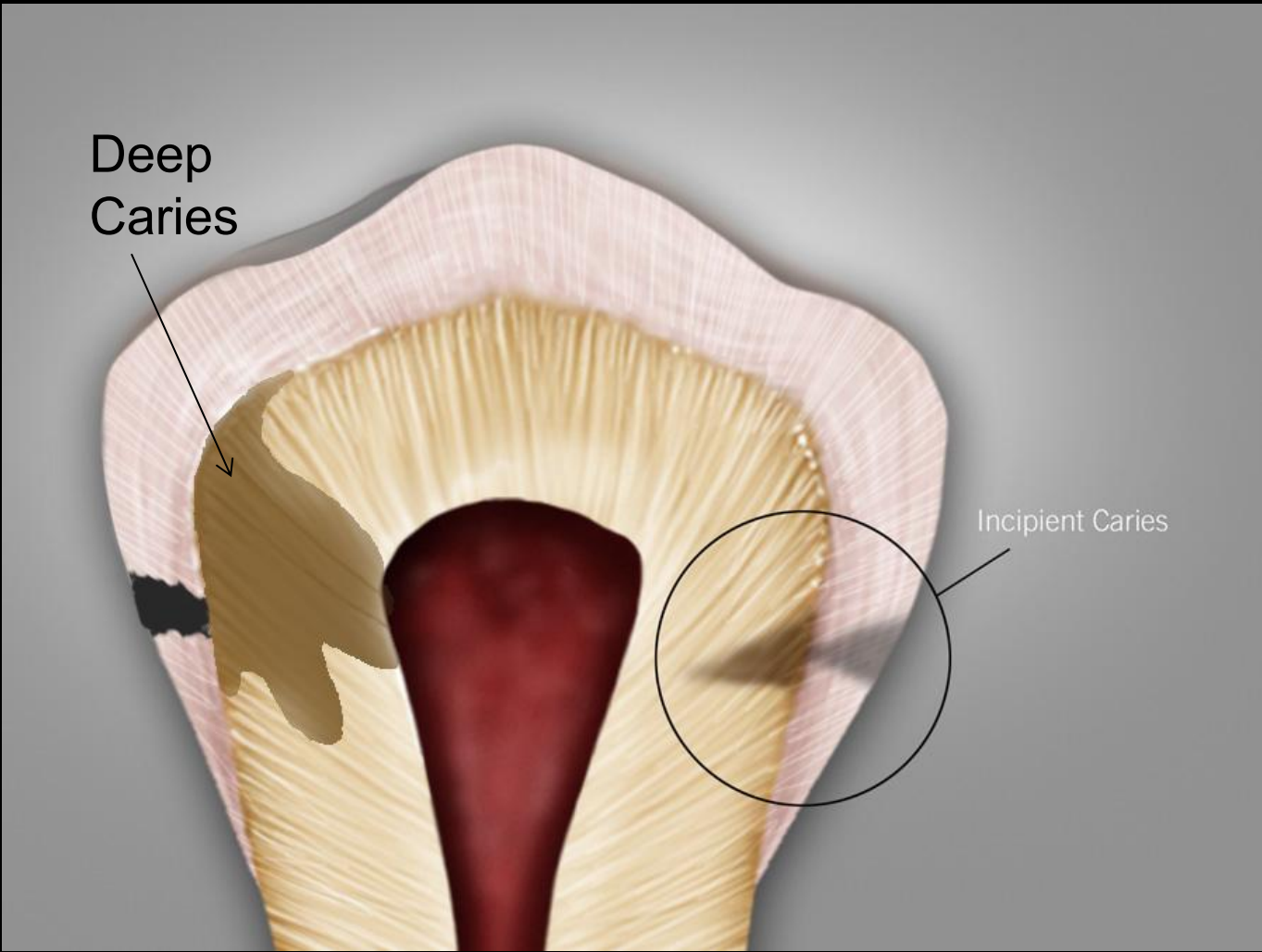
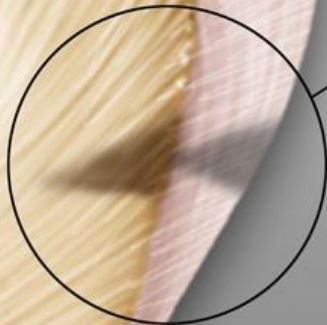
# Caries Progression and Selective Caries Removal (SCR) or Modified Hall Technique



Deep  
Caries



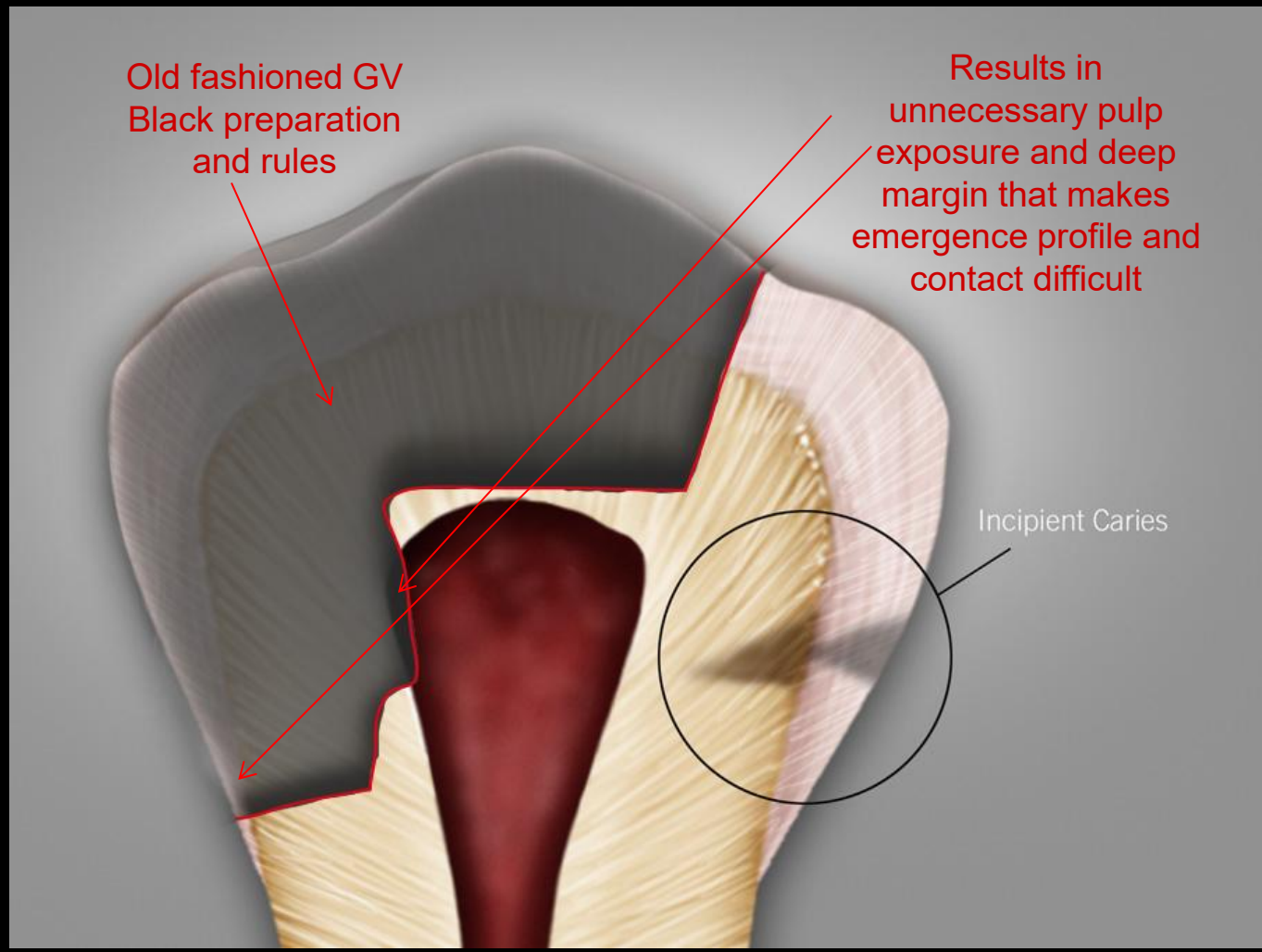
Incipient Caries



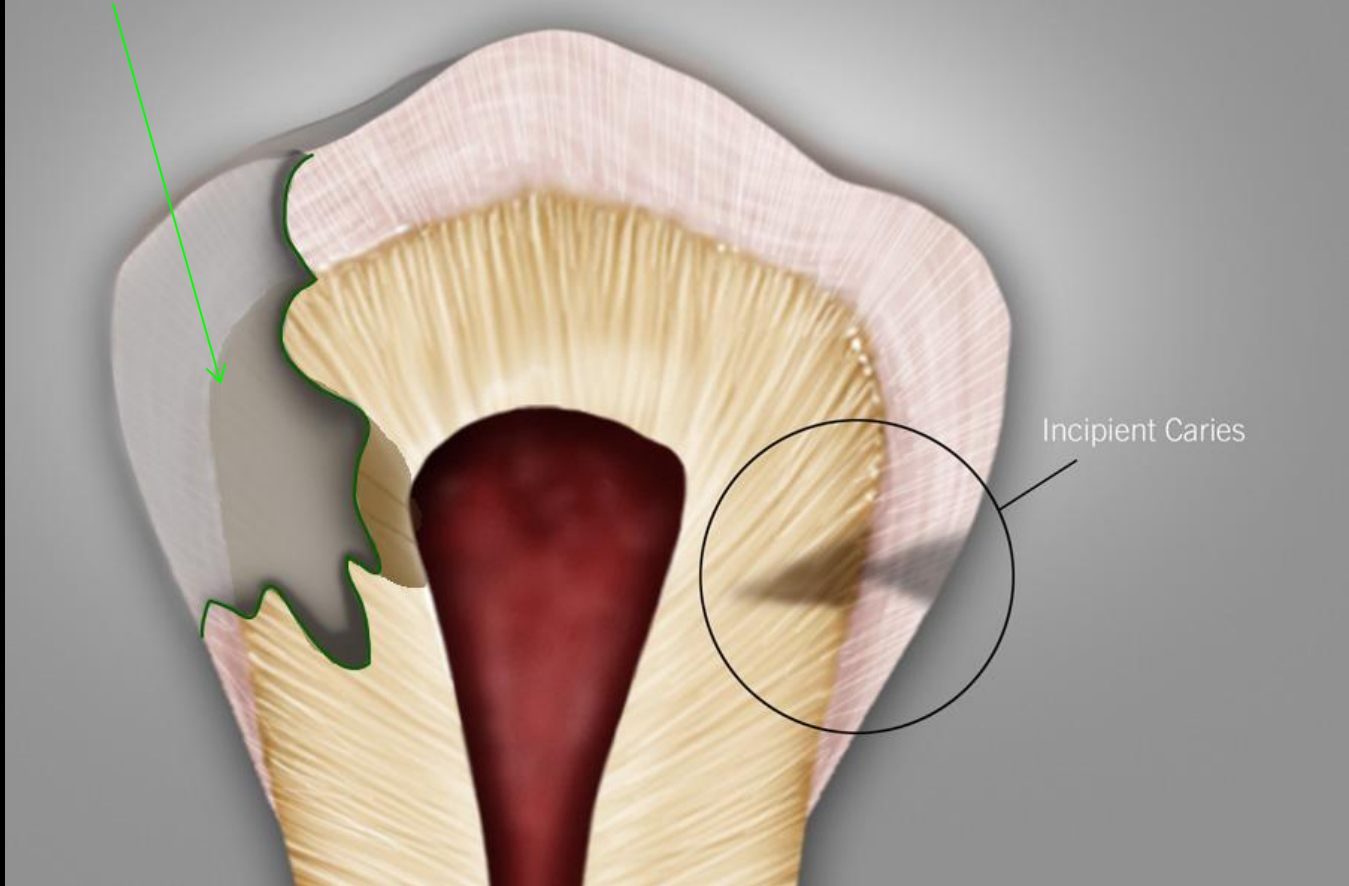
Old fashioned GV  
Black preparation  
and rules

Results in  
unnecessary pulp  
exposure and deep  
margin that makes  
emergence profile and  
contact difficult

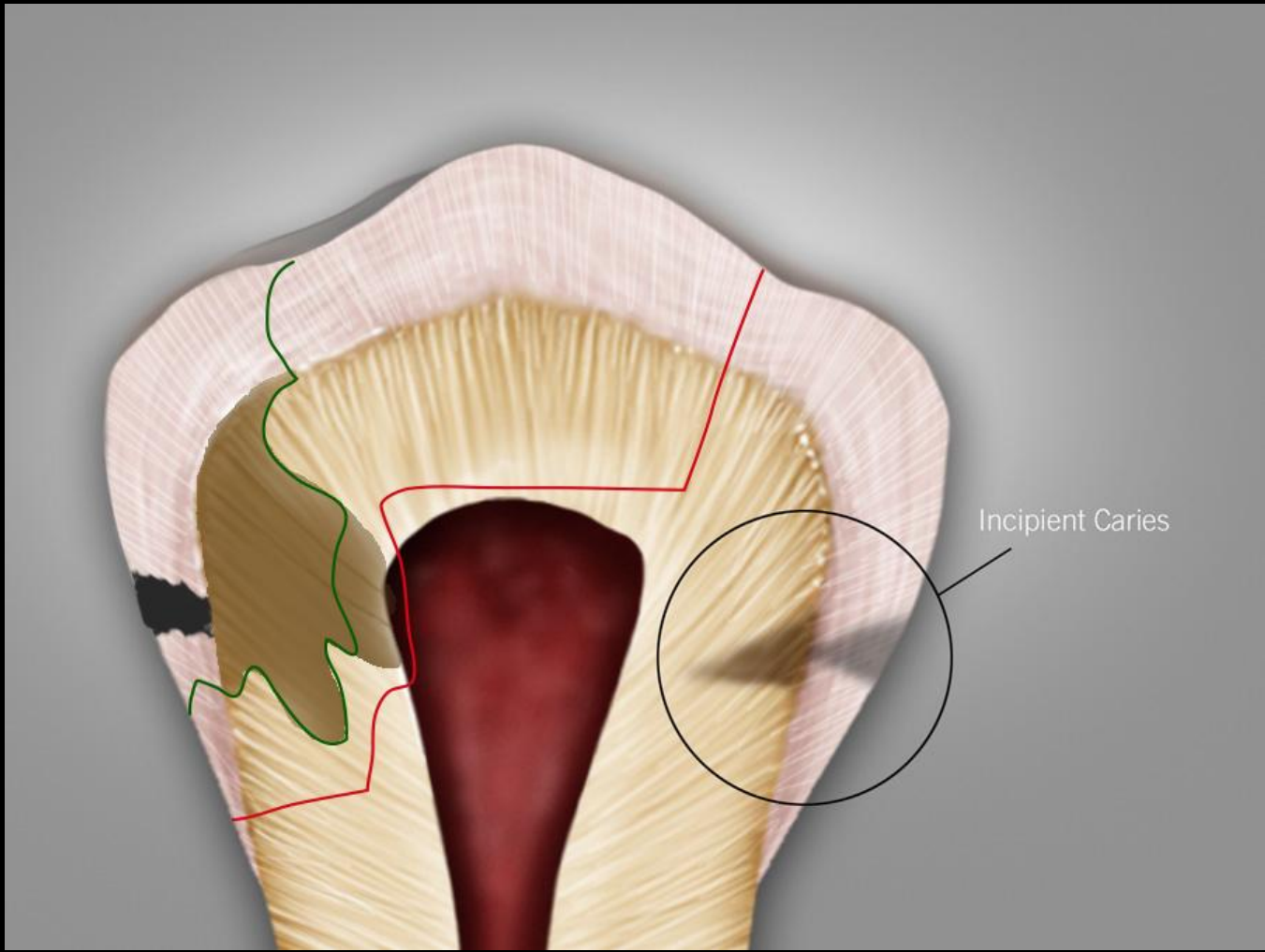
Incipient Caries



Modern "Clark Class II"



Incipient Caries



Incipient Caries

# What is the ultimate pulp capping agent?

- DyCal?
- RMGI?(Vitrebond/Fuji IX)
- MTA?
- Dentin in a Capsule? (Septodont)
- Caulk Snuggly stuff?
- Bonded resin?
- None of the above?

What is the ultimate pulp capping agent?

- A well sealed TRI and a **beret of soft smooth dentin**  
(Past al dente dentin)

# What are the 3 rules of pulp capping?

1. Don't expose the pulp
2. Don't expose the pulp
3. Don't expose the pulp

Hundreds of Selective Caries Removal (SCR) studies show remarkably and consistently high success rates. SCR is preferred by most patients over RCT or pulpotomy.

Qualitative and Quantitative Radiographic Assessment of Sealed Carious Dentin: A 10-Year Prospective Study	Oral Surg Oral Med Oral Pathol Oral Radiol Endod 2010	Objective: the objective of this study was to assess radiographic outcomes after partial carious dentin removal performed in deep caries lesions over a 10-year period.	10-year survival rate of the pulp: 100% in 13 teeth	Sealing of carious dentin arrested the caries process, promoted deposition of tertiary dentin, and induced mineral gain in the radiolucent zone.
The Monitoring of Deep Caries Lesions After Incomplete Dentine Caries Removal: Results After 14-18 Months	Clin Oral Investig 2006	Objective: this paper aims to assess radiographic changes after incomplete carious dentine removal and tooth sealing.	Survival rate of the pulp: 97% in 31 teeth	Complete dentine caries removal is not essential to control caries progression.
The Hall Technique: a randomized controlled clinical trial of a novel method of managing carious primary molars in general dental practice: acceptability of the technique and outcomes at 23 months	BMC Oral Health 2007	Objective: Study the simplified method of managing carious primary molars using preformed metal crowns cemented with no local anesthetic, caries removal, or tooth preparation, and compare to traditional pulpotomy and metal crown.	2-year survival rate was 89%, outperforming traditional treatment by 11%	The Hall technique was preferred to conventional restorations by the majority of children, carers and GDP's.
Long-Term Survival of Indirect Pulp Treatment Performed in Primary and Permanent Teeth with Clinically Diagnosed Deep Carious Lesions	Journal of Endodontics 2010	Objective: Examine clinically and radiographically the 3-year survival of teeth treated with Indirect Pulp Treatment	3-year survival rate was 96% for 125 primary molars and 93% for 45 permanent teeth.	IPT performed in primary and permanent teeth of young patients may result in a high 3-year survival rate Note: Frank decay was retained.
Outcomes of Partial and Complete Caries Excavation in Permanent Teeth: A 18-Month Clinical Study	Contemp Clin Dent 2018	Objective: Clinical and radiographic outcomes of partial caries removal vs. complete caries removal in permanent teeth with deep carious lesions.	Survival rate of the pulp: 92.5%	Leaving a layer of soft, wet dentin adjacent to the pulpal wall could be an elective treatment option for mature permanent teeth with deep carious lesions.
Clinical Performance of Sealed Composite Restorations Placed Over Caries Compared with Sealed and Unsealed Amalgam Restorations	JADA 1987	Objective: To identify differences in the clinical outcomes of carious lesions sealed with composite vs. amalgams placed over caries-free preparations.	Survival rate of the pulp: 100%	There was no significant clinical difference between occlusal caries sealed with composite vs caries-free occlusal preps restored with amalgams over 2 years.
Sealing vs Partial caries Removal in Primary Molars: a RCT.	BMC Oral Health 2014	Objective: To assess the efficacy of arresting dentinal caries either with sealants or partial caries removal and composite restorations	18-month survival rate of the pulp: 100% for 17 teeth	Composite sealing of caries can arrest their progression therefore its complete removal is not necessary.
Conventional Caries Removal and Sealed Caries in Permanent Teeth: A Microbiological Evaluation	J Dent 2012	Objective: To compare bacterial load after conventional carious dentine removal with incomplete carious dentine removal and	Survival rate: 100%	It is not necessary to remove all carious dentin before a restoration is placed.

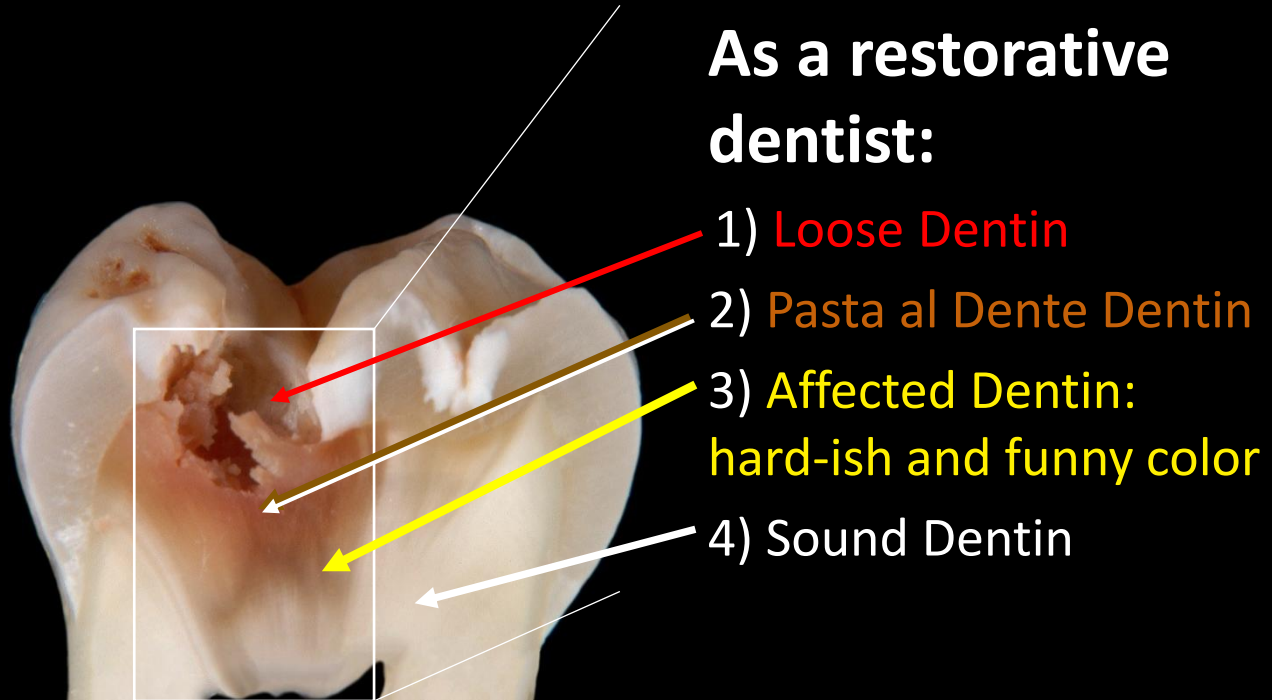
Partial Caries Removal in Deep Caries Lesions: A 5-Year Multicenter Randomized Controlled Trial	Clin Oral Investig 2018	Objective: To evaluate the effects of partial caries removal on pulp vitality five years after the procedure was performed.	Five-year survival rate: 80% of 121 teeth	Partial caries removal reduced the occurrence of pulp necrosis.
Effect of Different Liners on Pulpal Outcome After Partial Caries Removal: A preliminary 12 Months Randomized Controlled Trial	Caries Res 2019	Objective: To compare the effects of liners on pulp health outcomes 12 months after partial caries removal and restoration with composite.	12-month survival rate of the pulp: 94.6%	Partial removal of carious dentin does not interfere with pulp vitality or restoration survival, and liners are not necessary for the success of the procedure.
The Hall Technique 10 Years on: Questions and Answers	Br Dent J 2017	Objective: To review the success rate of sealing carious lesions.	5-year survival rate of the pulp: 97%	Sealing carious lesion is successful and this method is now regarded as a viable management options for carious primary molars
Sealing caries in primary molars: Randomized control trials, 5-year results	J Dent Res 2011	Objective: To compare clinical and radiographic failures of sealing carious lesions vs complete caries removal	5-year survival rate of the pulp: 95% of 264 teeth	Sealing caries outperformed conventional caries removal methods in preserving tooth vitality.
Ultrastructural and Microbiological Analysis of the Dentin Layers Affected by Caries Lesions in Primary Molars Treated by Minimal Intervention	Pediatr Dent 2007	Objective: To understand the effects that sealing carious lesions has on bacteria left in carious dentin.	60-day survival rate of pulp: 96%	Bacterial population decreased by 96% and carious dentine showed better tissue organization following sealing of the lesion.

In Contrast, Direct Pulp Capping study showed a much higher failure rate than SCR

Prognostic Factors for Clinical Outcomes According to Time After Direct Pulp Capping	JOE 2013	Objective: Identify what factors are significant for the survival rate of the pulp THREE YEARS after direct pulp capping with MTA and Dycal.	3-year Survival rate of the pulp: 67.4% of 70 teeth capped with MTA; 52.5% of 105 teeth capped with Dycal.	Selection of pulp capping material is important for pulp survival.
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# Selective Caries Removal or the Modified Hall Technique

Don't expose the pulp, establish a clean TRI and maintain frank caries where possible.



Caries zones – Image courtesy of Prof. Leandro Hilgert and Prof. Soraya Leal, University of Brasilia (UnB), Brazil

# Saving Natural Tooth Substance – With Confidence

Preparation guidelines have changed considerably over time. Over 100 years ago, G.V. Black promoted “extension for prevention”, today, the philosophy is “prevention of extension” (F.J.T. Burke, Dent. Update 2003, 30, 492-502), supported by guidelines for minimally invasive dentistry.

Minimally invasive preparations have meaningful benefits for patients:

- Increased tooth longevity
- Lower risk of pulpal exposure
- Reduced need for painful root canal treatments



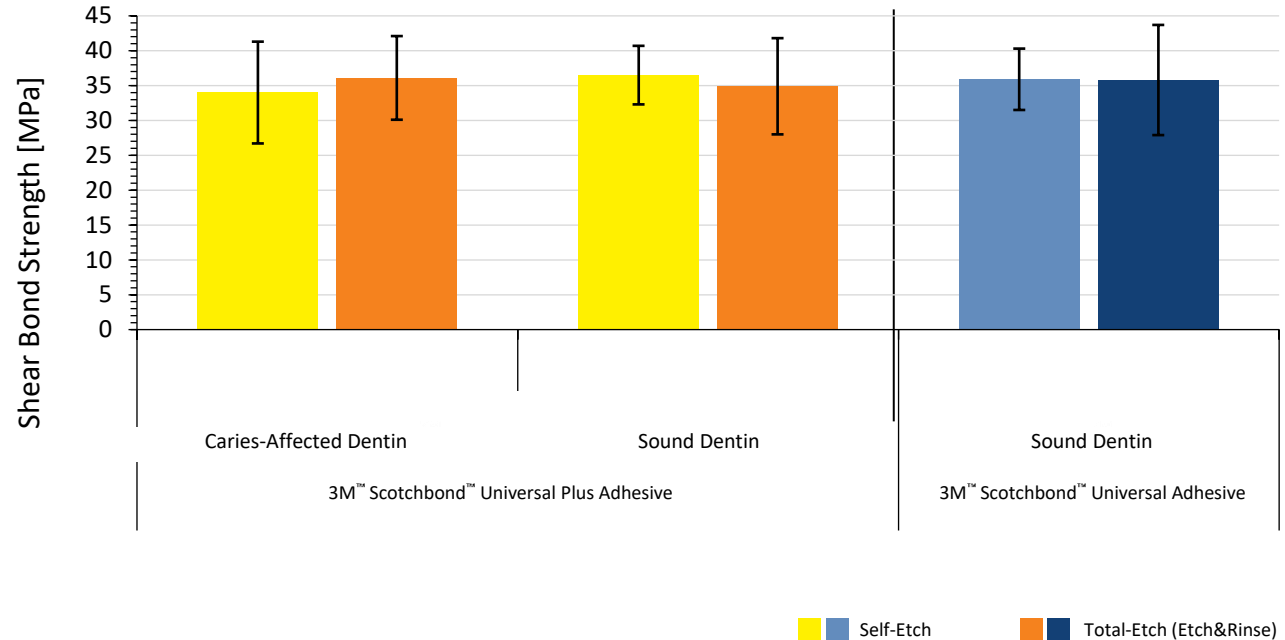
Long term survival of restorations depends on a stable bond to enamel and dentin. With minimally invasive dentistry, caries-affected dentin is preserved during excavation.

3M™ Scotchbond™ Universal Plus Adhesive bonds to firm caries-affected dentin with similar strength as to sound dentin, so you can have confidence in your minimally invasive preparations.

# Strong Bonding to Caries-Affected Dentin

Strong bonding to caries-affected dentin helps preserve tooth structure

Cariou human molars were prepared with a polymer bur (SmartBur™ II, SS White) to expose caries-affected dentin. In both etching modes, 3M™ Scotchbond™ Universal Plus Adhesive achieved similar shear bond strength to caries-affected dentin and sound dentin as the control 3M™ Scotchbond™ Universal Adhesive. This high bond strength makes it well suited for MID procedures.



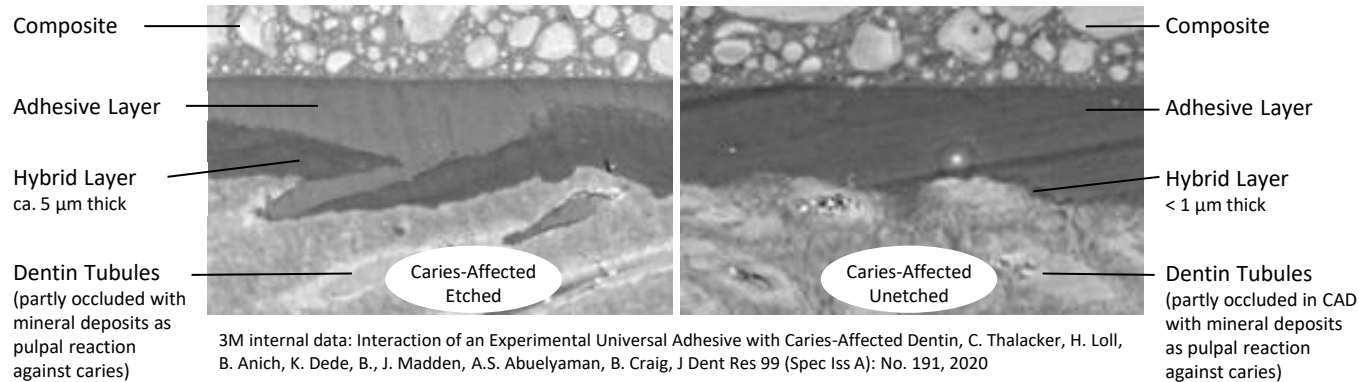
3M internal data: Interaction of an Experimental Universal Adhesive with Caries-Affected Dentin, C. Thalacker, H. Loll, B. Anich, K. Dede, B., J. Madden, A.S. Abuelyaman, B. Craig, J Dent Res 99 (Spec Iss A): No. 191, 2020

# Well-Defined Hybrid Layer on Caries-Affected Dentin

Supports minimally invasive dentistry to preserve natural tooth substance

3M™ Scotchbond™ Universal Plus Adhesive helps preserve natural tooth structure in MID procedures and when preparing near the pulp by forming a continuous hybrid layer without voids or gaps on both caries-affected and sound dentin. A well-defined hybrid layer effectively seals caries-affected dentin areas.

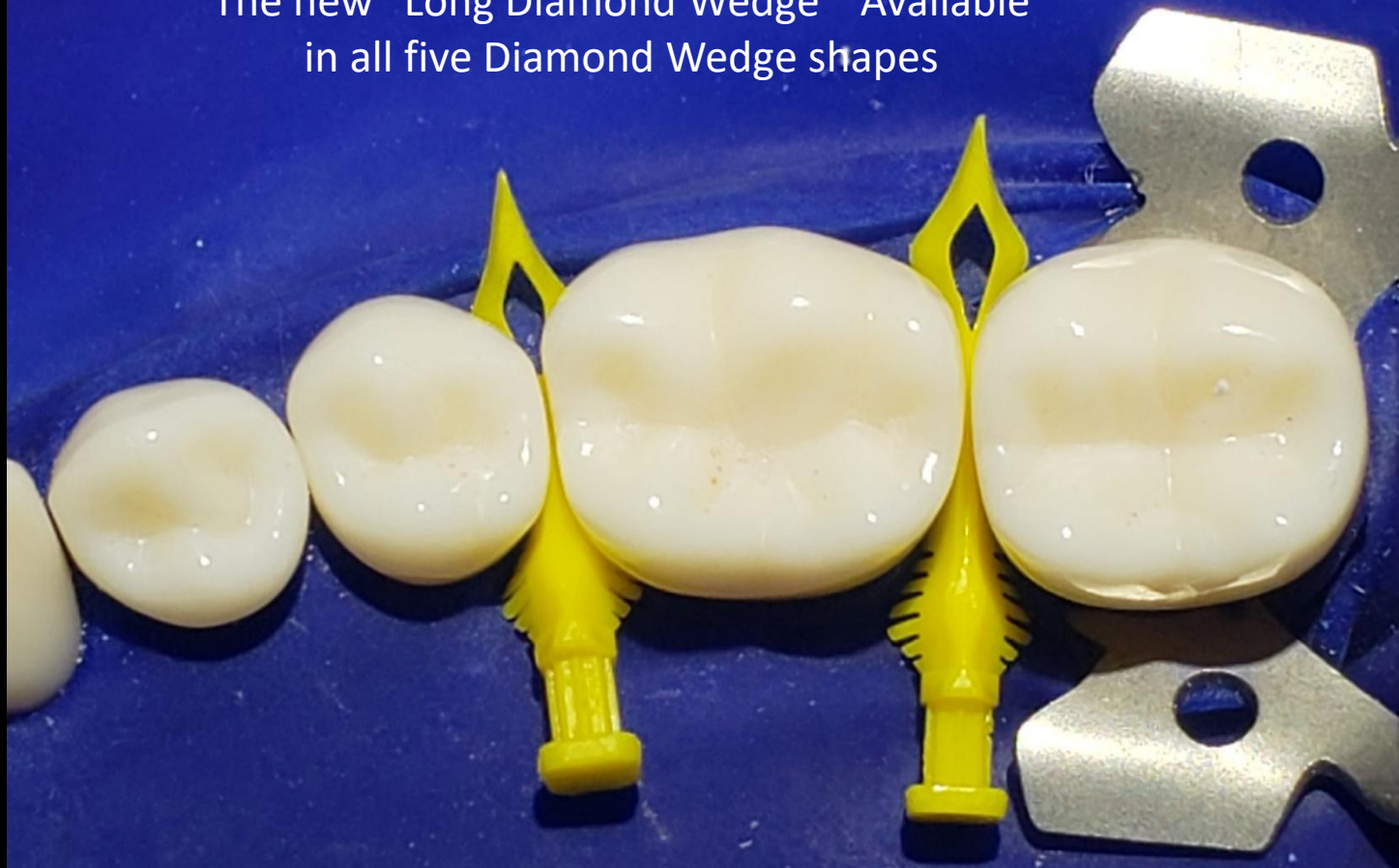
## SEM study – hybrid layer on caries-affected dentin (etched and unetched)



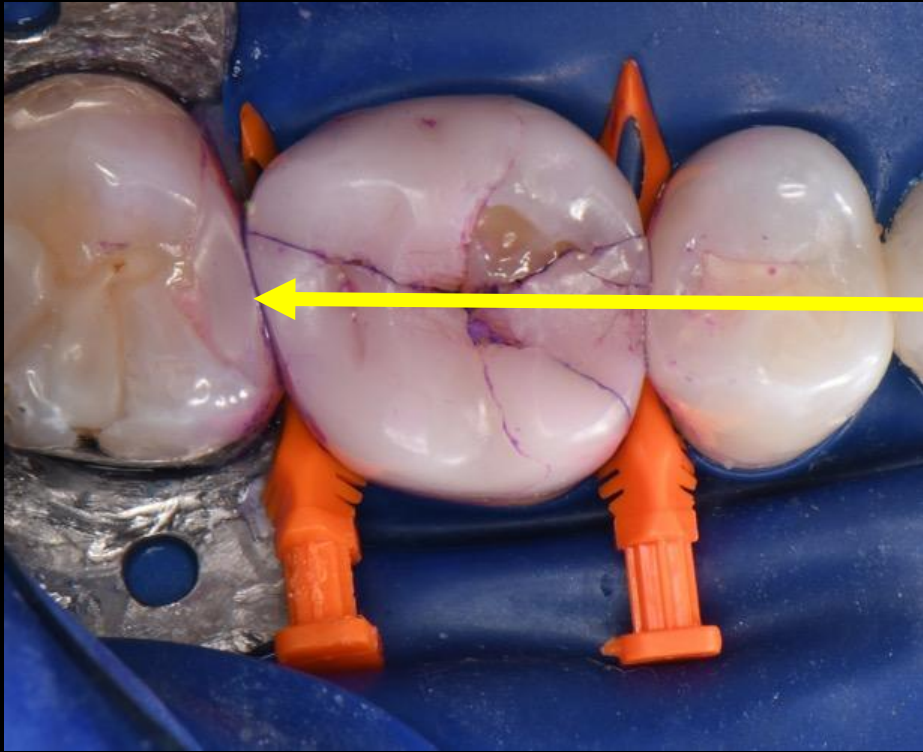
# SCR: We have a lot to talk about...

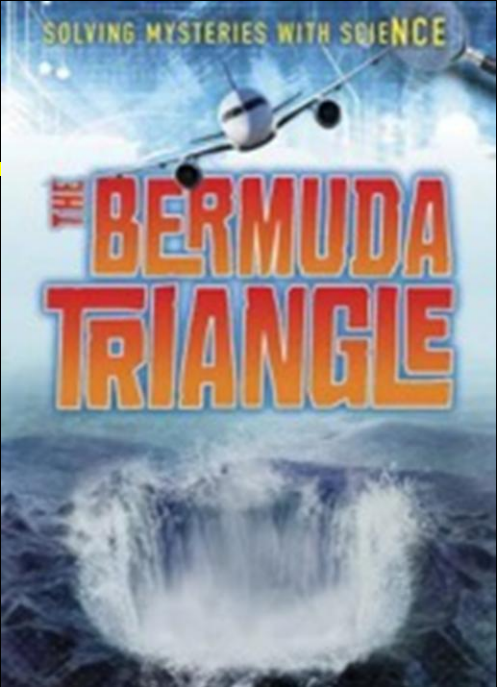
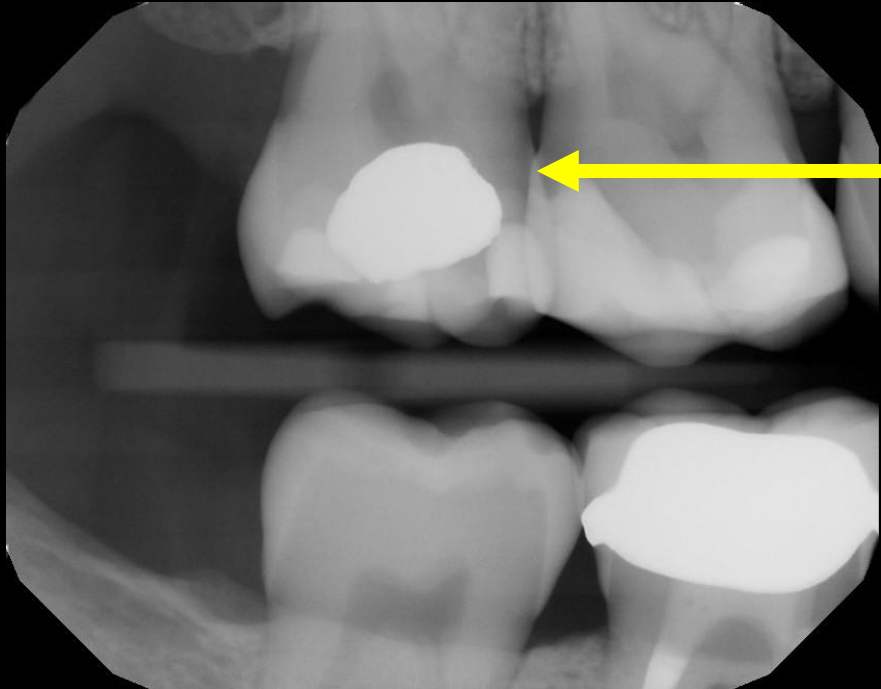
- 1) How much clean dentin do I need on the periphery to seal in decay?
- 2) Better question: How much clean dentin can I afford?

The new “Long Diamond Wedge” Available  
in all five Diamond Wedge shapes

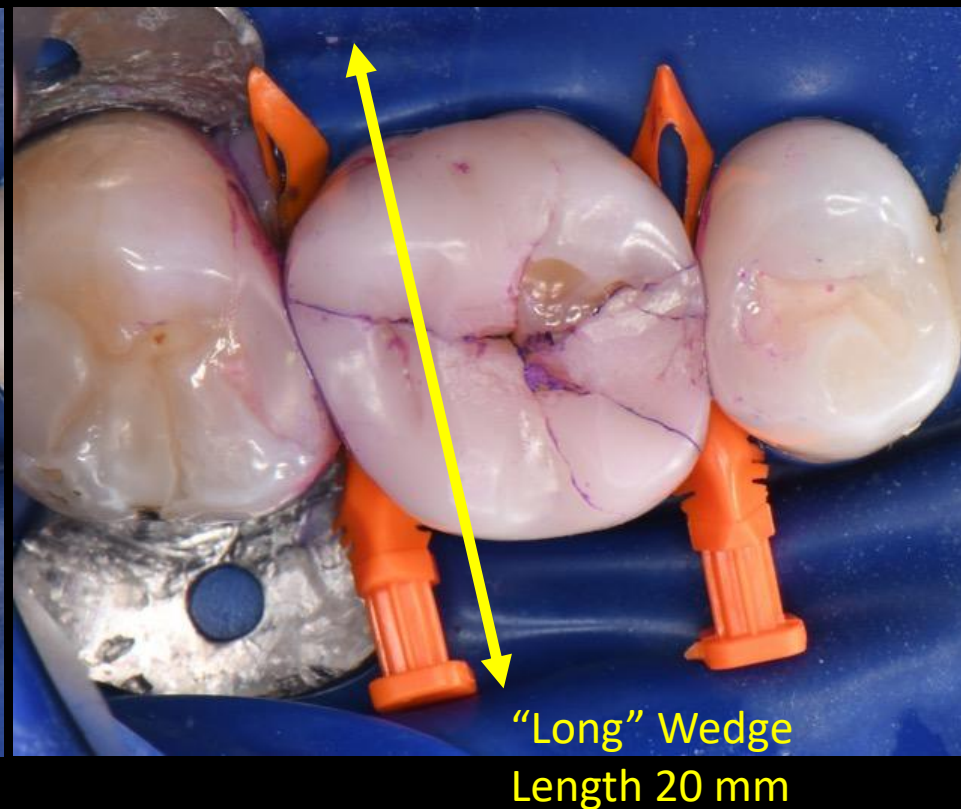
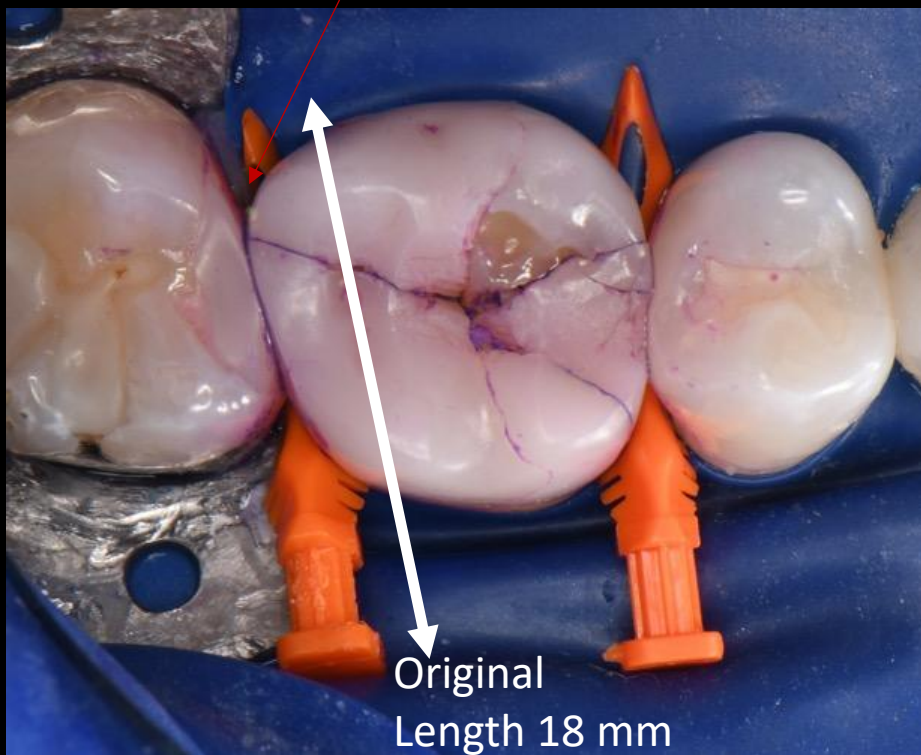




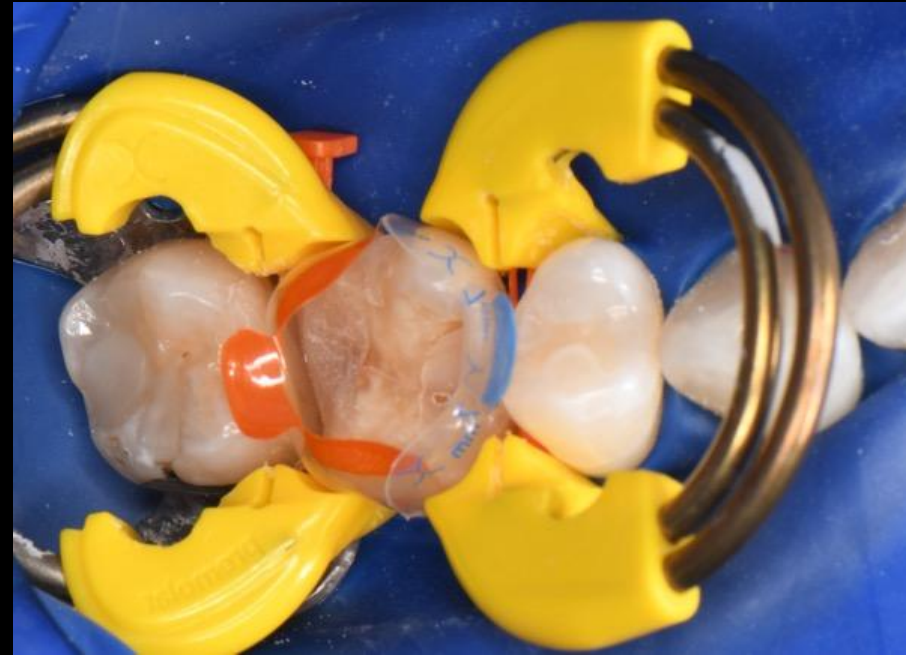




The new “Long Diamond Wedge” Available  
in all five Diamond Wedge shapes







...from a *Leading Expert*...case shown in *Leading Composite* company's instructional publication

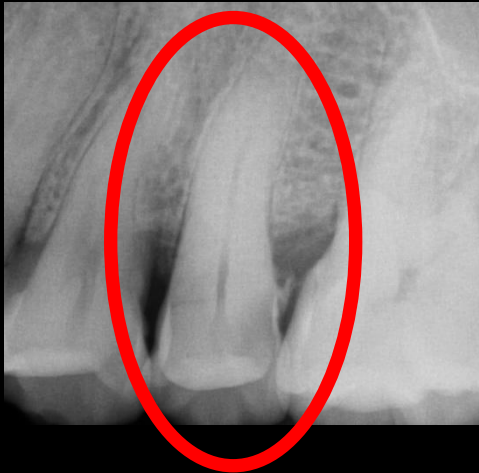






Arturo's first appointment:

- Flight Risk
- Chief Complaint – painful food impaction 13-14
- Limited Resources
- Not a good candidate for multi-appointment
- Calculus Removal took longer than the prep
- Little to no post operative pain
- SCR (Modified Hall): 0999 code \$175 add'l fee





### Wedging Strategy:

- Always pre-wedge
- Wedge “Nesting”
- Bottom wedge is small pink elevates the actual wedge
- Furcal “green” wedge









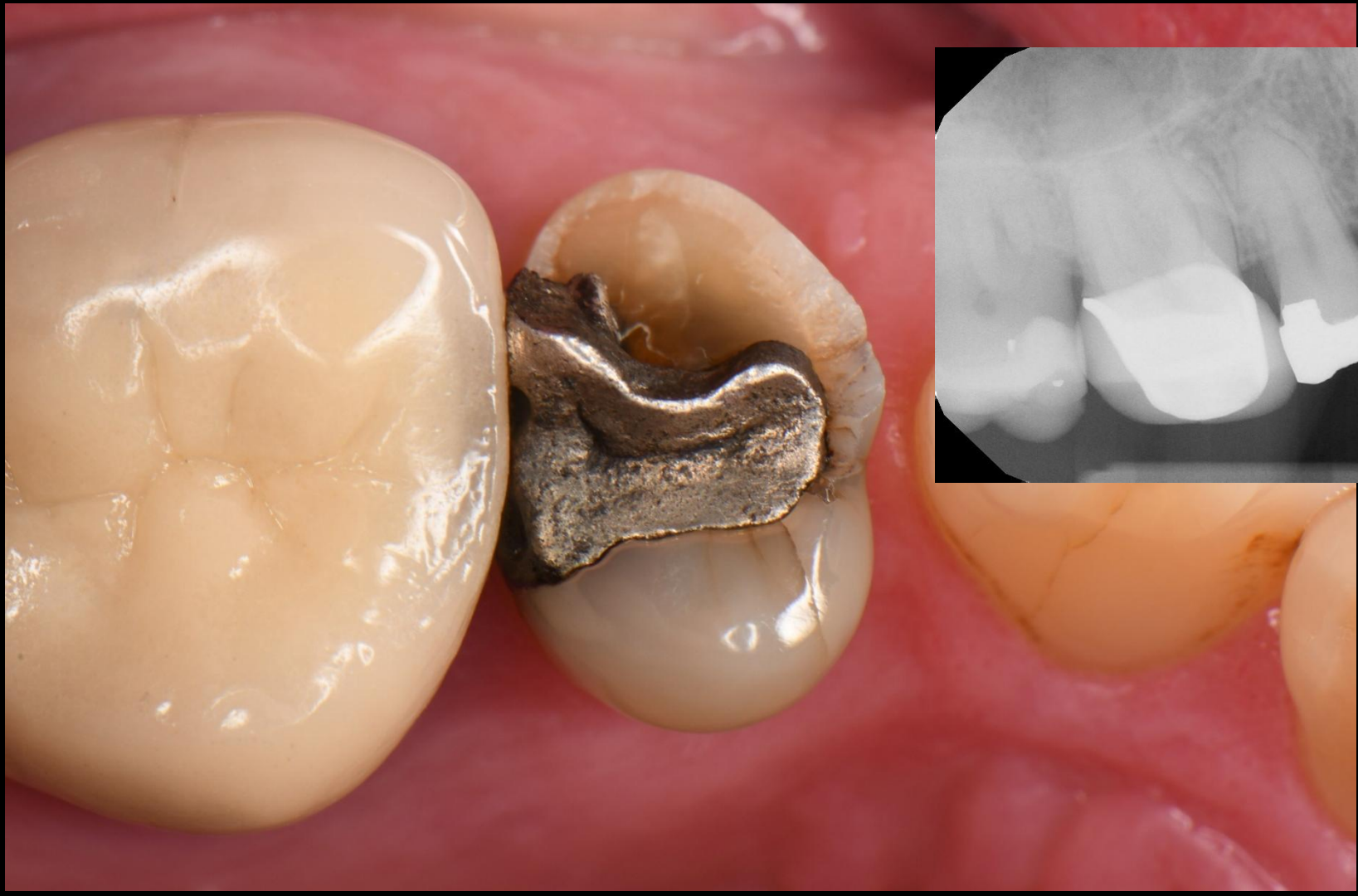




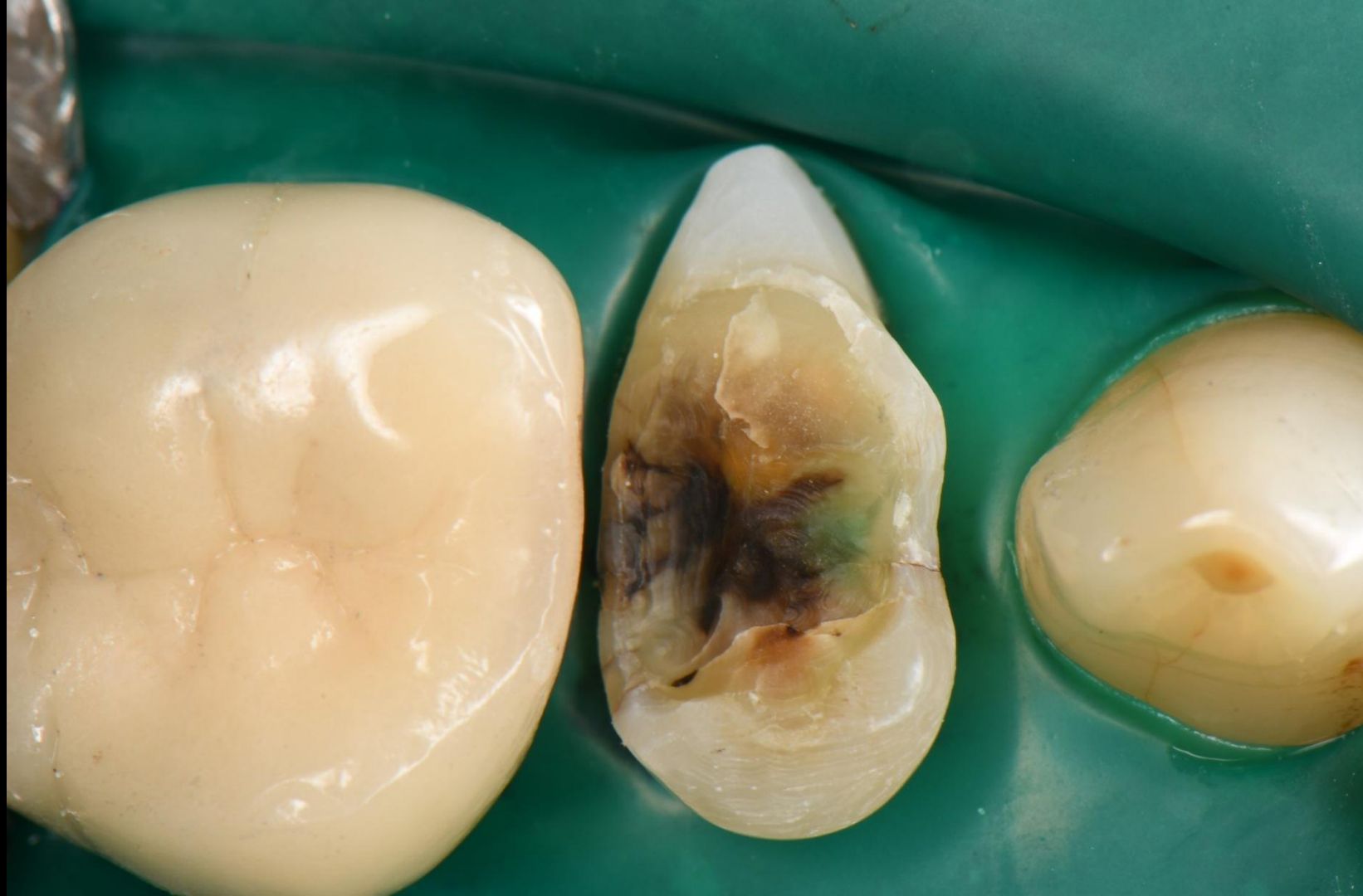




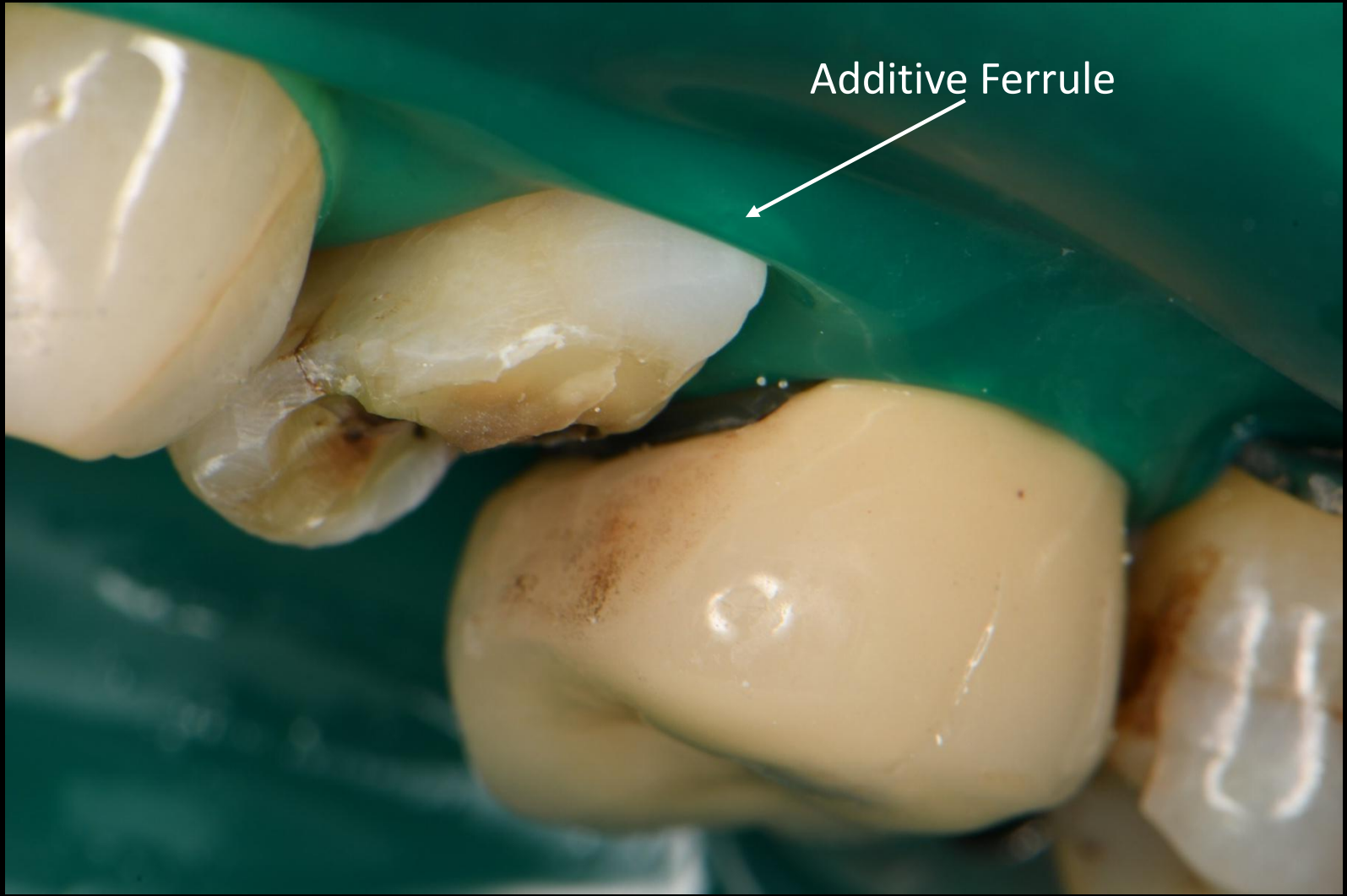




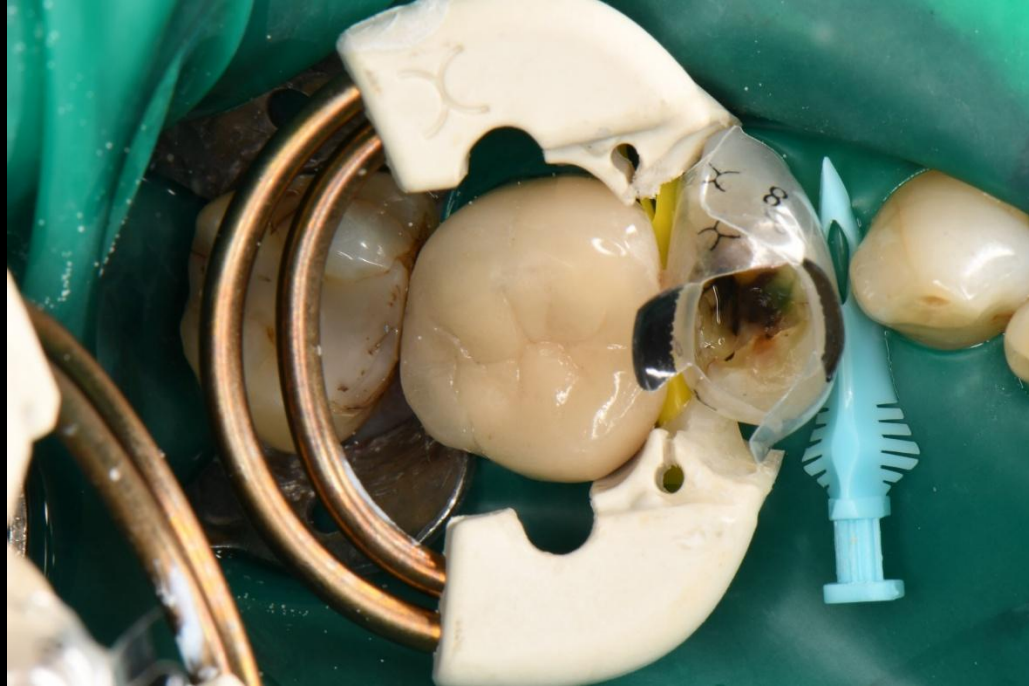


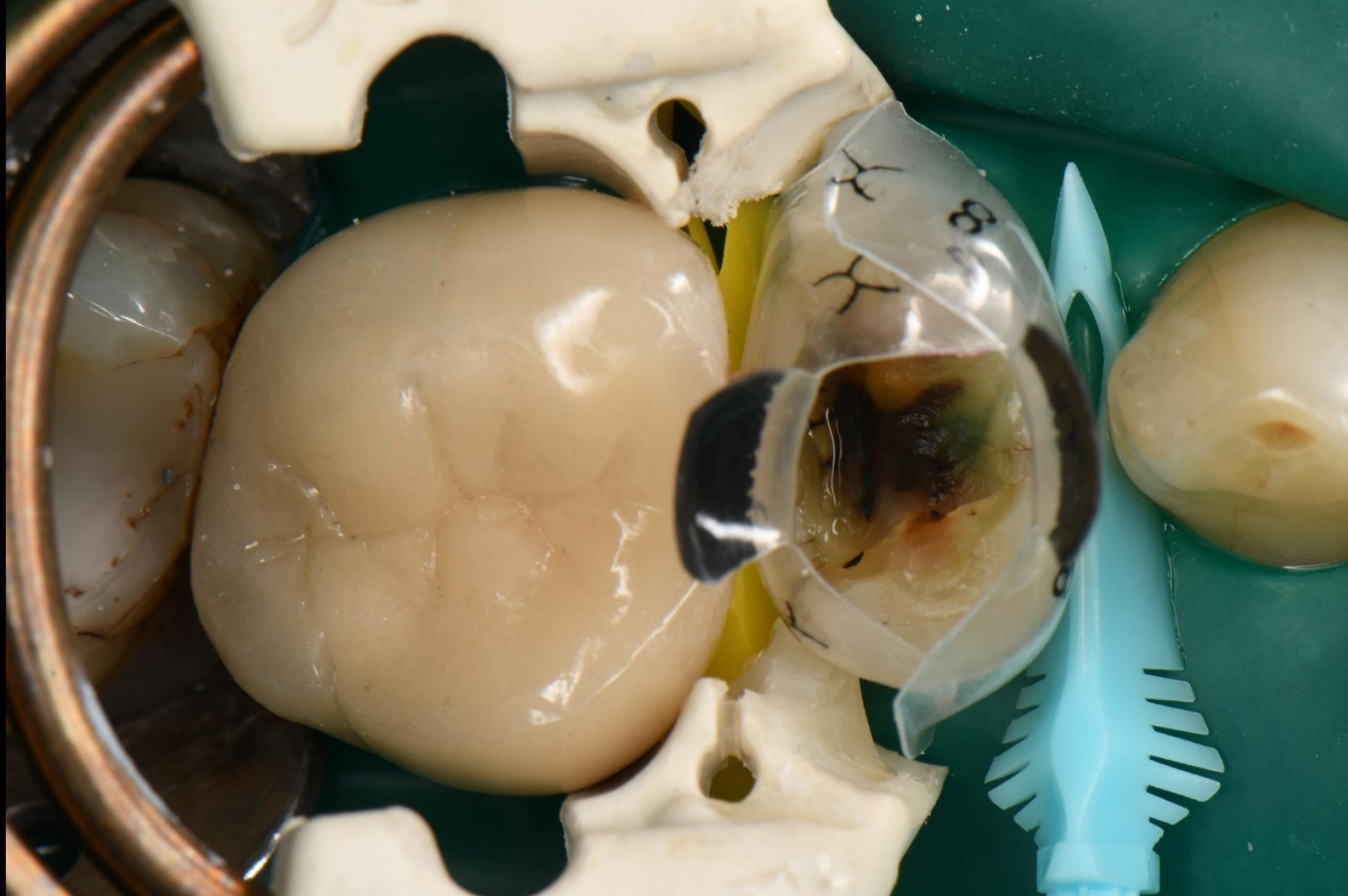


Additive Ferrule





















Dr. Rafael Bustamante  
Full Faculty



Dr. David  
Founder & F



Dr. Joshua Solomon  
Full Faculty



Dr. Abd  
F



Dominic Hassall  
 Full Faculty



Dr. Marco Maiolino  
Full Faculty



Agnes  
 y Track



Dr. David Carroll  
Adjunct Faculty



DR. R. BUSTAMANTE





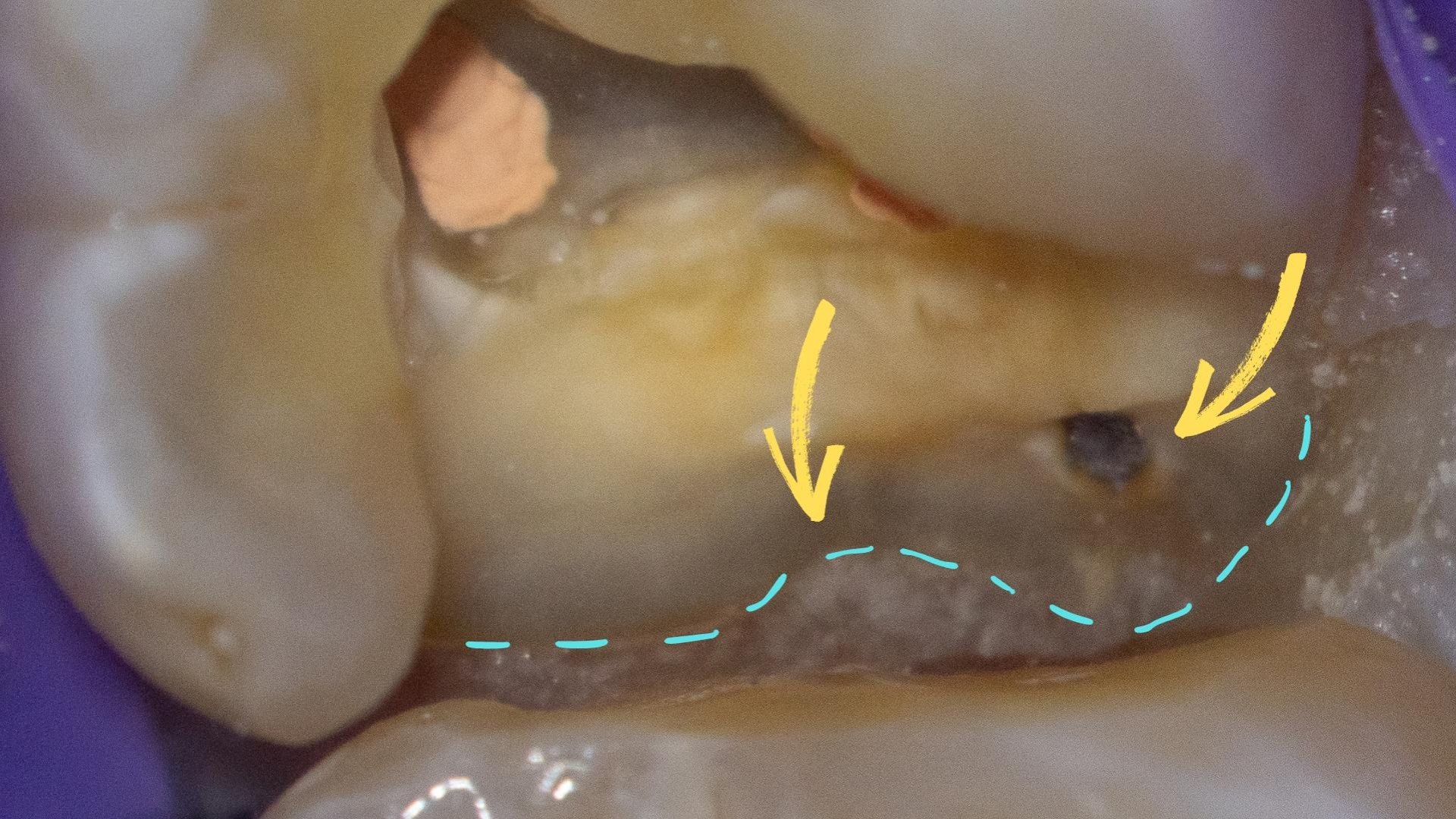


A close-up photograph of a tooth with a filling. The tooth is light-colored and has a dark, irregularly shaped cavity. The filling is a bright orange color and is located in the center of the cavity. The tooth is set against a dark blue background.

DR. R. BUSTAMANTE

DR. R. BUSTAMANTE





A close-up photograph of a dental crown, likely a metal-ceramic or porcelain-fused-to-metal crown, held in a metal tray. The crown is positioned with its occlusal surface facing upwards. A small, circular opening is visible in the center of the crown's occlusal surface, containing a small amount of orange-colored material. The crown is surrounded by white gauze pads, which are used to hold it in place. The background is a solid blue color.

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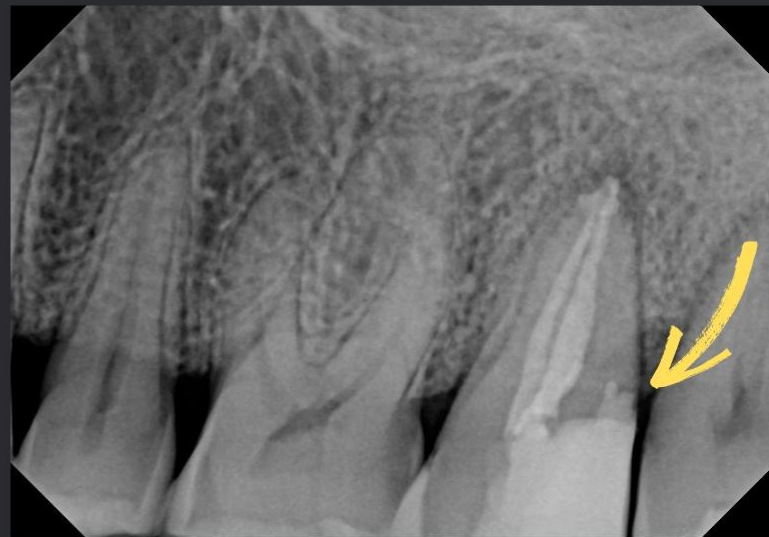


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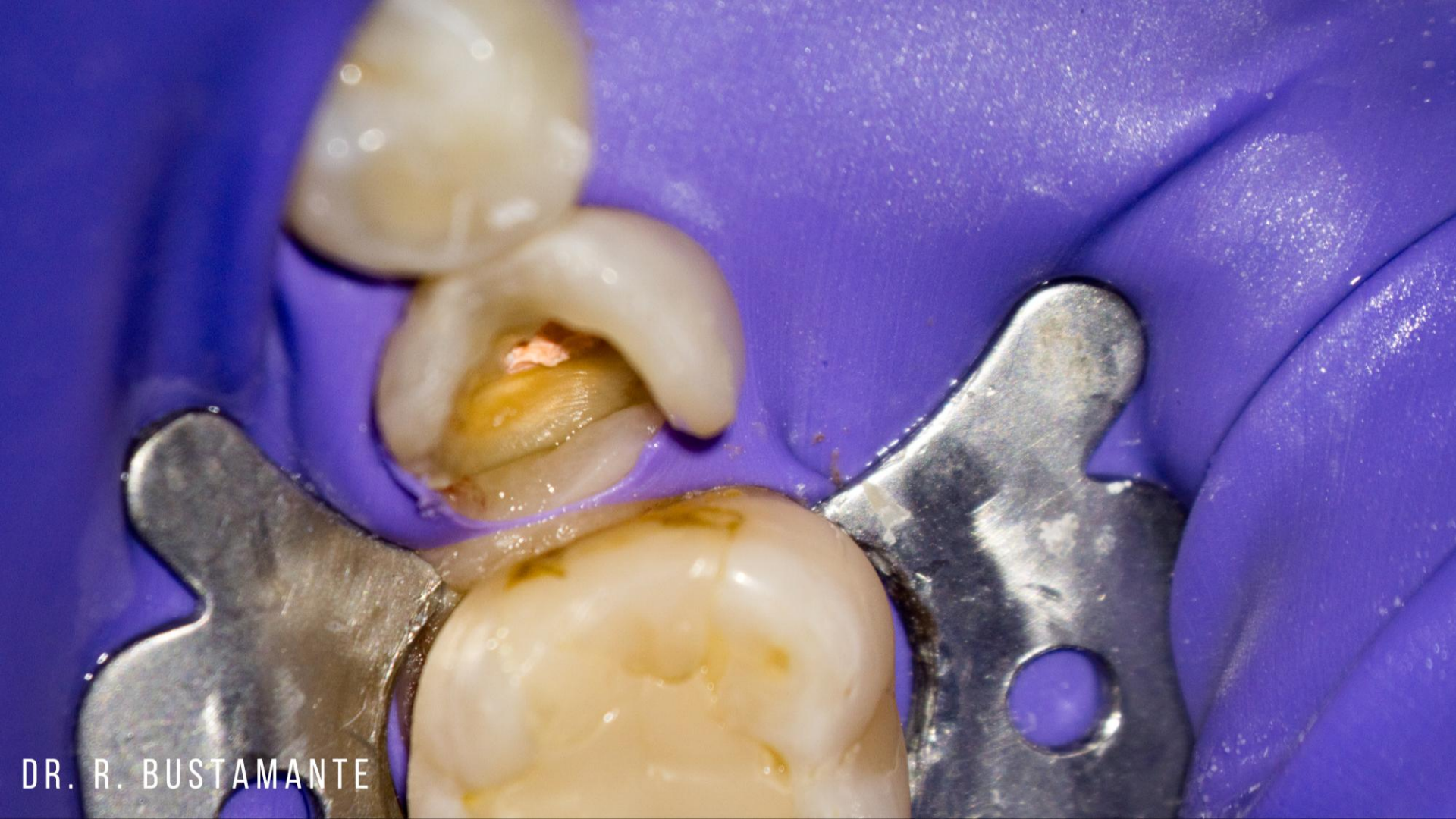
Before



After





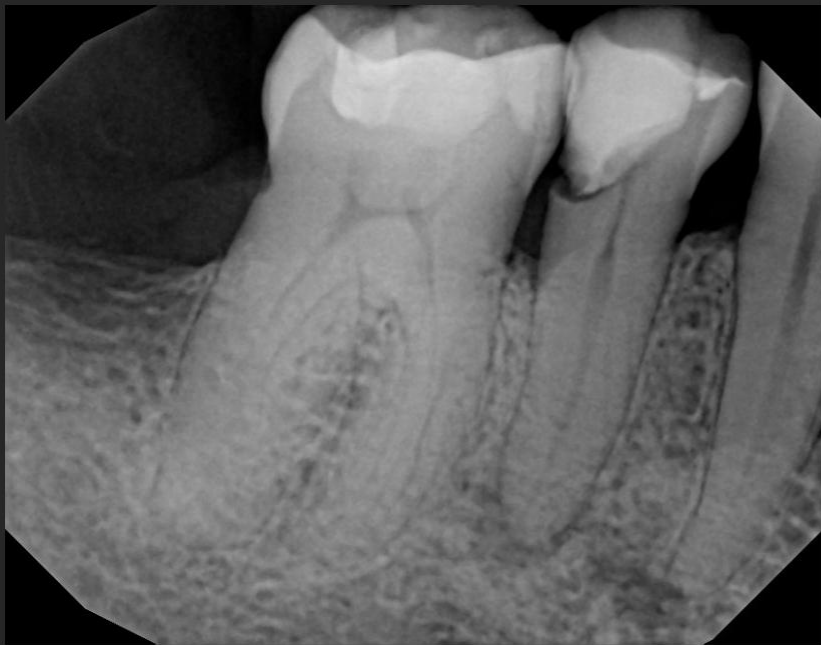






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BEFORE



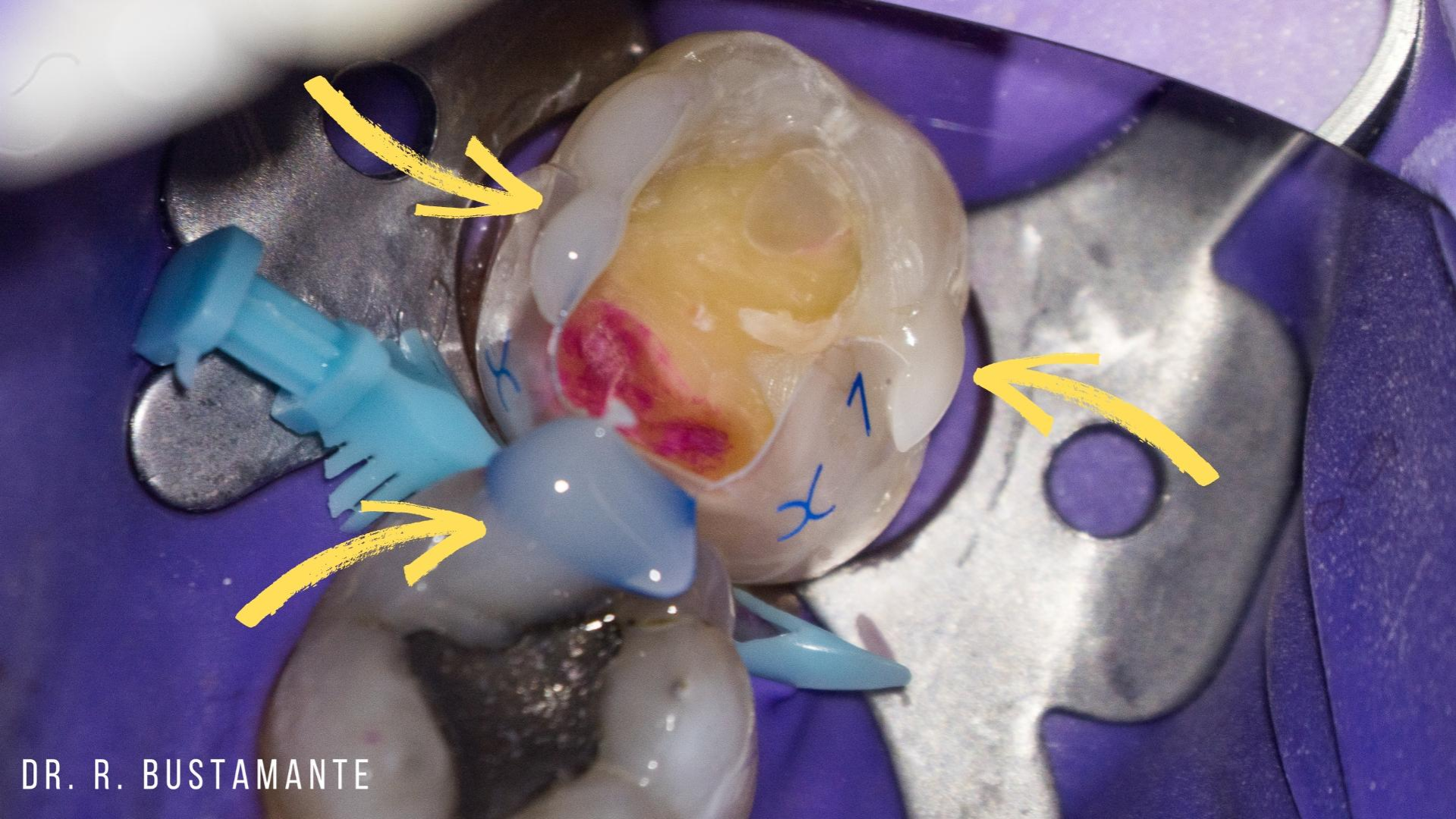
AFTER







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Before



After





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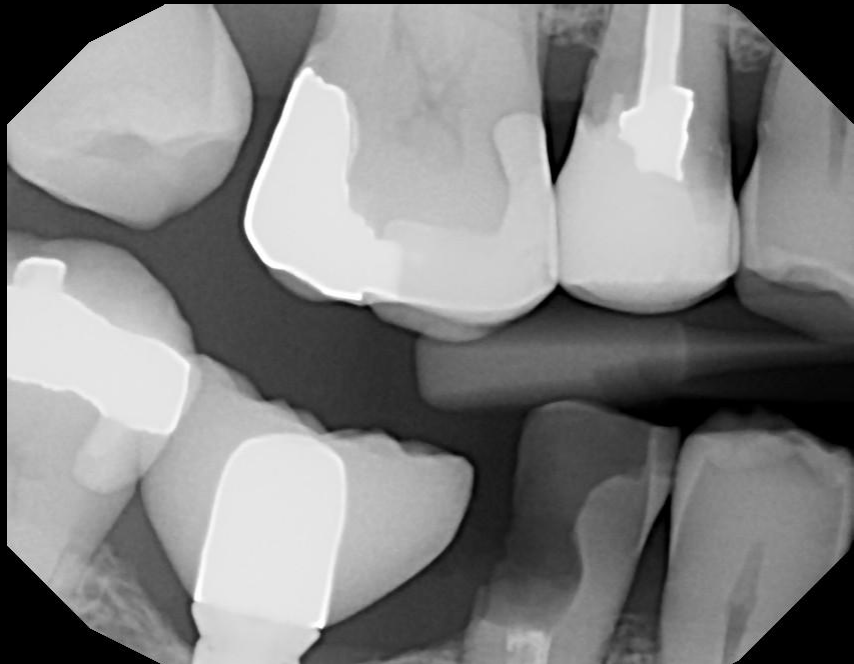
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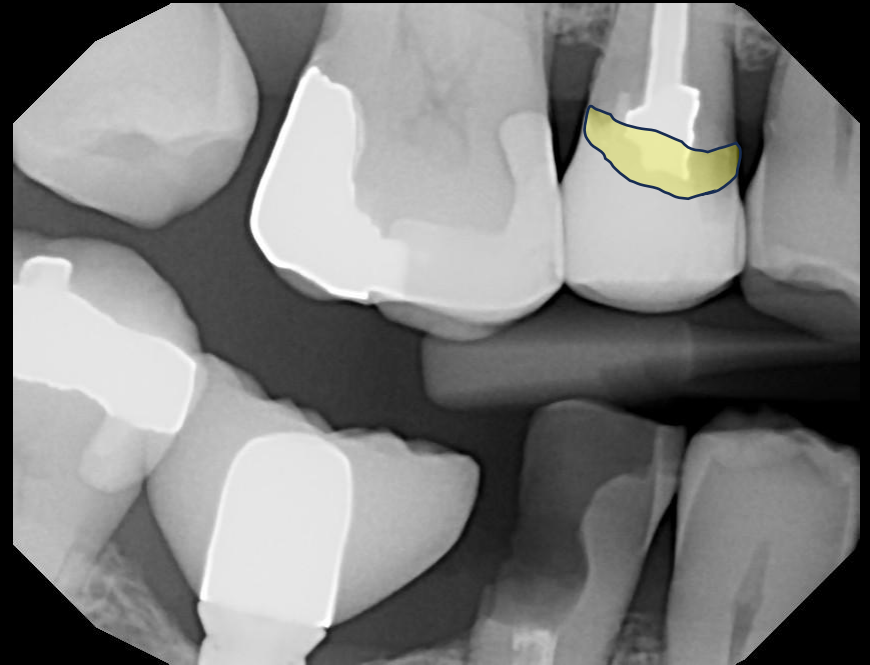
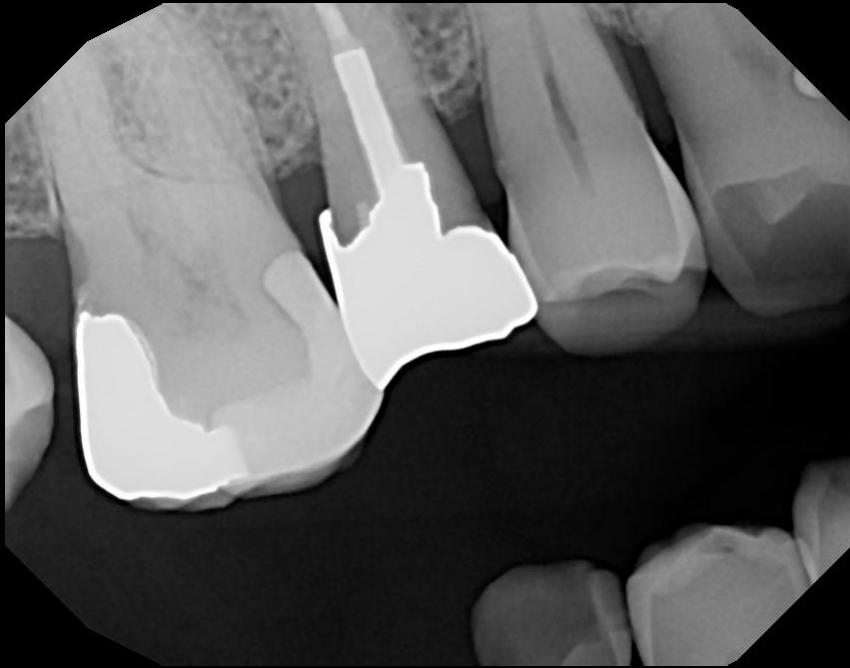
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# Bioclear Additive Ferrule



# 16-MONTH FOLLOW-UP



DR. R. BUSTAMANTE



ten steps and secrets to create a superb  
outcome for this sad tooth

1.X

2.X

3.X

4.X

5.X

6.X

7.X

8.X

9.X

10.x



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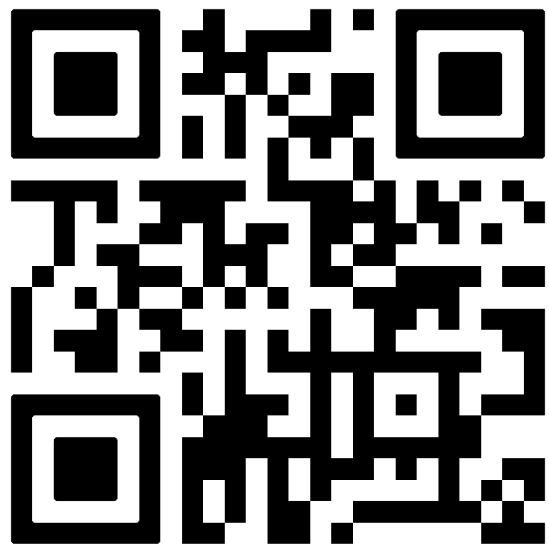
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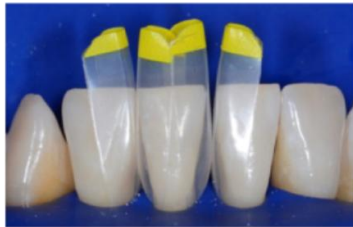
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# Getting paid to be conservative

## BIOCLEAR VS. CROWNS AND VENEERS

Bioclear is an alternative to traditional methods for enhancing a smile. Rather than preparing for a crown or veneer, the Bioclear Method—expanding the possibilities of dentistry—conserves the natural tooth structure, tooth enamel and tooth durability.



**BIOCLEAR PREPARATION**  
Bioclear allows dentists to **conserve** healthy tooth structure



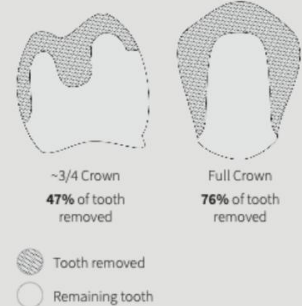
**CROWN PREPARATION**  
Crowns require dentists to **remove an average of 76%** of the tooth structure prior to the procedure



**VENEER PREPARATION**  
Veneers require dentists to **remove an average of 47%** of the tooth structure prior to the procedure

## AN HONEST LOOK AT CROWN PREPARATIONS

As illustrated below, crowns, veneers, and onlays require the removal of a significant amount of healthy tooth structure. Bioclear dentists can leave most or all of the tooth structure. Bioclear is a very attractive option to patients.





# BIOCLEAR LEARNING CENTER

Tacoma USA · Solihull UK  
Varberg Sweden · Cairo Egypt  
Syracuse Italy · Taubate Brazil  
Livermore CA (Bioclear pediatrics)  
Seoul Korea · Madrid/Barcelona  
Sydney Australia · Baghdad Iraq

A wide-angle photograph of a modern conference room. The room features a long, light-colored conference table with several black office chairs around it. The ceiling is a striking feature, with large, curved, illuminated panels in shades of blue and green. The walls are a mix of white and light blue, and there are large windows on the left side. The overall atmosphere is bright and professional.

# BIOCLEAR

LEARNING CENTER

Tacoma USA









# Last week's attendees at the certification course





# 2026 Certification Courses



- Core Anterior + Core Posterior • Complex Cases & Problem Solving
- Smile Design & Comprehensive Anterior Rejuvenation • Bioclear Alumni Summit

### January

S	M	T	W	T	F	S
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### February

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### September

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### December

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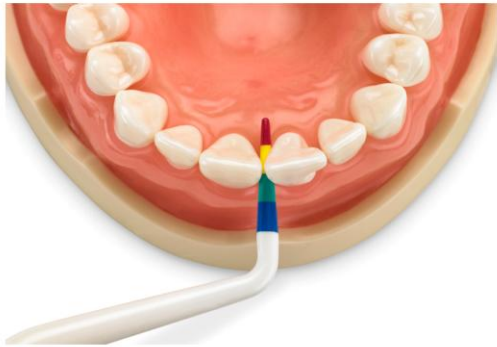
Treat yourself to a weekend with ∞ BIOCLEAR

# BLACK TRIANGLE

## CERTIFICATION COURSE

18 CE CREDITS

This three-part live hands-on certification course will teach you how to treat black triangles, gingival recession, root abrasions, and perform confident restorations. In becoming a certified Bioclear black triangle doctor, you'll increase your overall skill and knowledge of Bioclear and learn to market your new skills to patients.



### Upcoming Dates:

Washington DC

May 8<sup>th</sup> 2026



Orange Beach

April 24<sup>th</sup> 2026



Denver

October 9<sup>th</sup>

2026



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