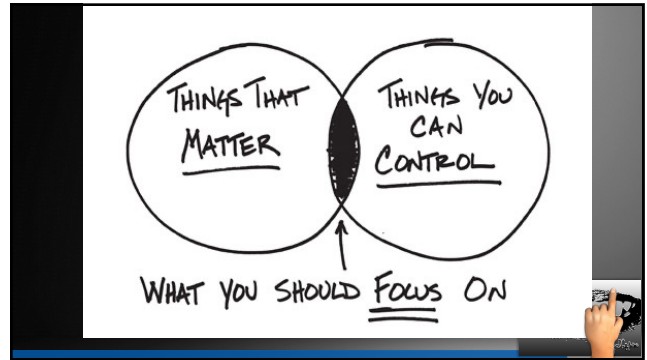


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5



6

### Cementation sanity

**Non-Adhesive Resin... BEST?**

- 1. Universal DBA**
  - All Bond Universal (Bisco)
  - Scotchbond Universal (3M)
  - MultiLink Primer A&B (Ivoclar)
  - Adhese (Ivoclar)
- 2. Dual cure resin cement**
  - DuoLink Universal (Bisco)
  - Rely X Ultimate (3M)
  - MultiLink (Ivoclar)
  - Variolink (Ivoclar)
- 3. Highest bond to dentin**
- 4. Highest restoration strengthening**



7



It doesn't matter how well it looks  
if it hurts or falls out



8

### "Universal" DBA's:



**Very tolerant**  
wet  
dry  
moist

**Very versatile**  
etch  
no etch  
selective etch


**Very good bond**  
enamel  
dentin  
ceramics  
zirconia  
composite

9

### Universal Dentin Bonding Agents

Regardless of etch technique,  
they work well.

Total etch  
No etch  
Selective etch



**Bond strength of universal adhesives: A systematic review and meta-analysis**

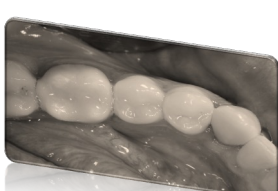
**Abstract**  
Objectives: A systematic review was conducted to determine whether the etch-and-bond or self-etching/bond is the best protocol for etching and bonding esthetic by universal adhesives.  
Data: This report followed the PRISMA statement. A total of 10 articles were included in the meta-analysis.  
Conclusion: This review confirms that a Universal DBA in eight adhesives (Bonded, based on Bisco, Scotch-Bond, Multi-Link, Rely X, and Variolink) is a good option for the etch and bond protocol and provides similar strength to several traditional adhesives when compared with the etch-and-bond protocol.  
Keywords: dental composite restorations, universal adhesive, etching, bonding, meta-analysis, systematic review.

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### Durable aesthetic restorations:

**Lithium Disilicate (IPS e.max)**  
Particle Filled Silica Glass  
360-400 MPa flexural strength  
Adhesive cementation best  
Strong enough to handle cementation  
Traditional porcelain bonding

**Zirconium Oxide (Bruxzir, Lava...)**  
Polycrystalline metallic type  
1000 MPa flexural strength  
NO silica so not etchable  
Cement or bond in place



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Zirconia

Lithium disilicate

3. Comfortable



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### Everyday excellence

**Zirconia:**  
"Ideal" prep AND low occlusal stress

Try in  
Restoration  
Clean – cleaner (ZirClean Bisoco, Ivoclean Ivoclar, Zr-C Apex/Vista)  
Rinse  
Dry  
Tooth  
Isolate  
Clean – 2X2 gauze

Cement – almost anything will work  
Self adhesive dual cure resin with 10 MDP  
SpeedCem, SmartCem, Unicem, Panavia, TheraCem, BeautiCem, etc

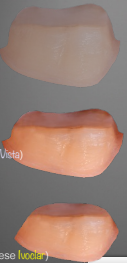

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### Maximum performance

**Zirconia:**  
"Compromised" prep OR high occlusal stress

Try in  
Restoration  
Clean – cleaner (ZirClean Bisoco, Ivoclean Ivoclar, Zr-C Apex/Vista)  
Rinse  
Dry  
Tooth  
Isolate  
Clean – pumice, chlorhexidine  
Universal DBA (All Bond U Bisoco, Scotchbond U 3M, AdHese Ivoclar)

Cement  
Self adhesive dual cure resin with 10 MDP  
SpeedCem, SmartCem, Unicem, Panavia, TheraCem, BeautiCem, etc

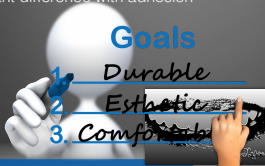



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### Zirconia cementation science:

1. If prep good, almost any cement works
2. Self-adhesive resin cements with 10-MDP had significantly more success than traditional cements (i.e. Zinc Phosphate, RMGI)
3. Poor retention preps and/or high occlusal stress, adhesion with resin-bonding is required and **NOT AN OPTION** for clinical success
4. Proper resin bonding is more critical for high translucency ZR success
5. 50 micron Al<sub>2</sub>O<sub>3</sub> air abrasion or a cleaner to **remove phosphates** before adhesive cementation makes a significant difference with adhesion

**Goals**  
1. Durable  
2. Esthetic  
3. Comfortable



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### 10-MDP

10-methacryloyloxydecyl dihydrogen phosphate

MDP containing materials:  
Bonding Agents  
Self-Adhesive Resin Cement  
Zirconia Primer



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### Dental Advisor

Ceramic Adhesives: Cementing vs Bonding  
Once the ceramic material for the restoration has been selected, the requirements for cementing or bonding can be specified.  
John M. Powers, PhD; John W. Farah, DDS, PhD

#### When Should Lithium Disilicate and Zirconia-based Ceramic Restorations be Bonded?

Suitable for Cementation with Self-adhesive Resin Cement

- Tooth preparation with adequate cervical-occlusal height: h > 3 mm
- Tooth preparation with adequate taper: a = 2 – 5 degrees

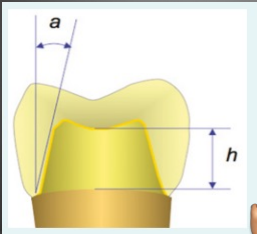

Bonding with Adhesive Resin Cement or Esthetic Resin Cement

Recommended

- Tooth with short clinical crown: h < 3 mm
- Tooth with over-tapered preparation: a > 5 degrees

Note: Occlusal reduction of preparations for zirconia-based ceramics

- Non-functional cusps: > 2.0 mm
- Functional cusps: > 2.5 mm

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### Zirconia "bonding":

50 micron aluminum oxide (lab)  
Try in  
Cleaner  
Rinse  
Dry

Good prep + low stress: 10-MDP Self adhesive dual cure resin  
Poor prep + high stress: 10-MDP Primer & dual cure resin

Zirconia cleaners:  
ZirClean Bisoco  
Ivoclean Ivoclar  
Zr-C Vista/Apex

10-MDP Metal/Zirconia primers:  
Z Prime Plus Bisoco  
Metal Primer Ivoclar  
Monobond Ivoclar  
ZR-P Vista/Apex



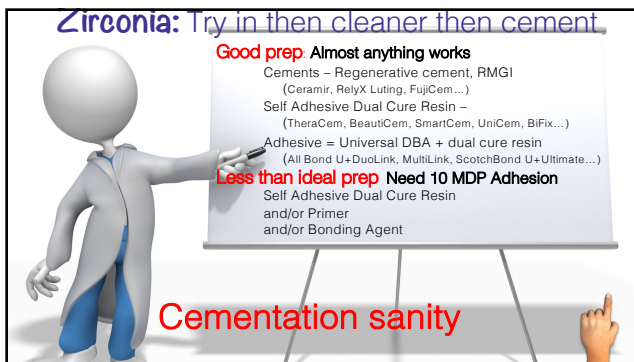

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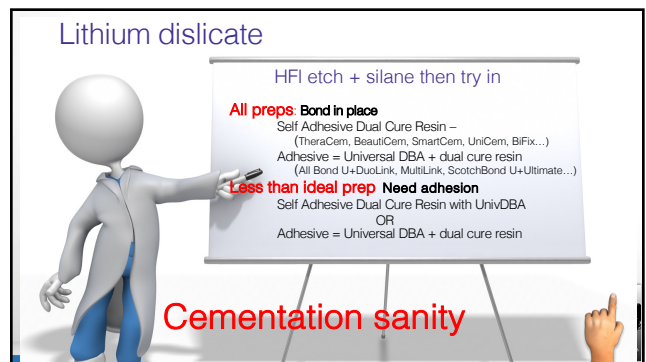
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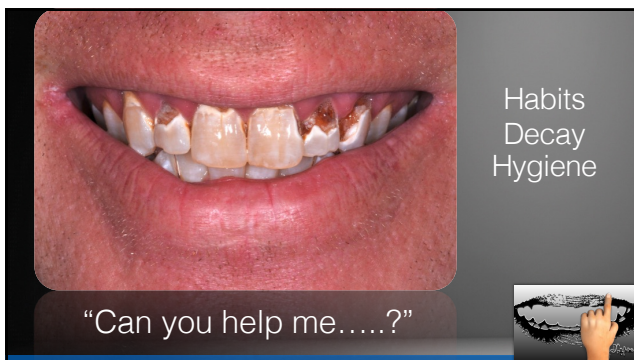
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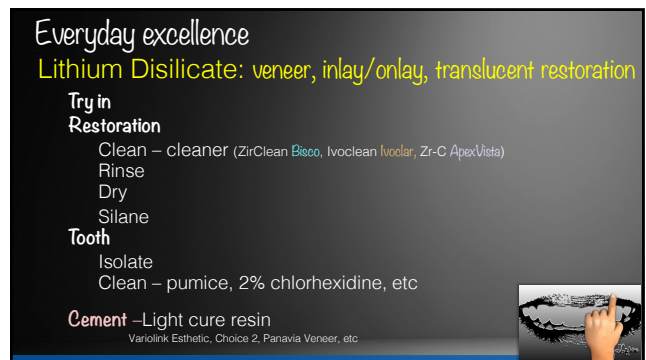
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**Maximum performance**  
**Lithium Disilicate: full coverage**  
 Universal DBA on tooth increases bond 25-40%

Try in  
**Restoration**  
 Clean (ZirClean Bisco, Ivoclean Ivoclar, Zr-C ApexVista)  
 Rinse  
 Dry  
 Silane  
**Tooth**  
 Isolate  
 Clean – pumice, 2% chlorhexidine, etc  
 ??? Universal DBA (All Bond U Bisco, Scotchbond U 3M, AdHese Ivoclar)

**Cement**  
 Self adhesive dual cure resin with 10 MDP  
 Variolink DC, SpeedCem, SmartCem, Unicem, Panavia, TheraCem, etc



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**Laminate veneers...**

LiS2 best for veneer longevity.

Long-term bond to enamel significantly better than to dentin or composite.

"Fresh" composite build-ups give better bond than to old composite.

**Clinical performance of laminate veneers: A review of the literature**

**Abstract**  
**Purpose:** This narrative review aimed to survey the clinical outcomes of laminate veneers (LVs), including their survival and success rates.  
**Study selection:** An electronic search of MEDLINE/PubMed, Web of Science, Cochrane Library, and Google Scholar from 2000 to April 2023 was conducted using the keywords "laminate" OR "veneer" OR "porcelain" OR "feldspathic" OR "lithium disilicate" OR "composite resin" OR "zirconia" OR "survival" OR "success." Case reports, case series, reviews, abstracts, in vitro studies, and observational studies were excluded. Five researchers independently evaluated the titles and abstracts of all identified studies.  
**Results:** A total of 55 studies were identified. None of the studies met the criteria for zirconia LVs. According to the studies in this review, LVs fabricated with feldspathic porcelain, leucite-reinforced glass ceramics (LRG), and lithium disilicate ceramics (LDS) exhibited satisfactory survival and success rates. Furthermore, hydrofluoric acid etching followed by silane priming of the surface of ceramic LVs is necessary for improved clinical outcomes. The extent of dentin exposure significantly decreases the success rate of ceramic LVs. An appropriate adhesive luting process is required to achieve the long-term success of ceramic LVs. Etching exposure should be minimized or sealed during tooth preparation to achieve a reliable and durable bond between LVs and abutment teeth.  
**Conclusions:** Based on this narrative review of the literature, the use of silica-based ceramic feldspathic porcelain, LRG, and LDS is recommended for LVs.

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**Tough cases**  
**Realistic expectations**

**Don't be a hero**



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**Universal Dentin Bonding Agents**

**Enamel**  
 Best long-term bond if phosphoric acid etched

**Dentin**  
 Best long-term bond if not phosphoric acid etched

**Etching Efficacy of Self-Etching Functional Monomers**

**Abstract**  
 Studies on dental bonding agents and their bond strengths with functional monomers of self-etching resin have been proposed both in vitro and in vivo. However, the effect of self-etching resin on the bonding of universal dentin bonding agents to enamel and dentin has not been fully investigated. The purpose of this study was to evaluate the etching efficacy of functional monomers on enamel and dentin. The study was conducted in vitro. The results showed that the etching efficacy of functional monomers on enamel and dentin was significantly higher than that of phosphoric acid. The results also showed that the etching efficacy of functional monomers on enamel and dentin was significantly higher than that of phosphoric acid. The results also showed that the etching efficacy of functional monomers on enamel and dentin was significantly higher than that of phosphoric acid.

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**Veneer cementation**



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**Preppies (Whip Mix)**  
**Cavity Cleanser (Bisco)**



30

What is silane?



$SiH_4$ ...silicone + hydrogen chloride then boiled with a metal halide to make silane

Couples silica glass fibers to resin matrix  
Connects 2 dissimilar materials

Dental = Silane + ethanol + acetic acid

Short shelf life because of water

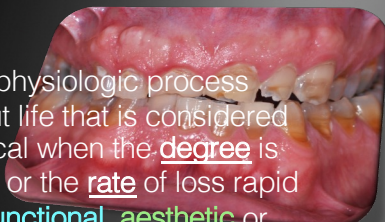

20-40% increase in bond strength if used  
Throw away if cloudy

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Tooth wear

A normal physiologic process throughout life that is considered pathological when the **degree** is excessive or the **rate** of loss rapid causing **functional**, **aesthetic** or **sensitivity** problems.

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Tooth wear

4 major causes:

- Erosion
- Attrition
- Abrasion
- Abfraction



or combination of these




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Tooth wear

How about drugs?  
Trauma?  
Occlusion?  
or combination of these

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PAC  
Cementation

The protocol for tomorrow




35

Lowering the stress...

Vision  
Planning  
Preparation




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PAC Cementation  
Isolate  
Clean teeth  
Try in  
Clean restorations  
Re-silanate  
Etch/bond teeth  
Luting material  
Tack cure  
Clean up

The guide for this weekend  
(silica based ceramics)



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PAC Cementation  
Isolate  
Clean teeth  
Try in  
Clean restorations  
Re-silanate  
Etch/bond teeth  
Luting material  
Tack cure  
Clean up

Have cement ready in advance



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PAC Cementation  
Isolate  
Clean teeth  
Try in  
Clean restorations  
Re-silanate  
Etch/bond teeth  
Luting material  
Tack cure  
Clean up

Adjustments

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PAC Cementation  
Isolate  
Clean teeth  
Try in  
Clean restorations  
Re-silanate  
Etch/bond teeth  
Luting material  
Tack cure  
Clean up  
Final cure  
Adjustments



40



PAC Cementation  
Isolate  
Clean teeth  
Try in  
Clean restorations  
Re-silanate  
Etch/bond teeth  
Luting material  
Tack cure  
Clean up  
Final cure  
Adjustments



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PAC Cementation  
Isolate  
Clean teeth  
Try in  
Clean restorations  
Re-silanate  
Etch/bond teeth  
Luting material  
Tack cure  
Clean up  
Final cure  
Adjustments



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Cementation  
Isolate  
**Clean teeth**  
Try in  
Clean restorations  
Re-silane  
Etch/bond teeth  
Luting material  
Tack cure  
Clean up

Preppies (Whip Mix)  
Cavity Cleanser (Bisco)  
MicroPrimeG (Danville)

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PAC Cementation  
Isolate  
**Clean teeth**  
Try in  
Clean restorations  
Re-silane  
Etch/bond teeth  
Luting material  
Tack cure  
Clean up

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Cleaning choices for zirconia:  
Rinse with Water  
Alcohol  
Ultrasonic cleaner  
Steam  
Cleaner

Cementation  
Isolate  
Clean teeth  
Try in  
**Clean restorations**  
Re-silane  
Etch/bond teeth  
Luting material  
Tack cure  
Clean up

45

Cementation  
Isolate  
Clean teeth  
Try in  
**Clean restorations**  
Re-silane  
Etch/bond teeth  
Luting material  
Tack cure  
Clean up

Rinse  
Dry  
Silane if silica based

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PAC Cementation  
Isolate  
Clean teeth  
Try in  
Clean restorations  
**Re-silane**  
Etch/bond teeth  
Luting material  
Tack cure  
Clean up

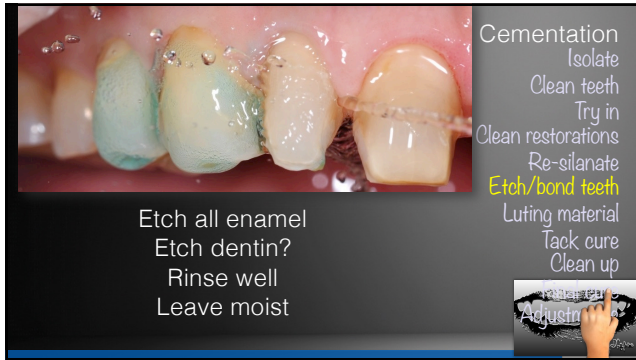
Bench dry 1-2 minutes

47

15 second etch

PAC Cementation  
Isolate  
Clean teeth  
Try in  
Clean restorations  
**Re-silane**  
Etch/bond teeth  
Luting material  
Tack cure  
Clean up

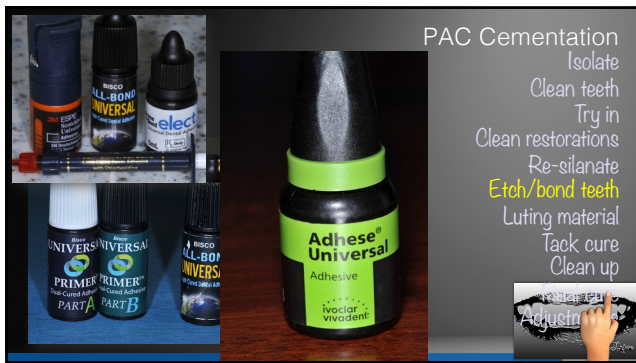
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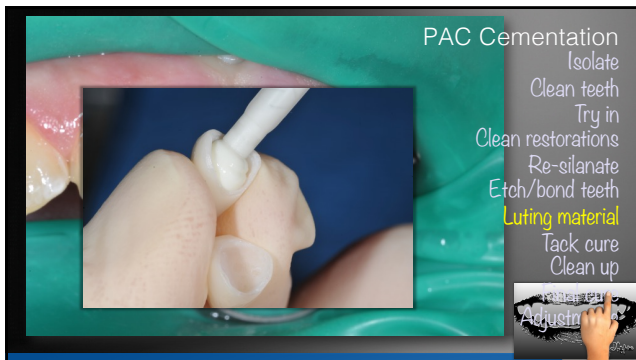
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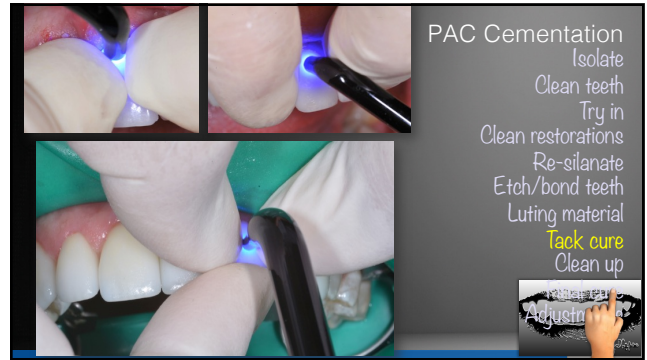
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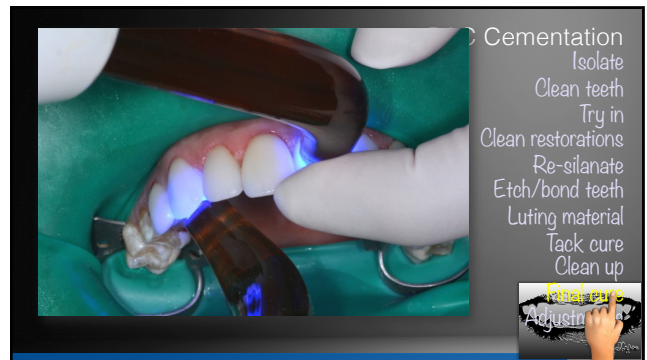
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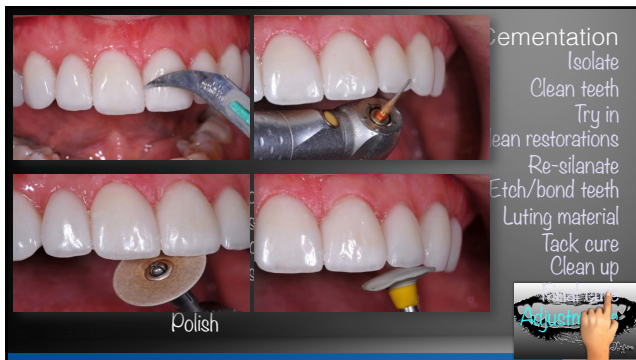
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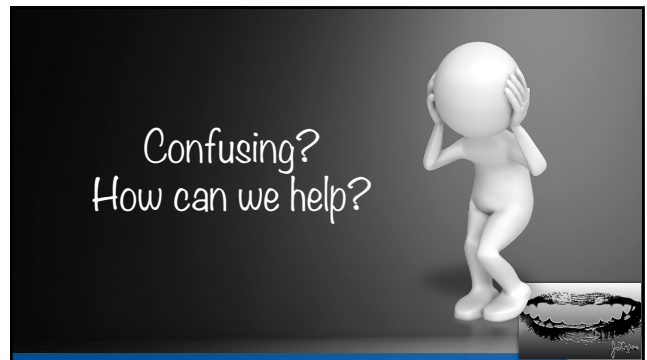
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