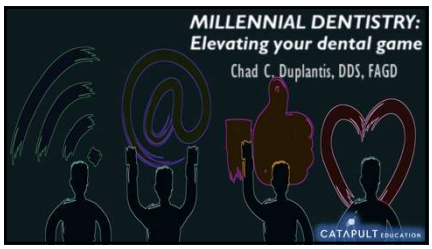
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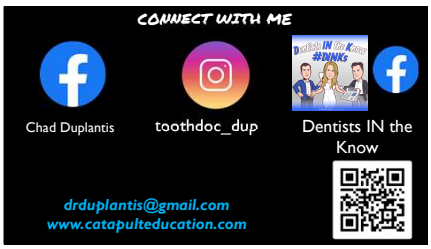
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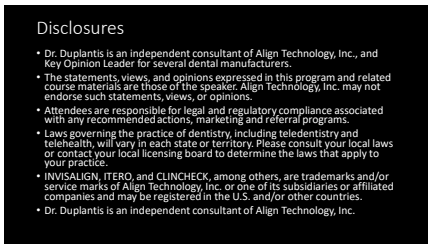
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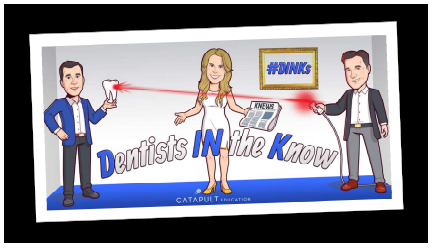
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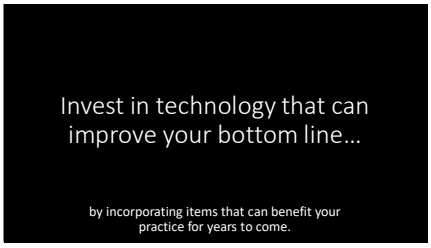
Invest in technology that can improve your bottom line…
by incorporating items that can benefit your practice for years to come.

8


START WITH...
Why?
How?
What?

9

How do you properly integrate technology?

10

S. M. U.

SYSTEMATIC METHODICAL UNDERSTOOD

11

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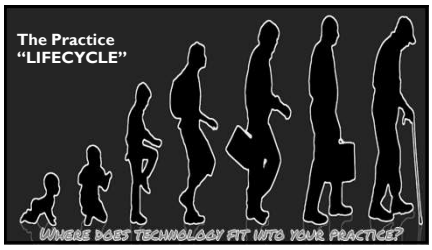

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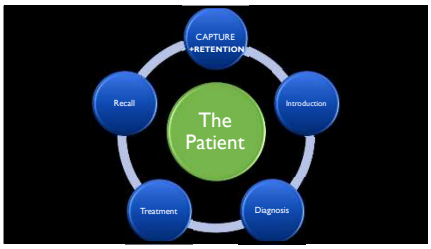

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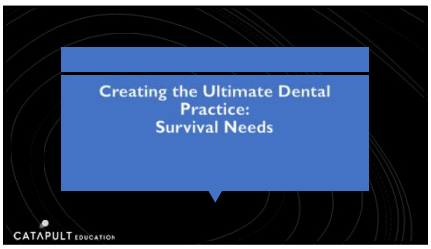

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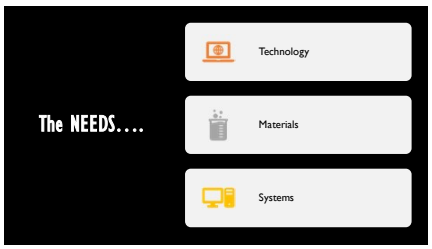

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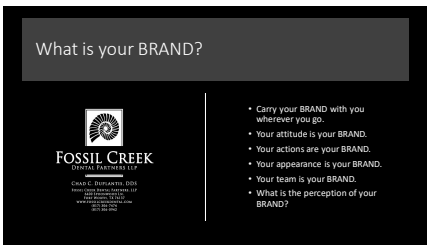

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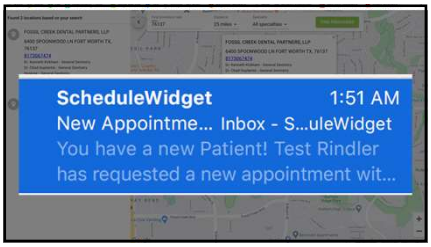

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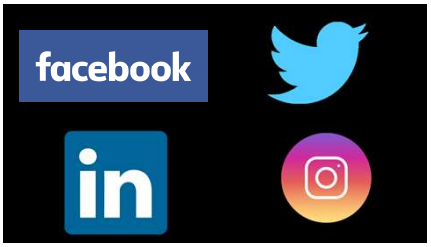

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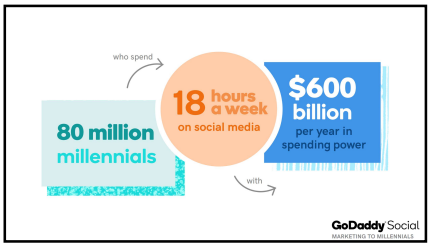

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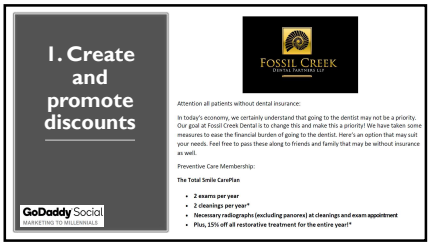

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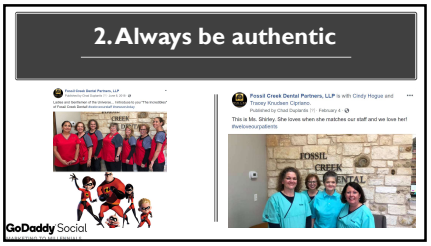

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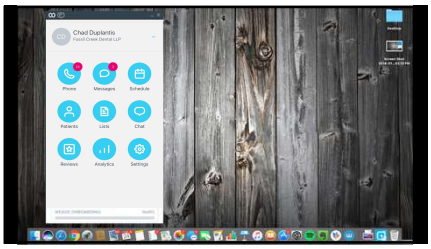

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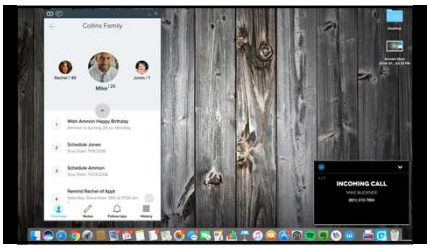

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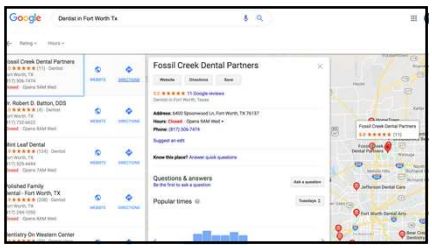

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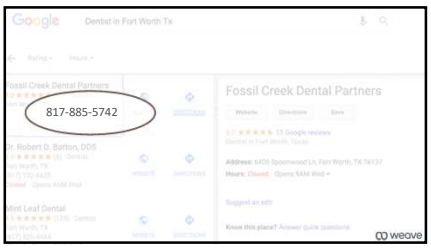

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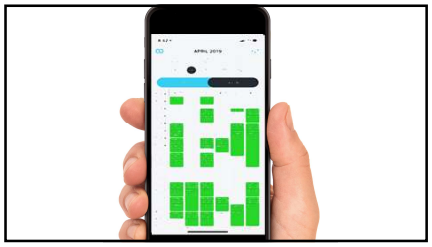

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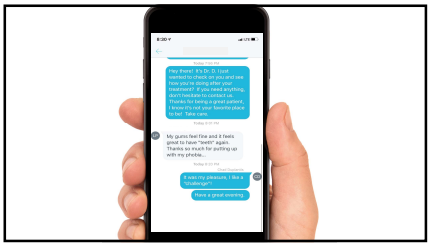

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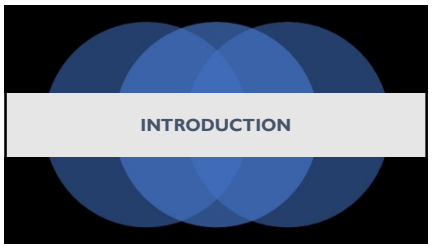

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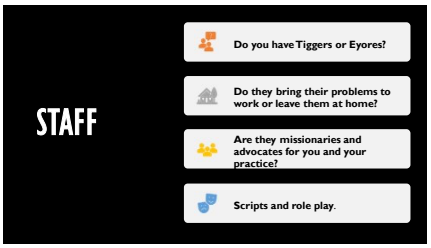

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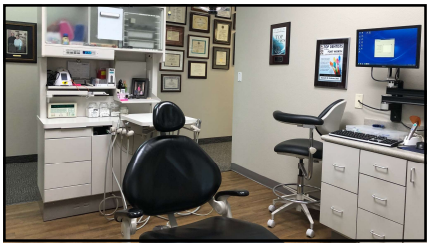

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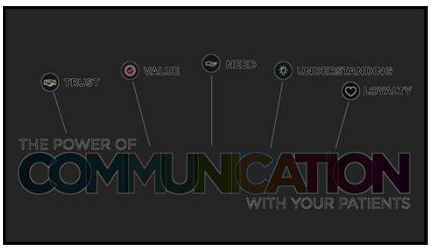

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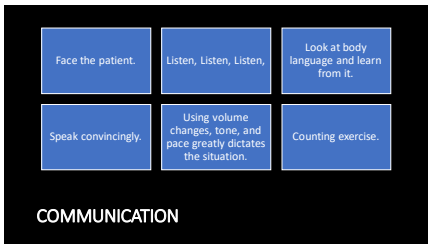

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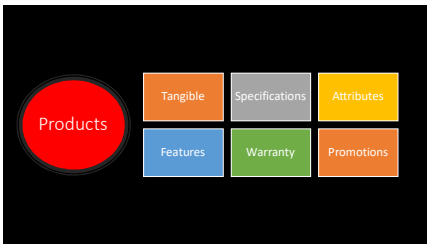

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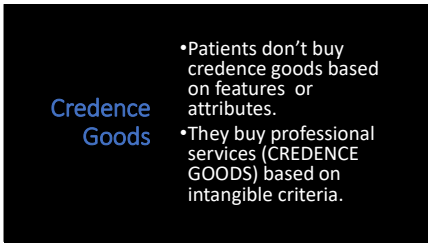

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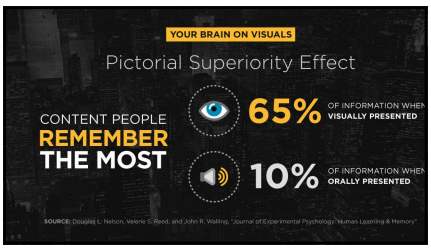

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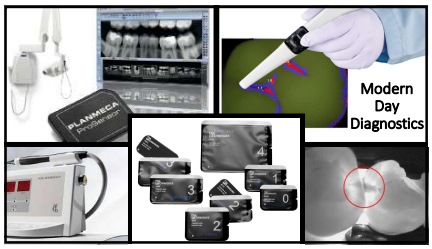

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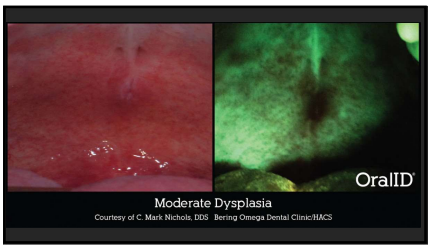

60

"It is estimated that about 3,400 new cases of HPV-associated oropharyngeal cancers are diagnosed in women and about 14,800 are diagnosed in men each year in the United States"

*Data source: National Program of Cancer Registries SEER*Stat Database: U.S. Cancer Statistics Incidence Analytic file 1998–2015. United States Department of Health and Human Services, Centers for Disease Control and Prevention. Released June 2018, based on the November 2017 submission.*

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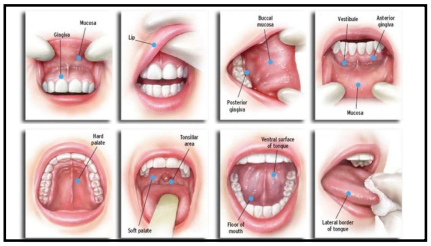

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Dental Photography

64

- 7.5 TRILLION PHOTOS TAKEN IN 2017
- MOBILE PHONES TAKE 4.192 TRILLION PHOTOS A YEAR!
- EVERY 2 MINUTES, HUMANS TAKE MORE PHOTOS THAN PHOTOS THAT EXISTED 150 YEARS AGO!

65

Dental Photography - THE CHALLENGES

- Knowledge of Cameras
- Understanding Photography
- Consistent Image Quality

66

Dental Photography – THE BENEFITS

- THIS IS A MUST!
- Most patients are visual learners!
- Improves Case Acceptance
- Liability Reduction
- Communication with Lab & Specialist

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TABLE 1. Basic Camera Settings

	Extraoral	Intraoral
Aperture (f/stop)	f/8–10	f/20–22 to f/32
Shutter speed	1/125–200	1/125–200
ISO	100–200	100–200
Magnification	1:10	1:2 or 1:3

http://decisionsindentistry.com/article/guide-to-dental-photography/

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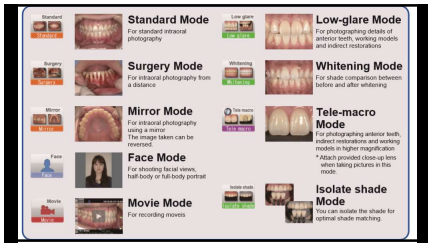

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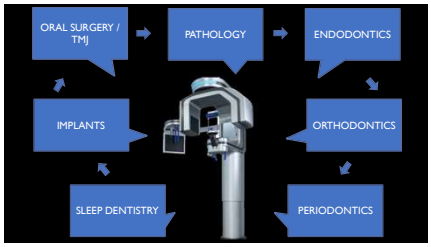
Photography (CONT'D)

- Doctor's Eyes Ultrabright Mirrors
- Cheek retractors
- Contrasters - Amazon

72



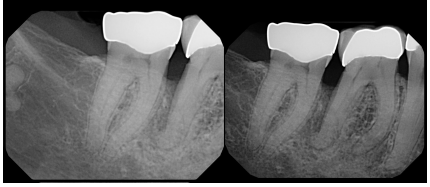
73

2D vs. 3D

74

Endo vs Implant…

Setzer, FC, Kim S. ***Comparison of Long-term Survival of Implants and Endodontically Treated Teeth.*** J Dent Res. 2014 Jan; 93(1): 19-26



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- Alamri, HM, et al. Applications of CBCT in dental practice: A review of the literature . General Dentistry. 2012; Sep/Oct:390-400.
  - **"CBCT has reduced implant failures by providing information about bone density, the shape of the alveolus, and the height and width of the proposed implant site for each patient"**

77

- **American Academy of Oral and Maxillofacial Radiology**
  - ***Recommendation:*** **Some form of cross-sectional tomographic images be used to treatment plan dental implant cases.[1]**

1. Tyndall, DA et al; American Academy of Oral and Maxillofacial Radiology. Positional statement of the American Academy of Oral and Maxillofacial Radiology on selection criteria for the use of radiology in dental implantology with emphasis on cone beam computed tomography. *Oral Surg Oral Med Oral Path Oral Radiol.* 2012;113(6):817-26.

78

From the FDA…

"The American Dental Association (ADA) and the FDA recommend that clinicians perform dental X-ray examinations, including dental CBCT, only when necessary for the diagnosis or treatment of disease. The clinical benefit of a medically appropriate X-ray imaging exam outweighs the small radiation risk. However, efforts should be made to help minimize this risk."

https://www.fda.gov/radiation-emitting-products/medical-x-ray-imaging/dental-cone-beam-computed-tomography

79

OSA RISK ANALYSIS
(Obstructive Sleep Apnea)

80

Sleep Dentistry

"There is a high probability of severe OSA if the airway area is less than 52 mm2 , an intermediate probability if the airway is between 52 to 110 mm2 , and a low probability if the airway is greater than 110 mm2"

Hatcher, David. (2012). Cone Beam Computed Tomography: Craniofacial and Airway Analysis. Dental clinics of North America. 56. 343-57. 10.1016/j.cden.2012.02.002.

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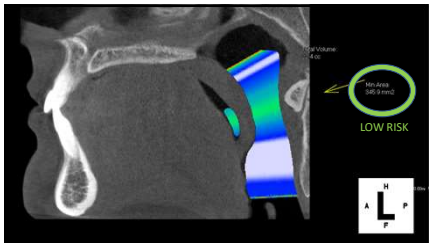

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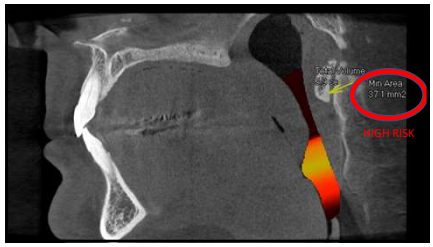

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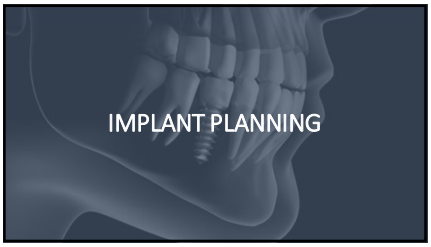

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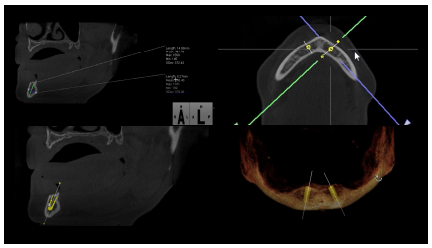

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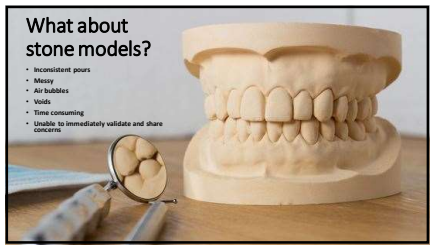

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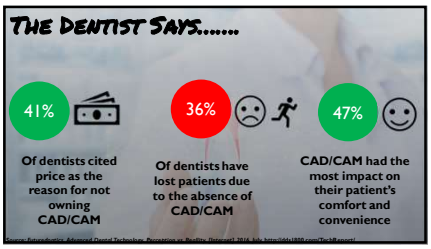

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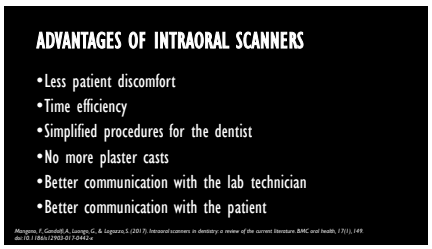

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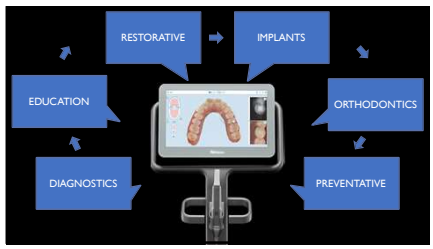

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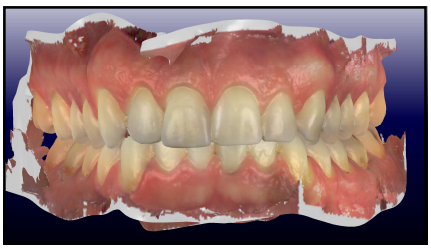

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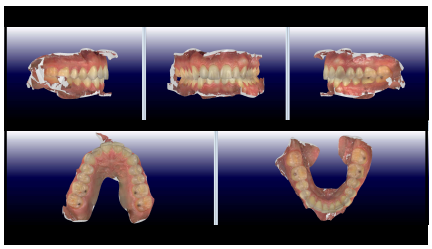

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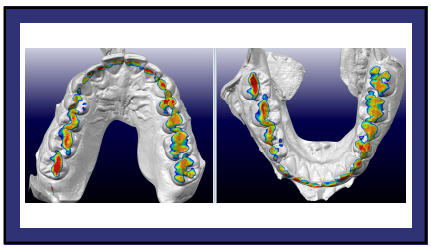

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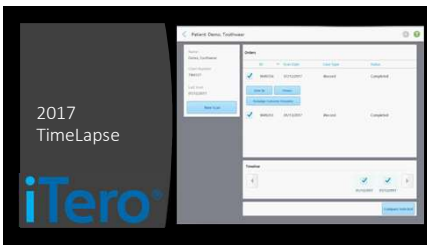

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What is the iTero Element 5D (2020 upgrade)?

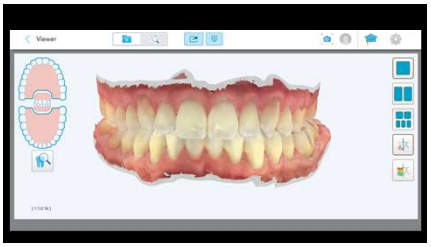
Near infrared imaging technology (NIRI)

- Class I laser – innovative optical aid
- Captures NIRI during routine scanning
- Captures various layers of data – monochromatic, color, intraoral images, NIRI
- Aids in detection of caries
- Does not use ionizing radiation

94

DIAGNOSTICS +
EDUCATION (real patient #1)

95



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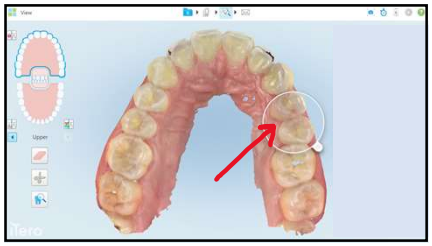


97

DIAGNOSTICS +
EDUCATION (real patient #2)

98

Patient Presentation:

- Mom was a rather poor historian, but:
- 17 year-old female patient
- Patient had an atrial septal defect that was repaired shortly after birth
- No other medical problems mentioned
- 2 years post-orthodontic treatment
- 2 years since last dental visit of any kind
- Went to pediatric dentist the week before she came to our office and was told that she had 9 cavities.

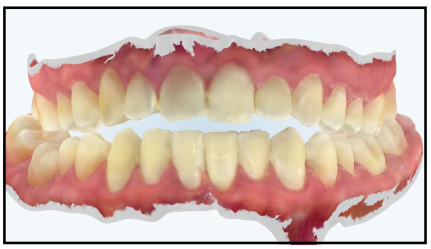
99

Patient Presentation:

- Mom concerned about the amount of decay.
- Pediatric dentist has graduated her.
- She arrives to me.
- Once she takes off her mask:
  - I notice that she is severely retrognathic.
  - We go about our typical exam, radiographs, perio charting, etc.
  - No photos except a few intraorals at Mom's request
  - So, we took a scan...

100

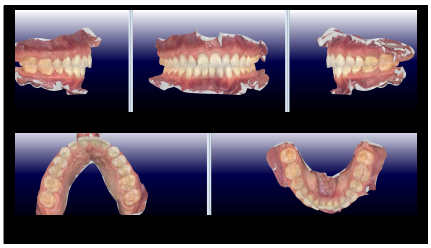
101



102

DIAGNOSTICS +
EDUCATION =
ORTHODONTICS

103



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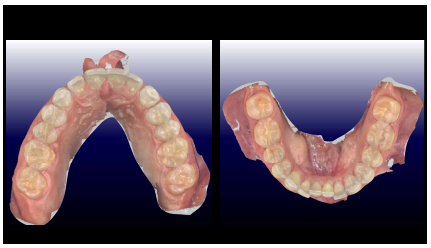

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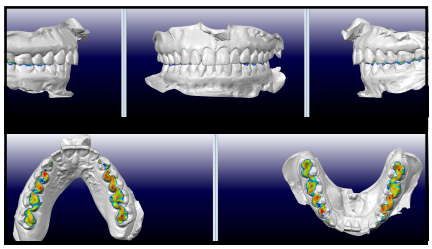

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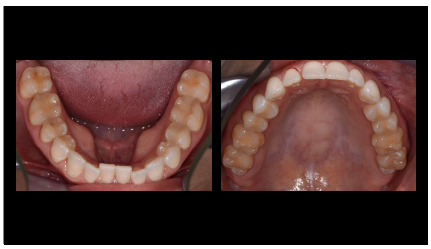

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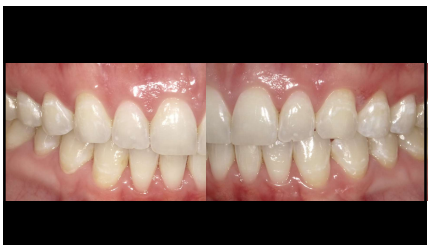

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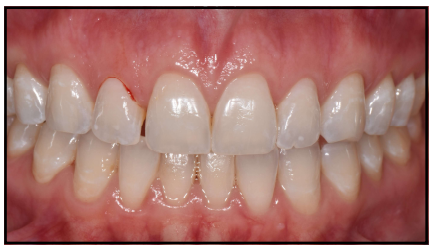

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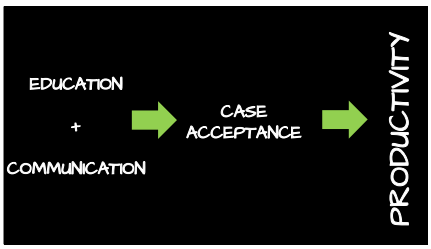

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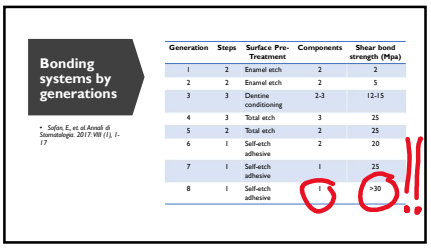

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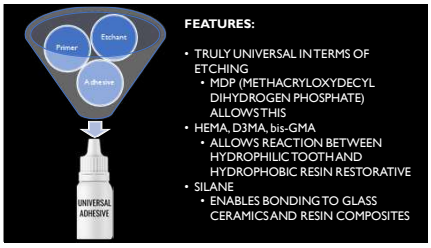

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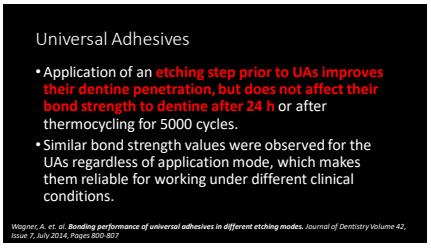


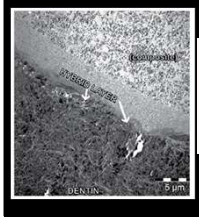
117

SENSITIVITY

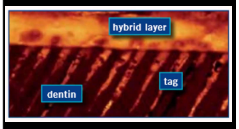
- 30% of patients feel post-operative sensitivity after posterior resin restorations.[1]
- Hypersensitivity can cause failure, and subsequently removal and more tooth loss due to more preparation.[2]
- Hydrodynamics and was initially developed by Brännström and further developed by others such as Pashley.[3,4,5]

1. Reis A, et al. Does the adhesive strategy influence the post-operative sensitivity in adult patients with posterior resin composite restorations? A systematic review and meta-analysis. Dental Materials. 2019 Sep;35(9):1332-1347.
2. Opdam NJ, Bronkhorst EM, Loomans BA, et al. Survival of direct-resin restorations in posterior teeth within a 19-year period (1996–2015): A meta-analysis of prospective studies. Dent Mater. 2019;35(6):958-985.
3. Brännström M. The cause of sensitive dentine. Odontol Revy. 1963;14:393-399.
4. Brännström M. The sensitivity of dentine. Oral Surg, Oral Med, Oral Path. 1966;21:517-526.
5. Pashley DH, Matthews WG, Zhang F, Johnson M. Cited shifts across human dentine in vivo in response

118



Critical formation of the 'hybrid' layer



119

DUAL CURE ACTIVATORS

- Clinician's must keep in mind the chemistry of universal adhesives…
- LIGHT CURE AND CHEMICAL CURE CANNOT BE MIXED
- A DUAL CURE ACTIVATOR may need to be added to the adhesive to make it compatible with a SELF- or DUAL-CURE material
- G-PREMIO bond (GC America) requires a DUAL CURE activator. Scotchbond Universal (3M Oral Care) requires a DUAL CURE activator when using a non-3M cement. This is manufacturer dependent.

120

	ADHESE UNIVERSAL (IVOCLAR VIVADENT)	ALL-BOND UNIVERSAL (BISCO, INC.)	CLEARFIL UNIVERSAL BOND (KURARAY)	FUTURABOND U (VOCO)
Phosphate Ester	10-MDP	10-MDP	10-MDP	"Modified" 10-MDP
Components	Dimethacrylate resins, HEMA, Ethanol, Water, MCAP (methacrylated carboxylic acid polymer), Fillers, Initiators	Dimethacrylate resins, HEMA, Ethanol, Water, Initiators	Dimethacrylate resins, HEMA, Ethanol, Water, Silane, Fillers, Initiators	Dimethacrylate resins, HEMA, Ethanol, Water, Carboxylic acid ester, Initiators
pH	2.5	3.2	2.3	2.3
Compatibility with self-cure mechanism of self- and dual-cure resin cements	No dual-cure activator is required with dual-cure resin cements as long as adhesive is light-cured first, according to manufacturer.	Dual-cure activator is not required when using self- or dual-cure resin cements because of higher pH compared to other universal adhesives.	Dual-cure activator is required; however, it is not required if Clearfil DC Core Plus or Panavia SA resin cement is used.	Two-component adhesive. Components are mixed in single-dose "blister" pack just prior to use. Once mixed, dual-cure activator is not required.

Alex, Gary. (2015). Universal Adhesives: The Next Evolution in Adhesive Dentistry?. Compendium. 36.

121

What is bioactivity – PART I?

"Bioactivity is the property of a biomaterial to form apatite-like material on its surface when immersed in a simulated body fluid (SBF) for a period of time."

Steven R. Jefferies, MS, DDS, PhD

Jeffries, SR. ***Bioactive Dental Materials:*** *Composition, properties, and indications for a new class of restorative materials.* InsideDentistry. Feb 2016 (12);58-64.

122

What is bioactivity – PART II?

"By its most basic definition, bioactive refers to a material that has a biological effect on surrounding tissues. The desired effect will depend on the purpose of the material."

Nathaniel Lawson, DMD, PHD

Lawson, Nathaniel. (April 2018). *Decisions in Dentistry* Examining Bioactive Restorative Materials.

123

What is bioactivity – PART II (cont'd)?

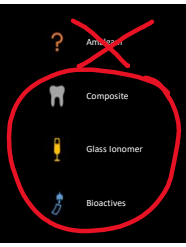
"…create a bond with surrounding tooth structure, and release ions to allow remineralization at tooth margins following an acid challenge. A bioactive cement may have the additional benefit of attracting calcium phosphate precipitates to its surface to occlude an existing cement gap."

Nathaniel Lawson, DMD, PHD

Lawson, Nathaniel. (April 2018). *Decisions in Dentistry* Examining Bioactive Restorative Materials.

124

What are the go to's?



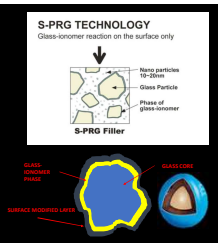
125

GIOMER TECHNOLOGY

126

Giomer Technology

- S-PRG Technology – Surface Pre-Reacted Glass ionomer cement used as fillers
- S-PRG fillers have a glass core pre-reacted with polyacrylic acid in presence of water
- S-PRG fillers are protected from water sorption and material degradation by surface modified layer



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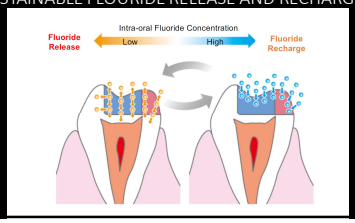
KEY GIOMER BENEFITS

- Fluoride release and recharge
- Decrease in acid production by creating an acid resistant layer
- Creates an anti-plaque effect

128

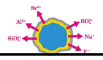
SUSTAINABLE FLOURIDE RELEASE AND RECHARGE



129

BENEFICIAL IONS OF GIOMER TECHNOLOGY

- F^- : Fluoride ion
  - Acid resistance via fluoroapatite
  - Antibacterial effect
  - Remineralization
- Sr^{2+} : Strontium ion
  - Acid resistance via strontium-apatite
  - Inhibit dentinal hypersensitivity
  - Accelerate calcification
  - Accelerate bone formation
- Na^+: Natrium/Sodium ion
  - Resistance to decay and bacteria
  - Caries prevention
- Al^{3+} : Aluminium ion
  - Inhibit dentinal hypersensitivity
- SiO_3^{2-} : Silicate ion
  - Calcification of bone tissue
- BO_3^{3-} : Borate ion
  - Bactericidal effect
  - Accelerate bone formation



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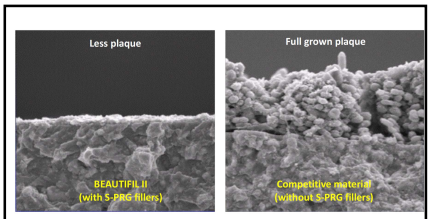
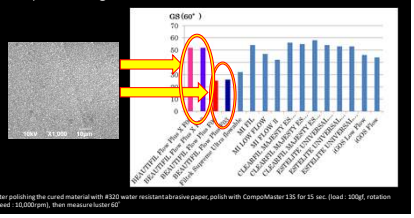


SEM images of plaque on restorative surface after 24 hours without brushing

131

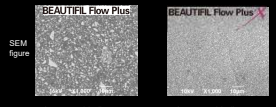
Comparison of glossness



After polishing the cured material with #320 water resistant abrasive paper, polish with CompoMaster 135 for 15 sec. (load : 100gf, rotation speed : 10,000rpm), then measure luster 60°

132

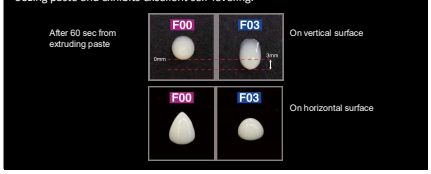
Extreme polishability



133

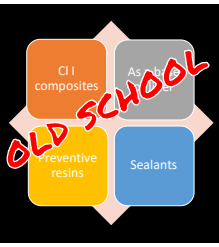
Excellent handling properties

Available in two different viscosity, F00 and F03, BEAUTIFIL Flow Plus X is non-oozing paste and exhibits excellent self-leveling.



134

Uses of flowable composites

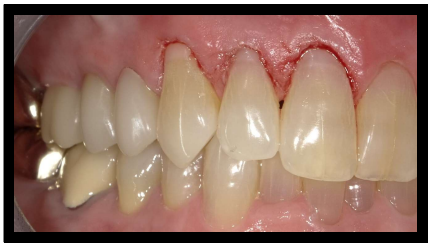


135

NEWER uses of flowable composites

- CL V COMPOSITES
- CL III COMPOSITES
- ORTHODONTIC ATTACHMENTS
- TEMPORARIES

136



137

Bioactive condensable composites

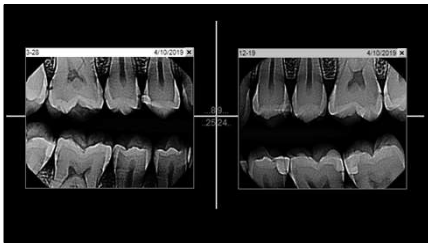
What about Cl II composites?

138

GIOMER technology!

- Predictable and functional esthetics
- Greater strength
- Higher wear resistance
- Excellent polishability.
- Volumetric shrinkage of 0.85%
- Polymerization shrinkage stress of 2.72 mpa.

139



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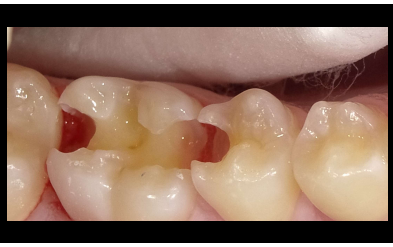

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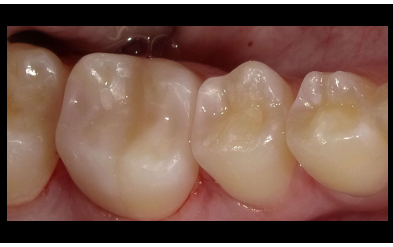
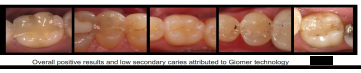


142

VALIDATED 8- AND 13- YEAR STUDIES OF

• **8-year study published in JADA, 2007**	• **13-year study presented at IADR, 2013 poster session**
• 16 of 26 Class I, and 25 of 35 Class II restorations were observed	• 19 of 26 Class I, and 22 of 35 restorations were observed
• **No failures**	• 66% retention rate (27 of 41)
• **No secondary caries**	• 3.27% secondary caries rate (2 of 61) restorations
• Maintained aesthetics	
• **No post-op sensitivity**	

13-year Study Photos



Overall positive results and low secondary caries attributed to Giomer technology

143

Giomer Technology

GIOMER TECHNOLOGY, PT II

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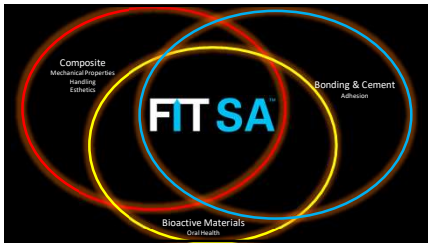

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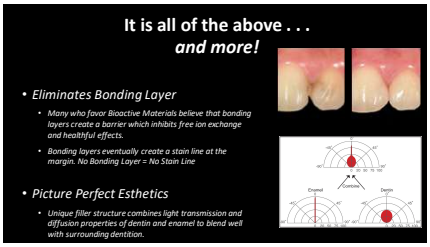

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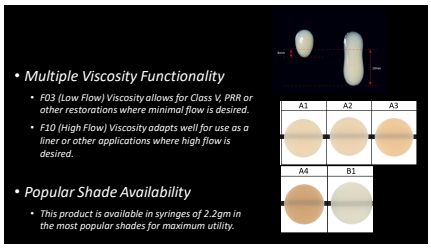

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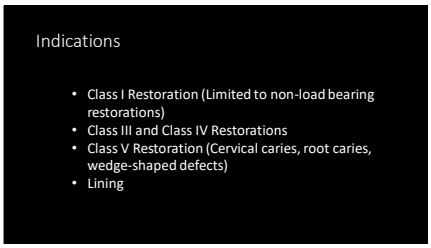

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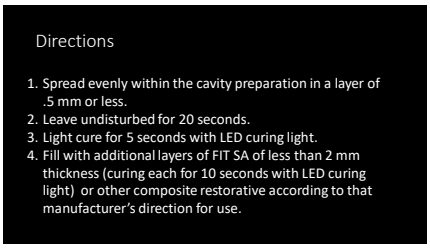

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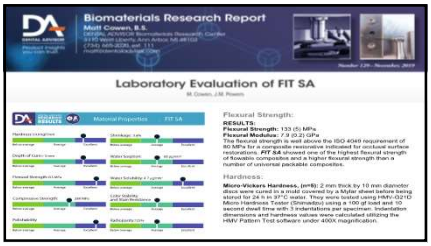

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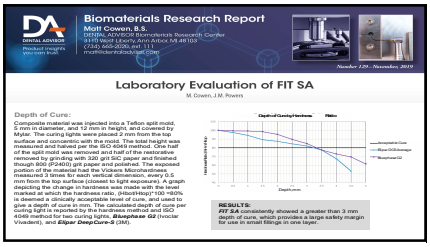

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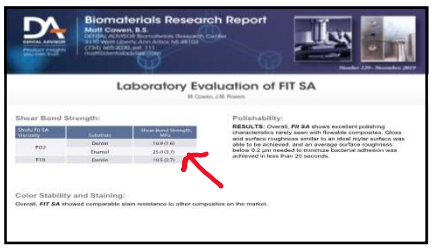

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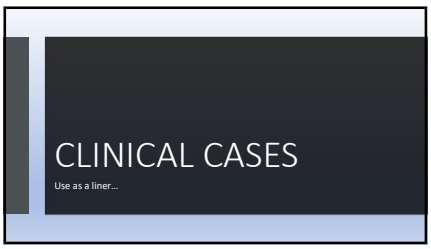

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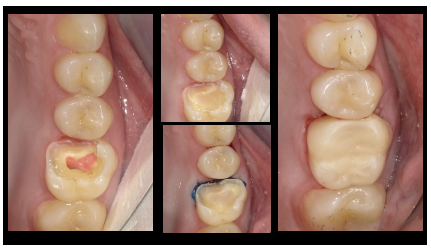

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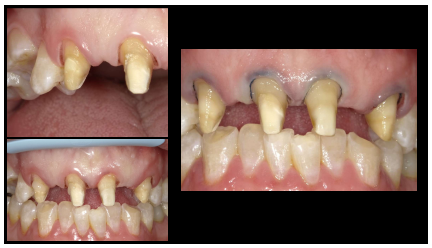

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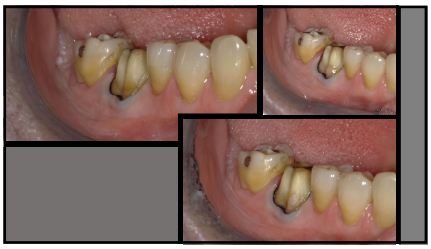

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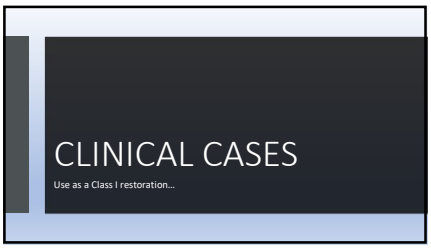

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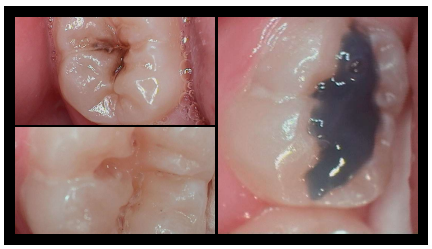

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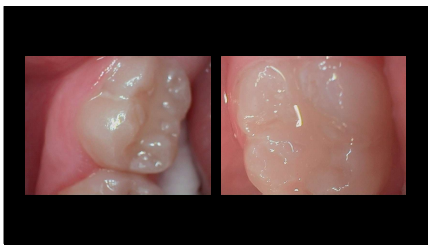

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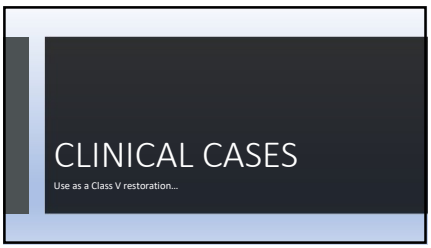

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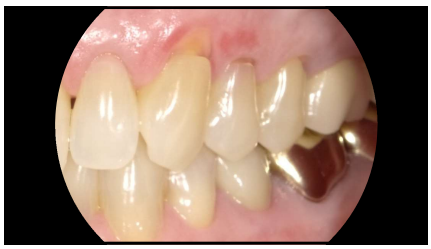

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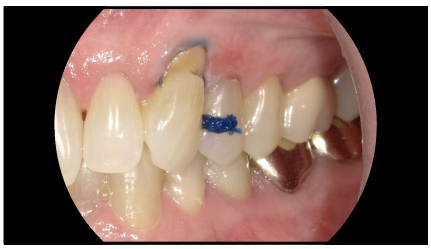

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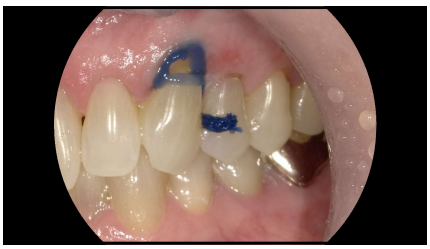

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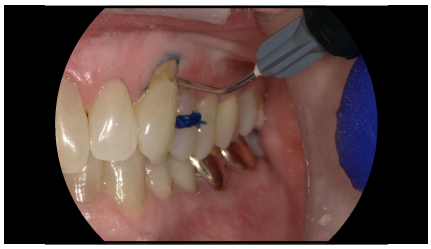

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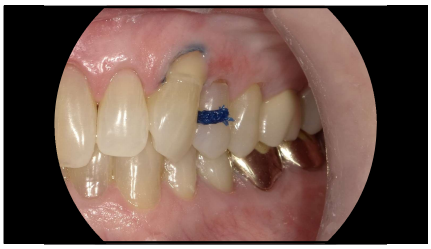

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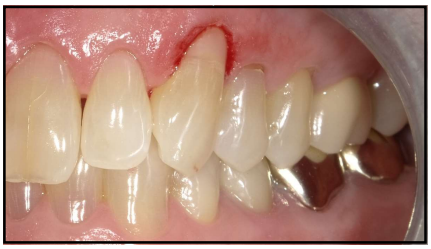

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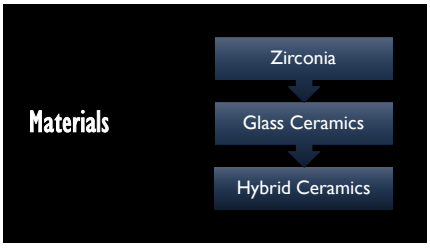

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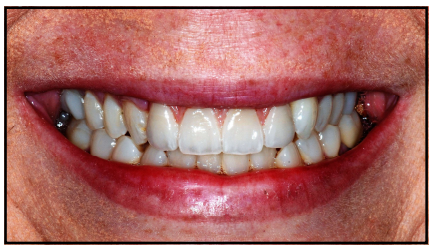

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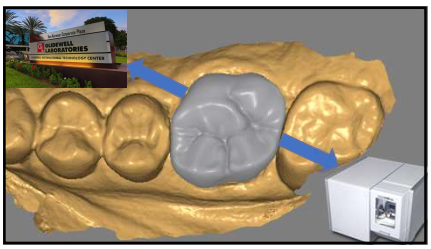

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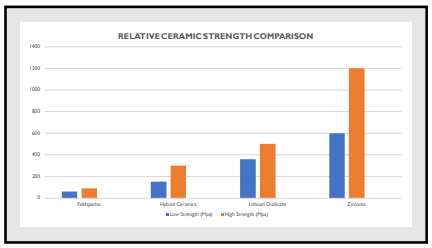

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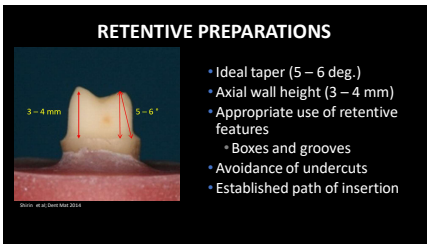

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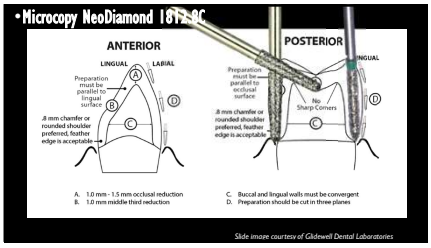

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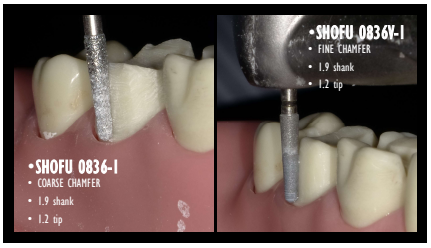

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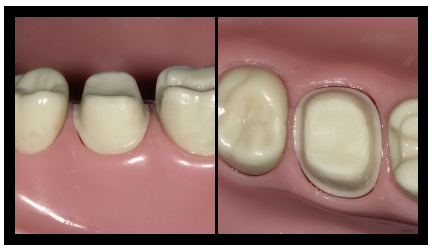

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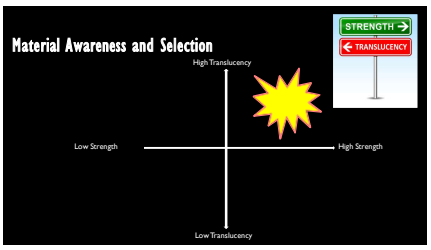

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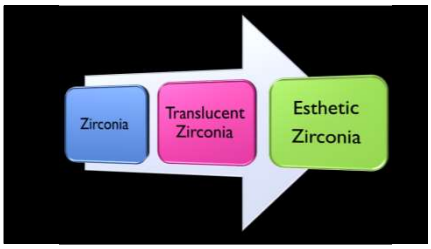

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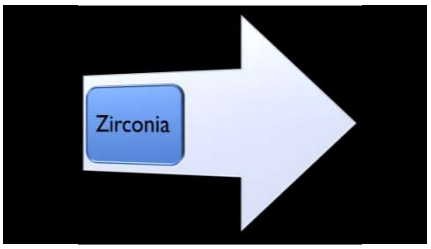

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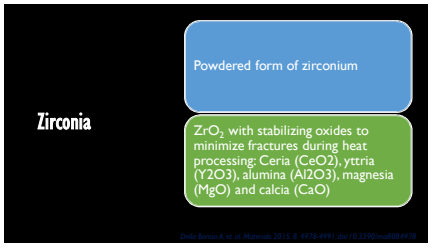

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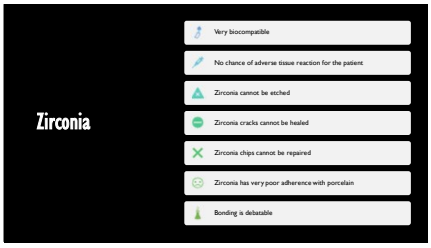

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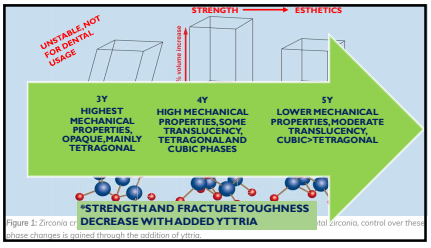

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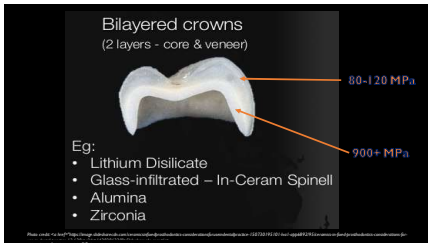

190

Zirconia Indications (Dr. Robert Winter, Spear Education)

- Single posterior crowns
- Up to 4-unit posterior bridges
- Multiple tooth restorations
- As a replacement for gold crowns

191

Zirconia Indications (Dr. Robert Winter, Spear Education)

- Masking of moderate to severe discoloration of underlying tooth structure
- As an alternative to a metal occlusal surface when a patient desires a metal- free restoration
- When the patient has parafunctional issues
- When you need to achieve maximum strength in an all-ceramic restoration

192

Zirconia Contraindications (Dr. Robert Winter, Spear Education)

~~High esthetic expectations~~

~~If bonding is necessary~~

193

Question:

- How does zirconia wear the adjacent teeth?

Assumption:

- Zirconia is detrimental to opposing dentition.

194

- Burgess, et al. Enamel Wear Opposing Polished and Aged Zirconia. Operative Dentistry, 2014, 39-2, 189-194

- **"zirconia causes less wear to opposing teeth and experiences less surface wear than enamel or a veneering porcelain"**

195

- Janyavula, S, et al. The wear of polished and glazed zirconia against enamel. J Prosthet Dent. 2013 Jan;109(1):22-9

- **"The highest ceramic wear was exhibited by the veneering ceramic. For enamel antagonists, polished zirconia caused the least wear, and enamel caused moderate wear."**

196

Zirconia In Office Workflow

197

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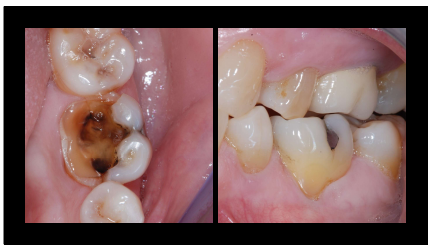
199



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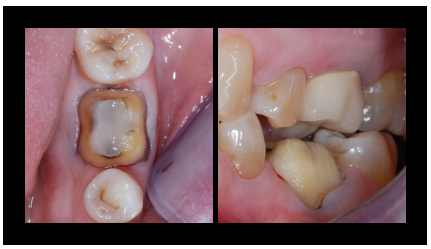

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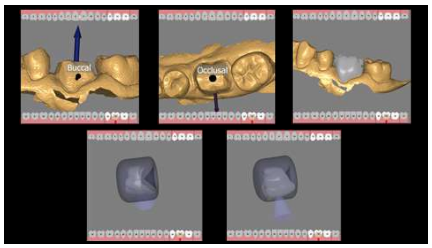

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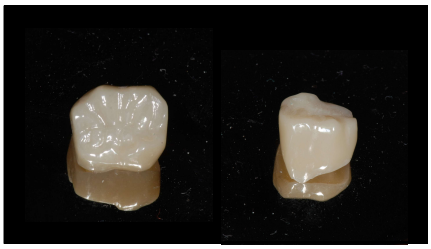

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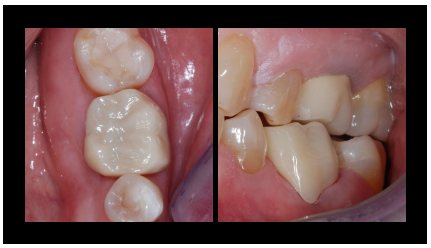

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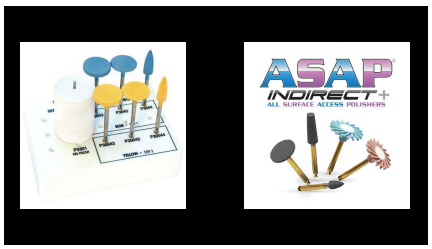

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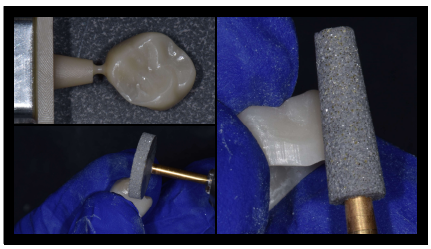

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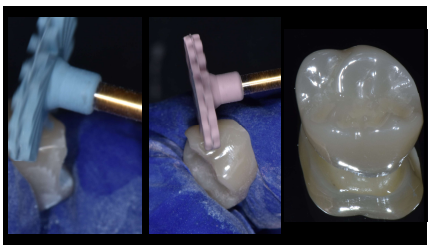

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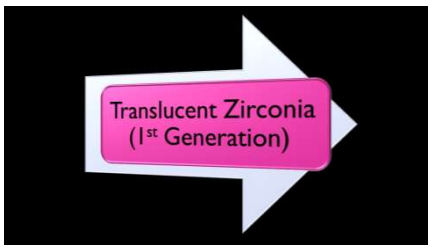

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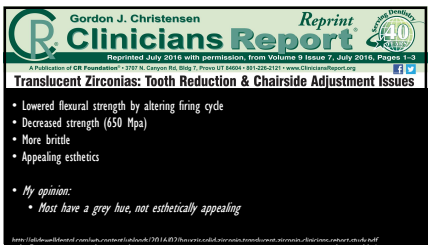

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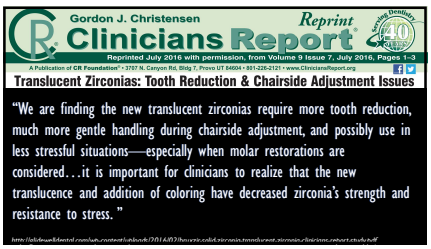

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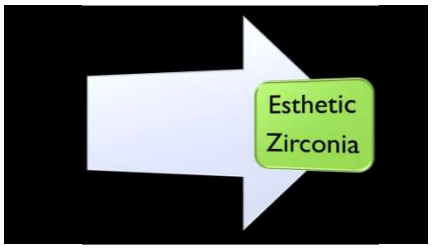

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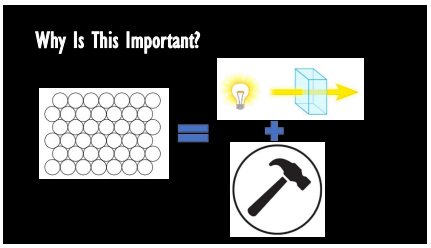

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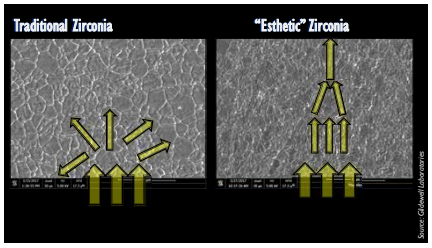

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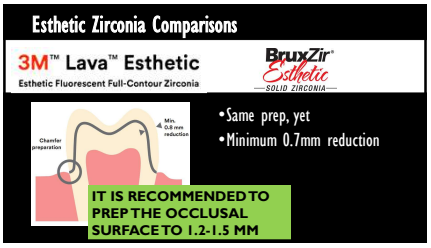

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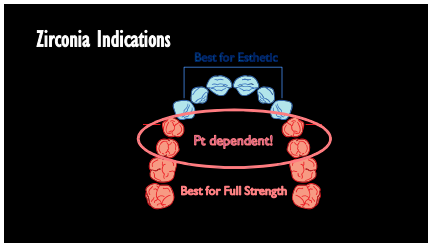

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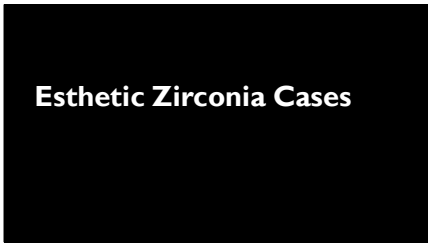

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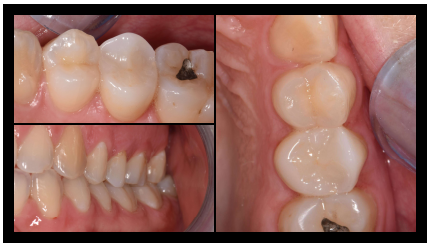

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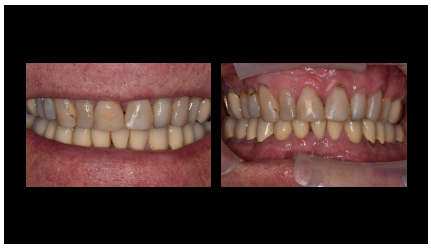

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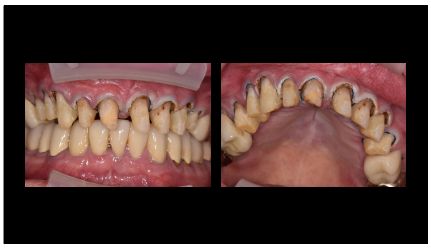

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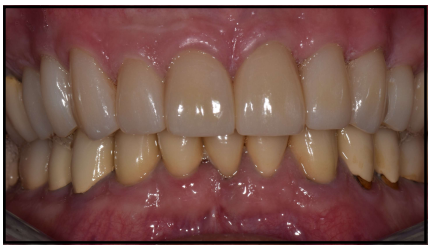

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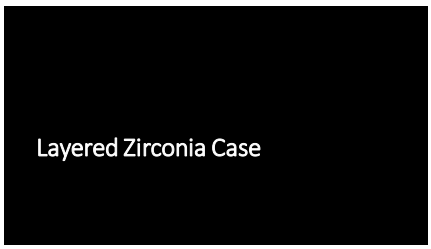

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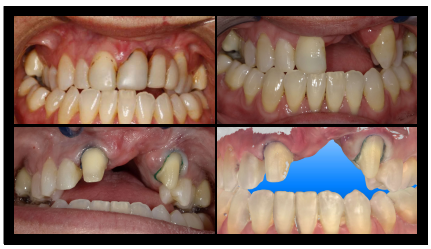

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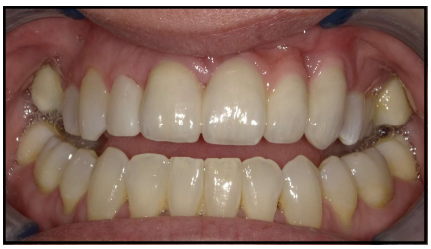

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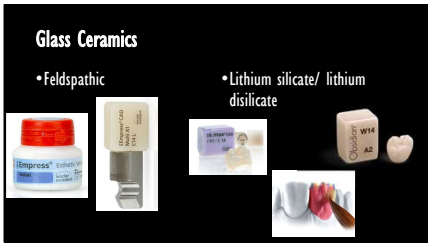

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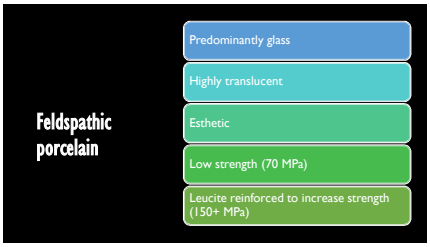

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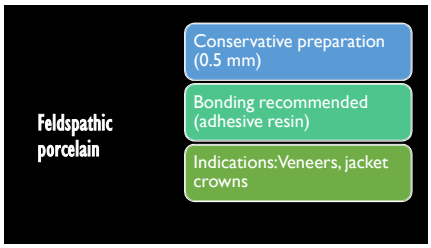

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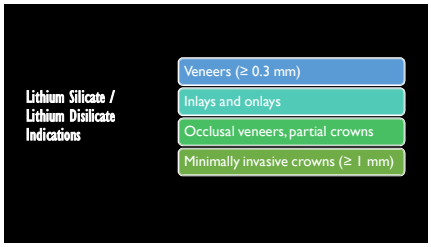

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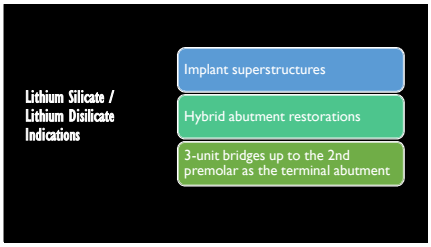

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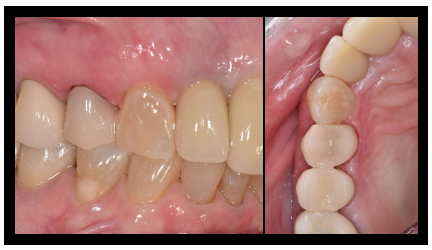

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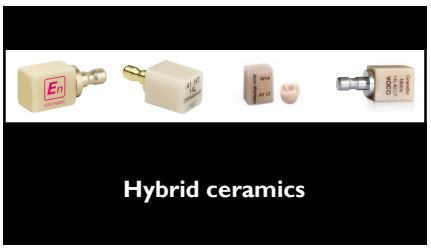

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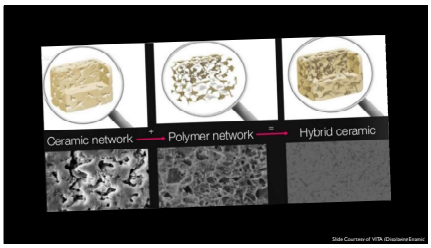

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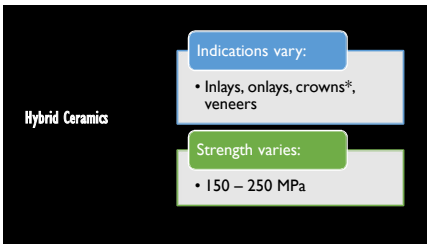

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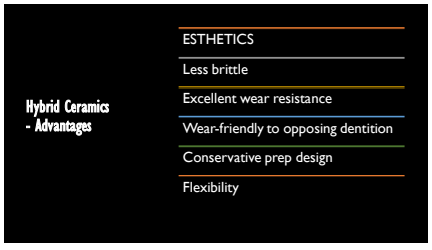

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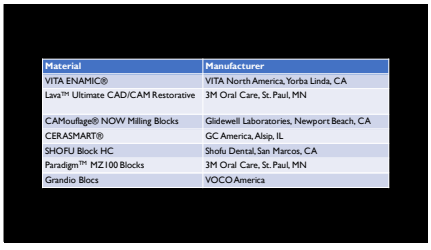
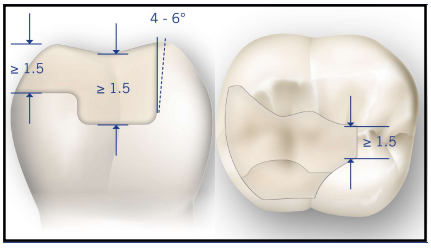


Material	Manufacturer
VITA ENAMIC®	VITA North America, Yorba Linda, CA
Lava™ Ultimate CAD/CAM Restorative	3M Oral Care, St. Paul, MN
CAMouflage® NOW Milling Blocks	Glidewell Laboratories, Newport Beach, CA
CERASMART®	GC America, Alsip, IL
SHOFU Block HC	Shofu Dental, San Marcos, CA
Paradigm™ MZ100 Blocks	3M Oral Care, St. Paul, MN
Grandio Blocs	VOCO America

242



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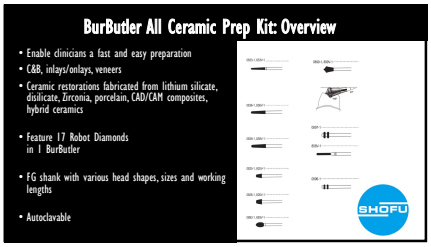

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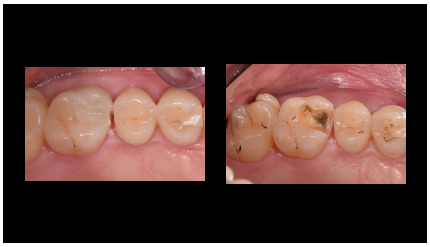

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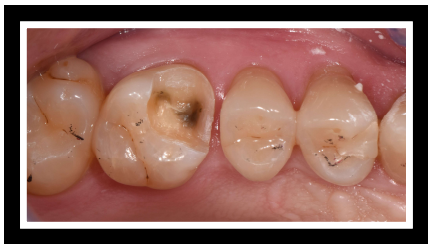

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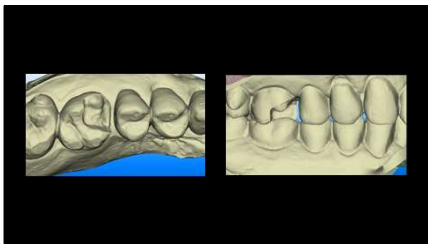

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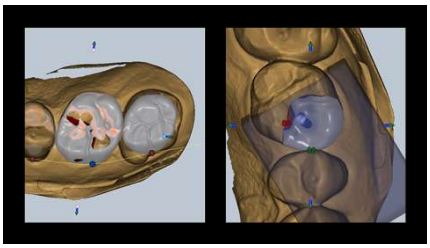

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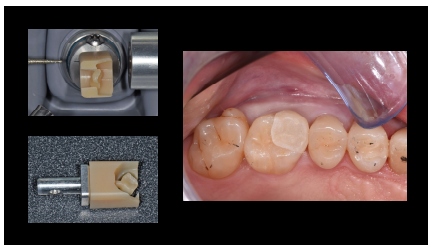

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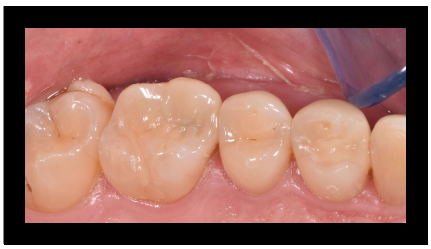
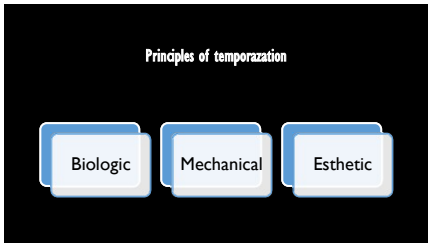


251

Temporization

The quick and easy way

252



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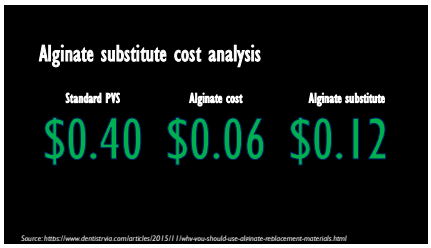

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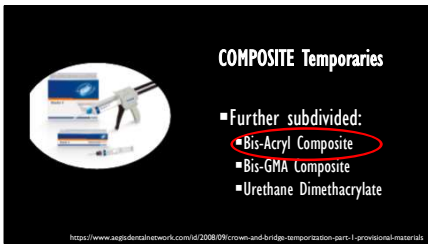

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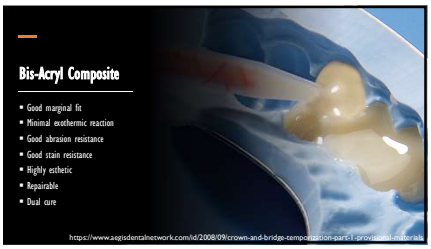

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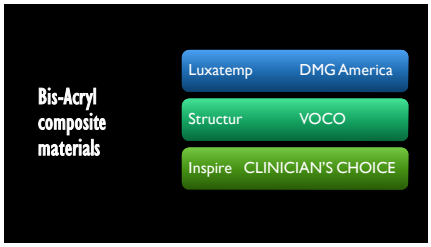

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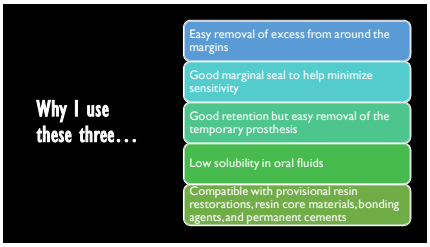

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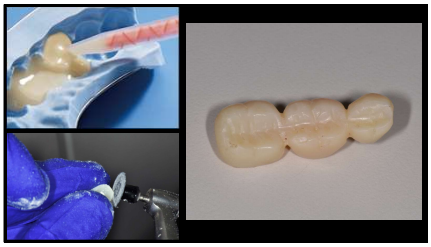

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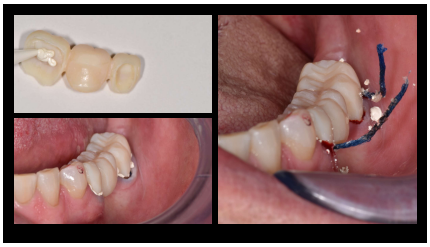

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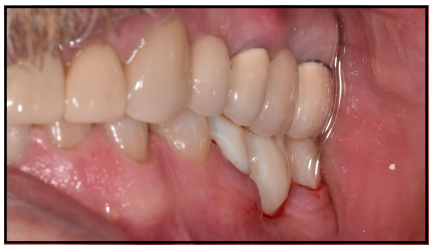

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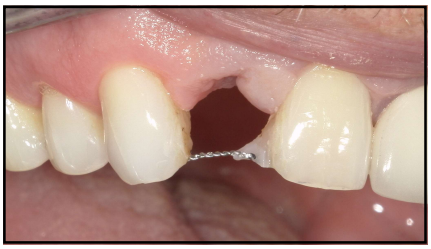

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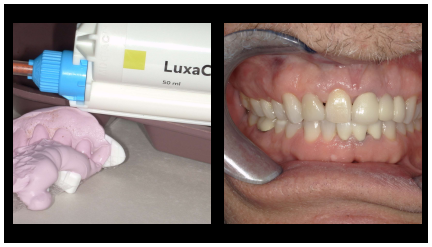

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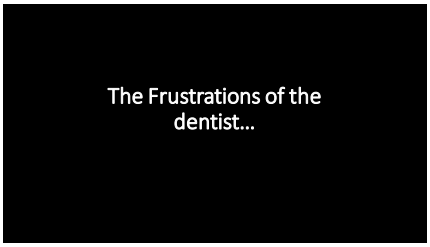

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271

What frustrates you?

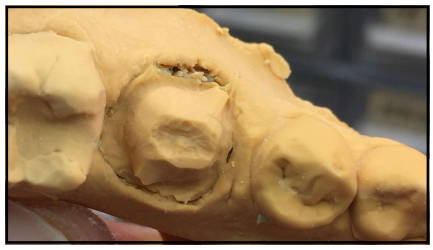
- **Quality**
- **Predictability**
- **Consistency**

272

The Frustrations of a Dental lab technician…

273

274



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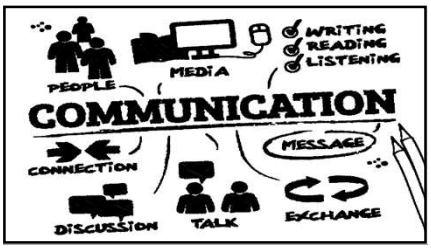


276

How do we improve the dentist - lab relationship?

277

Improving the relationship:

1. Find a quality lab (or labs)
2. Take quality impressions
3. Provide quality information
4. COMMUNICATE
5. Relay expectations

278

1. Find a quality lab

279

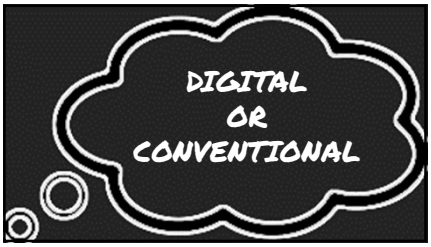
Labs needed

- Bread and butter lab
- In office mill
- High end ceramist
- Removable lab
- Full arch prosthesis lab

280

2. Take quality impressions

281



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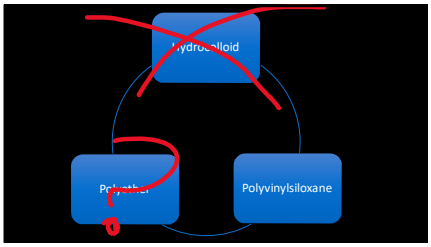


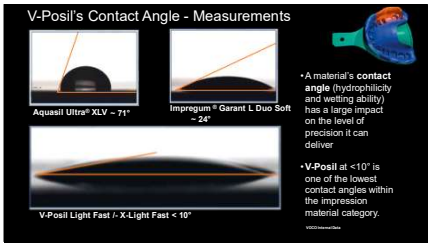
284

Polyvinylsiloxane

- Addition reaction silicones
- Introduced in the 1970s as a 2-paste system (i.E., A base and a catalyst)
- When the 2 pastes are mixed, an addition reaction occurs between the silane and the vinyl groups
- New low viscosity hydrophilic PVS impression materials have better clinical success than hydrophobic PVS impression materials

285

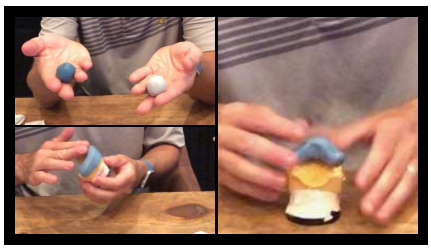
286



287

LARGER SPAN, LARGER CASES

288



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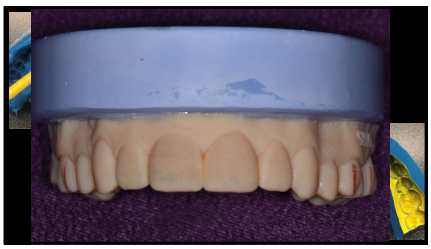

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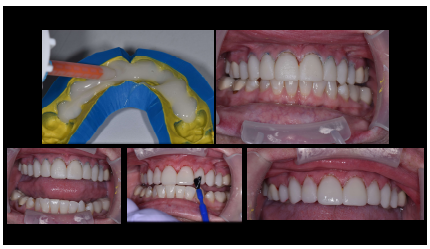

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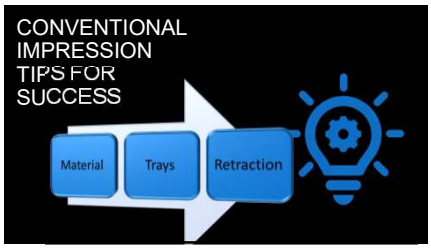

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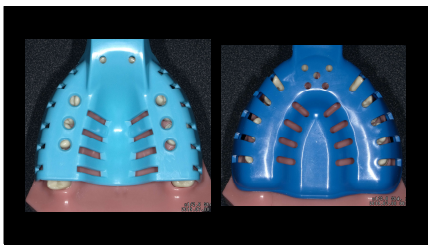

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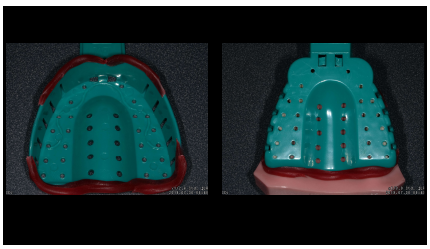

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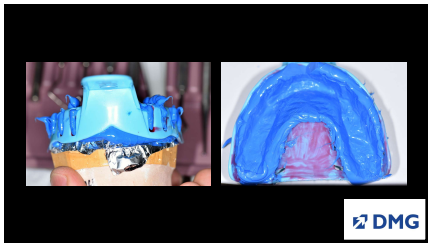

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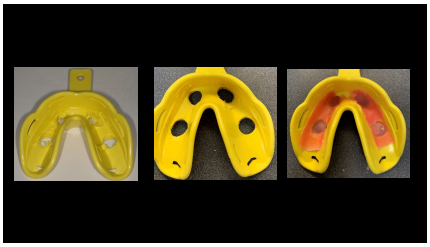

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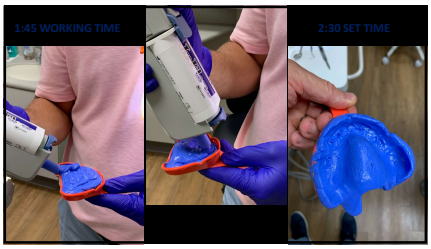

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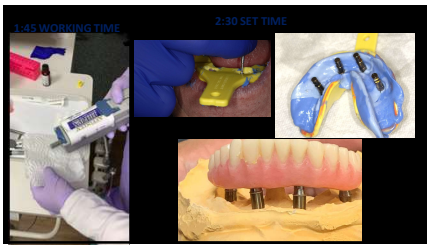

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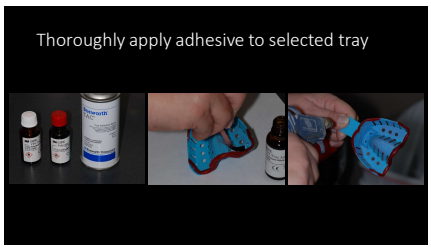

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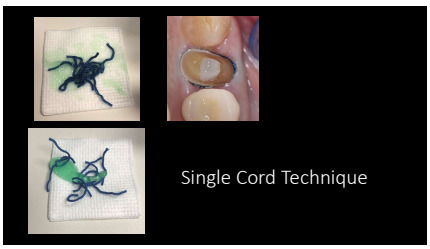


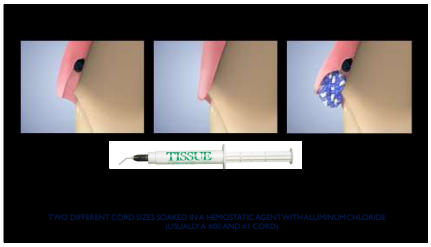
306

- 25% aluminum sulfate
- kind to soft tissue
- acts similar to a coagulant to stop bleeding, ensuring tissue will not turn black
- Acts as a lubricant during retraction cord placement
- Will not interfere with the set of your impression material
- Gooseberry-flavored

Tissue Goo
Hemostatic Gel

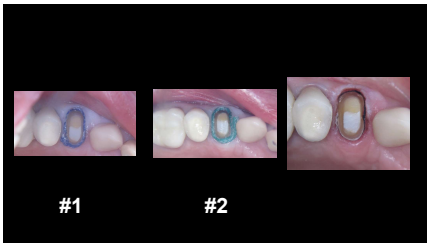
https://www.clinicianschoice.com/product/tissue-goo-hemostatic-gel/

307



TWO DIFFERENT CORD SIZES SOAKED IN A HEMOSTATIC AGENT WITH ALUMINUM CHLORIDE (USUALLY A #00 AND #1 CORD)

308



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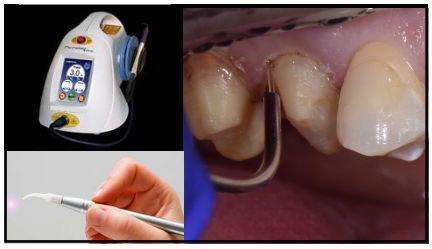

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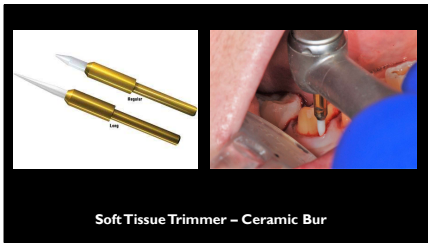
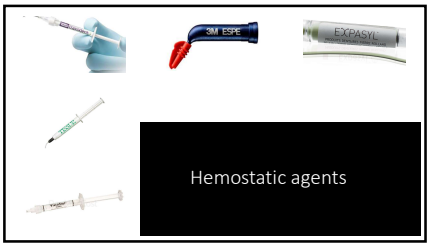


Soft Tissue Trimmer – Ceramic Bur

311



312

3. Ensure adequate retraction

313

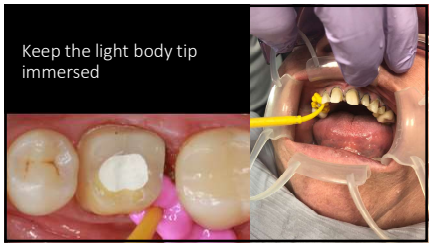
3. Ensure adequate retraction

- Following Retraction
  - Rinse, rinse, rinse!
  - Clean the prep with a wet cotton pellet
  - Utilize a microbrush to verify there are no contaminants at the margin

314

4. Apply uniformly!

315



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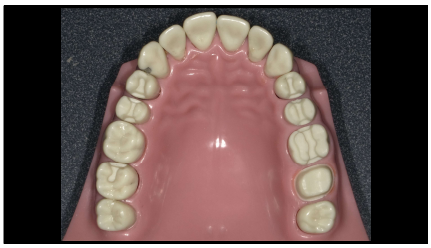

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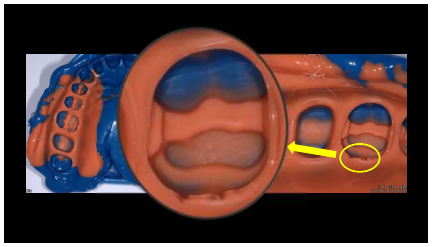

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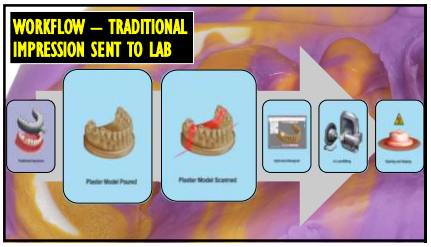
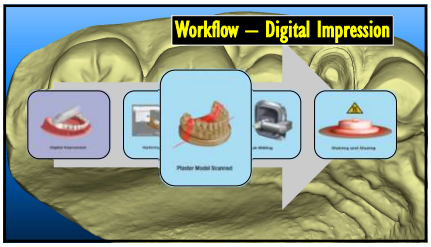


324

Digital Workflow

325

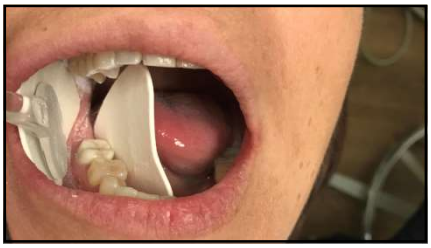


326

327

Cheek retractors

328



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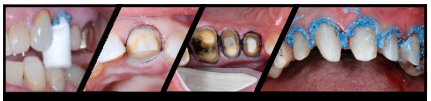
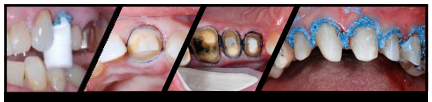


Principles of perfect impressioning

- Traditional impression
  - Visualization
  - Retraction
  - Moisture control

330



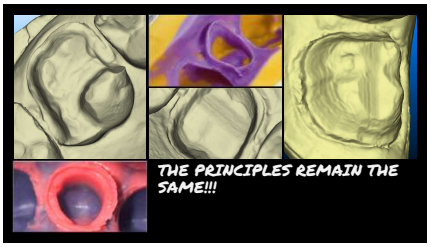
Principles of perfect impressioning

- Digital impression
  - Visualization
  - Retraction
  - Moisture control

331

THE PRINCIPLES REMAIN THE SAME!!!

332

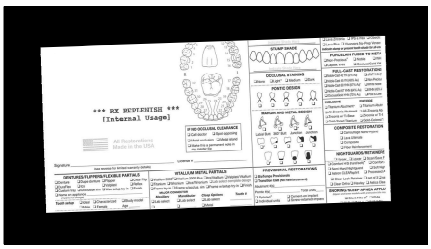


333

3. Provide quality information

Be thorough on the lab slip

334



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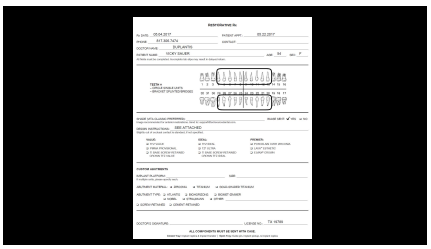

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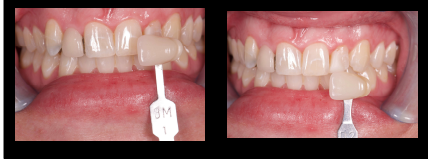
3. Provide quality information



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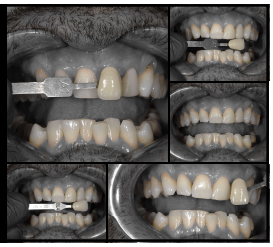
3. Provide quality information - get quality results

339

3. Provide quality information



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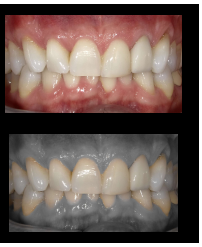

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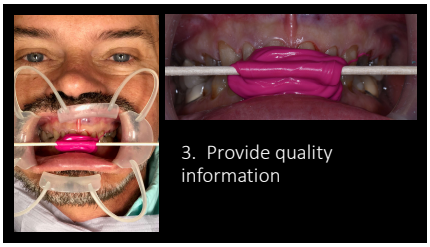

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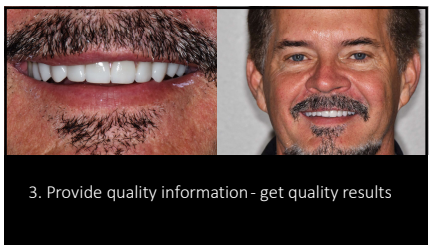

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CEMENTATION

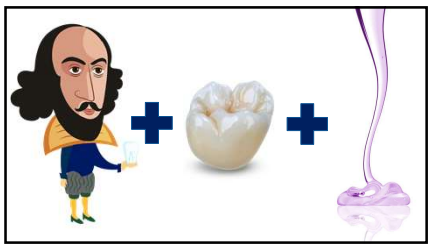
"A restoration is only as successful as the glue that holds it in"

347

SUCCESS...

lies not only in the ability to diagnose, choose, and treat. It lies in the ability to bring it all together with a glue that provides a long lasting restoration with minimal or no sensitivity!

348



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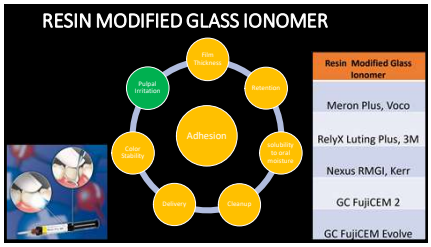
Material Cementation

RMGI

SARC

ARC

351



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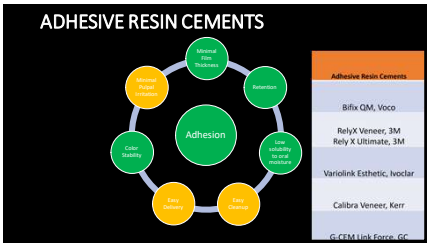

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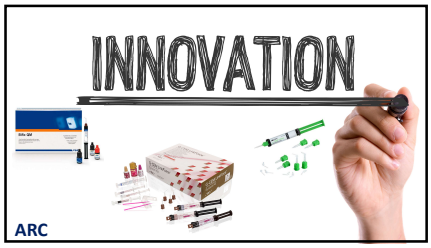

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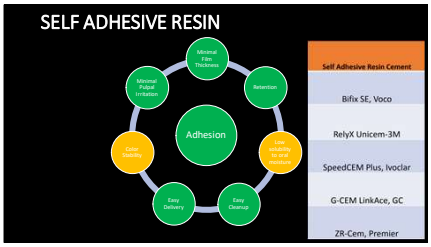

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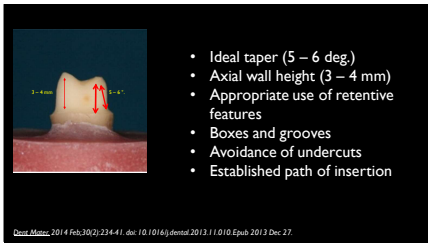

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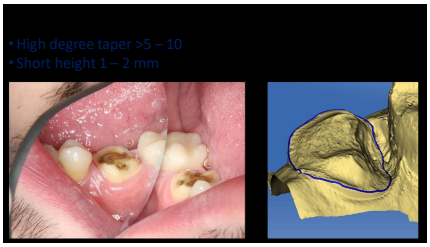

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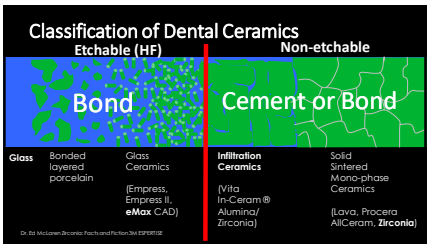

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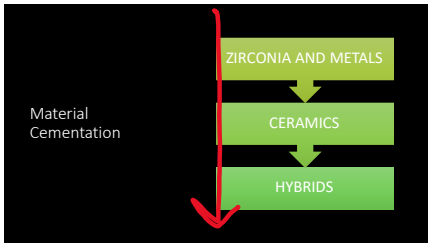

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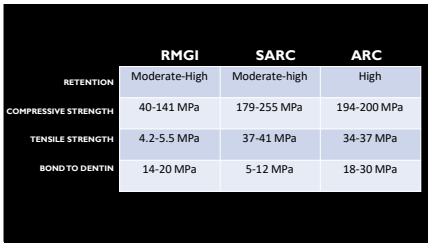
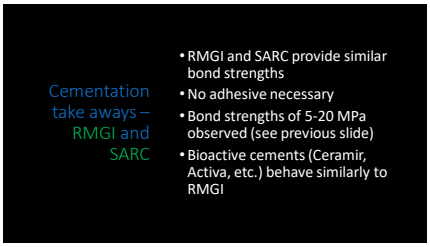


	RMGI	SARC	ARC
RETENTION	Moderate-High	Moderate-high	High
COMPRESSIVE STRENGTH	40-141 MPa	179-255 MPa	194-200 MPa
TENSILE STRENGTH	4.2-5.5 MPa	37-41 MPa	34-37 MPa
BOND TO DENTIN	14-20 MPa	5-12 MPa	18-30 MPa

368



369

Cementation take aways - ARC

- ARC Provides highest bond strengths.
- Enamel bond (30-40 MPa)> Dentin Bond (18-30 MPa)
- Dentinal bond strength is not enhanced by etching.
- ARC bond strength is dependent upon the adhesive used.

370

Bioceramic cements

- New and different
- May require trituration
- Caries inhibitive
- 2 and 3 year studies with no loss of retention or marginal leakage
- universal cement
- Glass ionomer +++ properties

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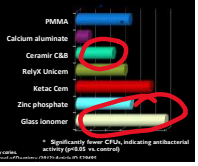
Antibacterial properties

- No antibacterial effect was observed for any other cements than Ceramir Crown & Bridge after 1 day or 7 days
- No correlation between either acidic materials or fluoride release and antibacterial properties could be seen; rather, basic materials showed stronger antibacterial properties



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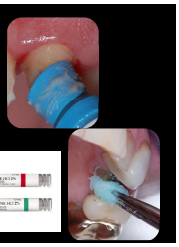
In Summary

373

- Adhesion is dependent upon a clean surface.
- All temporary cement must be removed.
- ANESTHESIA MAY BE NECESSARY.
- Tooth must be properly cleaned with:
  - Pumice and water slurry
  - Chlorehxidine or water
- Tooth must be moist, and not desiccated.



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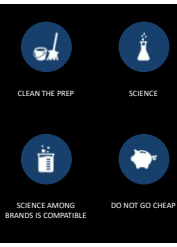
Important things to remember



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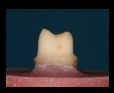
METAL, PORCELAIN TO METAL AND ZIRCONIA



RMGI (or SARC)

ASSESS / CLEAN THE PREP

AIR ABRADE THE RESTORATION

CHOICES

ZIRCONIA or METAL PRIMER

ADHESIVE RESIN CEMENT

TACK CURE

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GLASS CERAMICS – SARC (RETENTIVE PREP)

ETCH*

SILANE

SELF-ADHESIVE RESIN CEMENT

TACK CURE

POLISH

FINAL CURE/ OR ALLOW FOR DUAL CURE

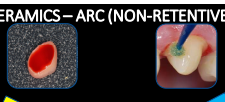
CLEAN PREP/TEMP CEMENT

CLEANSER

*IF NOT DONE AT THE LAB

377

GLASS CERAMICS – ARC (NON-RETENTIVE PREP)



ETCH*

SILANE AND/OR UNIVERSAL BONDING AGENT

ADHESIVE RESIN CEMENT

TACK CURE

POLISH

FINAL CURE

CLEAN PREP/TEMP CEMENT

ETCH

CLEANSER

UNIVERSAL BONDING AGENT

*IF NOT DONE AT THE LAB

378

Restoration	Cement Choice	Tooth Preparation	Restoration Preparation
Zirconia	Cement - good retention only	Ensure clean preparation (pumice or scrub)	Air abrade restoration (50-60 µm aluminum oxide, < 2bar), apply RMGI or SARC cement
	Bond - SARC	Ensure clean preparation	Air abrade restoration (50-60 µm aluminum oxide, < 2bar)., apply silane primer, apply SARC cement
	Bond - ARC	Ensure clean preparation, etch and/or bonding agent according to manufacturer's instructions	Air abrade restoration (50-60 µm aluminum oxide, < 2bar)., apply silane primer, apply bonding agent and ARC cement (dual cure)
Lithium Silicate or Disilicate	Bond - SARC	Ensure clean preparation	etch restoration with 5% HF acid etch for 20s, apply silane primer apply SARC cement
	Bond - ARC	Ensure clean preparation, etch and/or bonding agent according to manufacturer's instructions	etch restoration with 5% HF acid etch for 20s, apply silane primer, apply bonding agent, apply ARC cement
Leucite-Reinforced Ceramics	Bond - ARC	Ensure clean preparation, etch and/or bonding agent according to manufacturer's instructions	etch restoration with 9.6% HF acid etch for 1 minute (max 2.5 minutes), apply silane primer, apply bonding agent, apply ARC cement
Hybrid Ceramics	Bond - ARC	Ensure clean preparation, etch and/or bonding agent according to	air abrade restoration with 25-50 µm aluminum oxide (1.5 - 2 bar), apply silane primer for 60 seconds, apply bonding agent and ARC dual cure cement (verify

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Restoration Type		Glass Ionomer or Ceramir Cement	Self Adhesive Resin Cement	Adhesive Resin Cement
ll Crown	Zirconia	/*	/	/**
	Solid or Print	/*	/	/**
	Emax or Obsidian		/	/
	CAMouflage			/
neer	Emax			/
	Feldspathic Porcelain			/
rlay	CAMouflage/Luxa Ultimate			/
	Enamlic		/	/
	Obsidian or Emax		/	/
nplants		/	/	Not really needed

	Glass Ionomer or Ceramir Cement	Self Adhesive Resin Cement	Adhesive Resin Cement
	Meron Plus QM	RelyX Unicem-3M	RelyX Ultimate-3M
	GC Fujicem Evolve	SpeedCEM Plus - Ivoclar	EZ CEM - Zest
	*Ceramir - Doxa	Maxcem Elite - Kerr	Bifix QM - Voco
		Bifix SE - Voco	RelyX Veneer
*DCO Ceramic Bond and Monobond Plus are primers that enhance the bond strength of the cement to the crown. They works on both resin cement classifications, BUT has no effect on the Glass Ionomer classification. Works on all type of crown materials	*Ceramir is not truly a glass ionomer, but has similar properties. For these cements to be successful, the prep must have retention (4-6 mm tall with minimal taper)	THE CERAMIC PRIMERS ENHANCE the bond strength on the CROWN, NOT THE TOOTH. No additional primer/adhesive is necessary for these, unless specifically directed for material set by dentist	These cements require an adhesive and primer for them to work properly. Primers will help, but additional adhesive is necessary inside the crown and on the tooth for the cement to work properly

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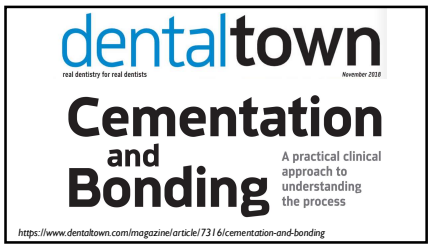

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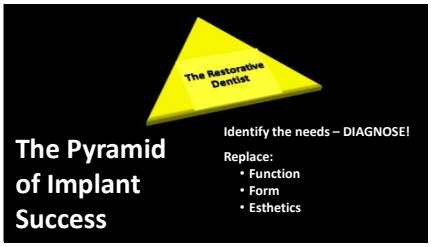

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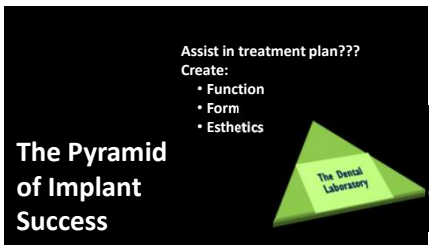

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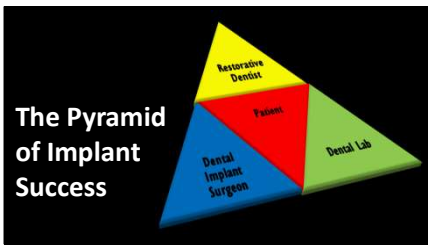

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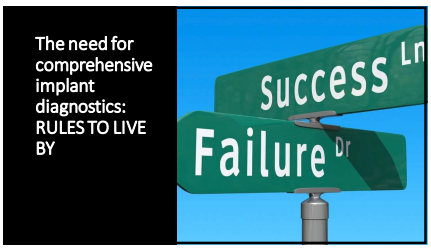

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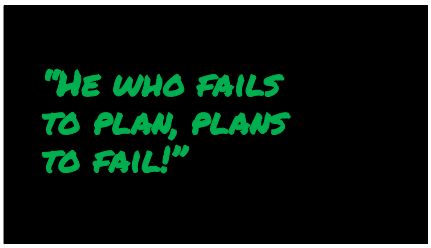

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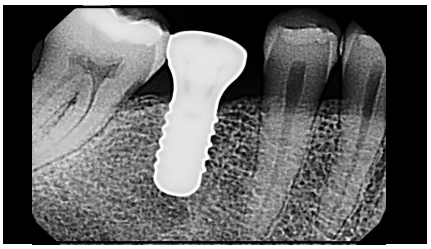

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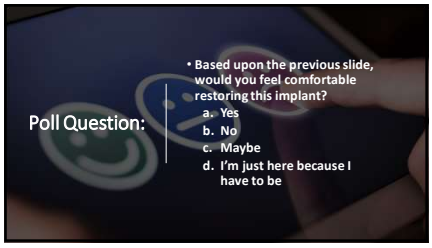

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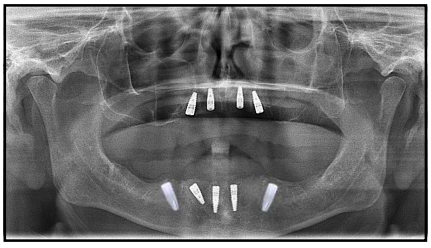

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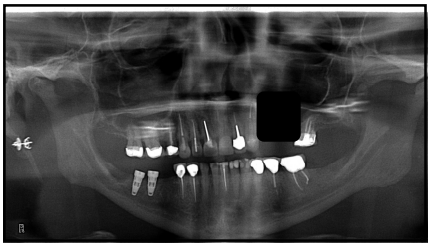

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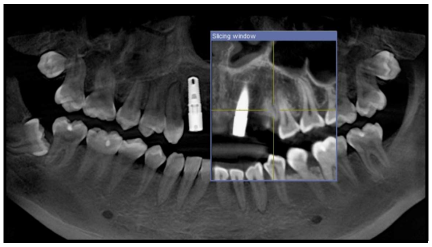

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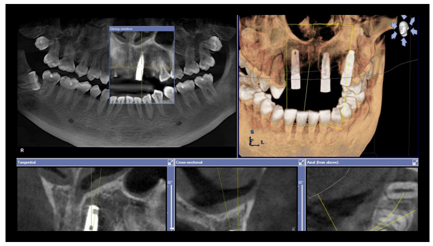

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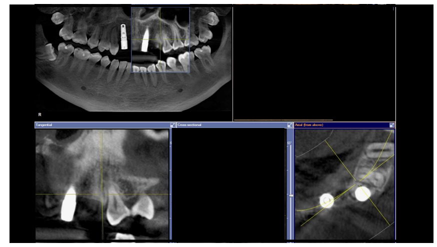

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Implant Placement Considerations

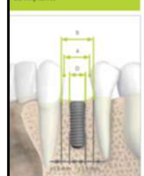
400

Implant Placement Considerations: The Rules of 6

- The Rules of 6
- 6 Rules of creating or identifying appropriate bone volume

Cooper LF, Pin-Harry OC."Rules of Six"--diagnostic and therapeutic guidelines for single-tooth implant success. Compendium of Continuing Dental Education. 2013 Feb;34(2):94-8

401



BL Implants	Shoulder diameter [illegible] (mm)	Gap width (mm)	Distance between adjacent teeth at bone level (mm)
	BL Ø 3.3	5.5	6.5
	BL Ø 4.1	6.0	7.0
	BL Ø 4.8	7.0	8.0
	Rule	D + 2 mm	D + 3 mm*

Photo Courtesy of Straumann

402

Implant Placement Considerations: The Rules of 6

2. Buccolingual Distance

- 6 mm of buccolingual distance – or -
- There should be at least one mm of good bone on either side of the implant.[1]
  - 3mm diameter implant = 5 mm bone width necessary

Photo Credit: Straumann

1. Chiche F A. Leriche M A. Multidisciplinary implant dentistry for improved aesthetics and function. *Prac Perio Aest Dent* 1998: 10: 177–186.

403

Implant Placement Considerations: The Rules of 6

3. 6 mm length at minimum

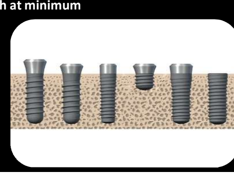


Photo Courtesy of Straumann

404

Implant Placement Considerations: The Rules of 6

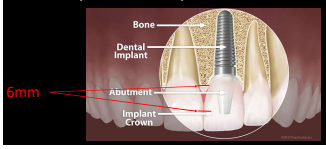
4. 6 mm inter-occlusal distance to permit inclusion of ideal components and prostheses without functional or esthetic interference.

Photo Credit: Straumann

405

Implant Placement Considerations: The Rules of 6

5. There can be no more than a distance of 6 mm from the interproximal contact point to the bone crest.



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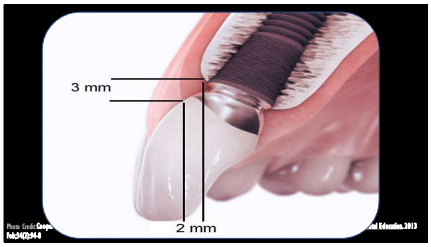

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Additional Implant Placement Considerations

Apico-Coronal Position of Implant

- Problems can arise when placed to apically or coronally
  - Too Deep
    - **Soft Tissue Collapse**
    - **Cementation Issues**
  - Too Coronal
    - **Odd emergence profile**
- Ideal Placement
  - 3-4 mm in the esthetic zone, beneath free gingival margin

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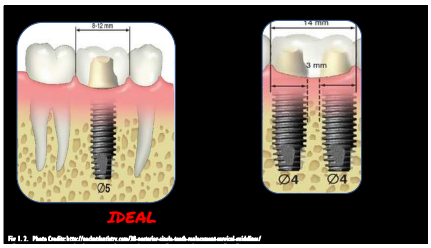
Additional Implant Placement Considerations

- Interproximal Distance[1]
  - The *ideal* distance between two implants is 3 mm (restorative platform)
  - The *ideal* distance between an implant and a natural tooth is 3-4 mm
  - Attention to these parameters will conserve papilla and bone height

1. Tarnow DP, Cho SC, Wallace SS. The effect of inter-implant distance on the height of inter-implant bone crest. J Periodontol. 2000 Apr;71(4):546-9.

409



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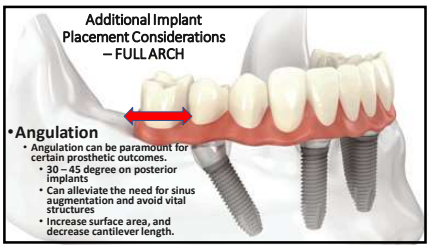
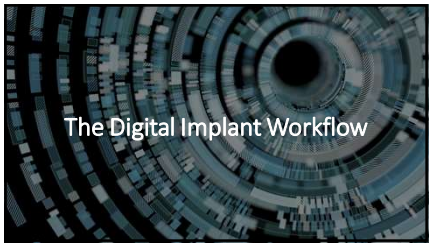
Additional Implant Placement Considerations – FULL ARCH



- **Angulation**
  - Angulation can be paramount for certain prosthetic outcomes.
    - 30 – 45 degree on posterior implants
    - Can alleviate the need for sinus augmentation and avoid vital structures
    - Increase surface area, and decrease cantilever length.

411



412

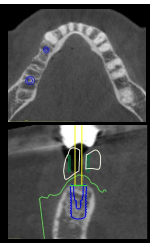
The Digital Implant Workflow

SCAN → PLAN → PLACE → RESTORE

413

Diagnostic Data Needed

- CBCT
  - Cone beam computed tomography
  - Offers a high resolution 3D image with doses up to 15 times lower than conventional radiography.
  - "Volumetric Imaging"
  - Fast and comfortable to the patient
  - Open environment



414

Diagnostic Data Needed

- CBCT
  - Offers several advantages:
    - 3-D assessment of the residual alveolar ridge and the adjacent teeth to assess bone levels and periapical
    - mesiodistal osseous dimension
    - buccolingual osseous dimension
    - occlusogingival dimension of the alveolus

415

Diagnostic Data Needed

- Alamri, HM, et al. Applications of CBCT in dental practice: A review of the literature . General Dentistry. 2012; Sep/Oct:390-400.
  - "CBCT has reduced implant failures by providing information about bone density, the shape of the alveolus, and the height and width of the proposed implant site for each patient"

416

Diagnostic Data Needed

- CBCT
  - American Academy of Oral and Maxillofacial Radiology
    - *Recommendation:* Some form of cross-sectional tomographic images be used to treatment plan dental implant cases.[1]

1. Tyndall, DA et al; American Academy of Oral and Maxillofacial Radiology. Positional statement of the American Academy of Oral and Maxillofacial Radiology on selection criteria for the use of radiology in dental implantology with emphasis on cone beam computed tomography. *Oral Surg Oral Med Oral Path Oral Radiol.* 2012;113(6):817-26.

417

Poll Question:

- Do you believe that CBCT is the standard of care?
  a. Yes
  b. No
  c. It will be soon
  d. I'm just here because I have to be

418

The Digital Restorative Workflow

PLAN

419

Co-Diagnostic Software

- Co-Diagnostic Software
  - Prosthetic driven implant planning solutions
  - Integrates pre-operative data to plan placement and final restorative goal
  - Allows for the Restorative Dentist, Implant Surgeon, and Dental Laboratory to communicate goals and set an endpoint

Prosthetic Driven → Immediate Provisionalizaton

420

Guided Implant Surgery

- Provides a restorative driven surgical approach.
- Surgeons work off of same restorative plan as the restorative dentist.
- All of the pre-planning (waxups, stents, etc.) are done virtually
- The guesswork is eliminated
- Greatly reduces and possibly eliminates errors
- All involved are working towards a COMMON GOAL

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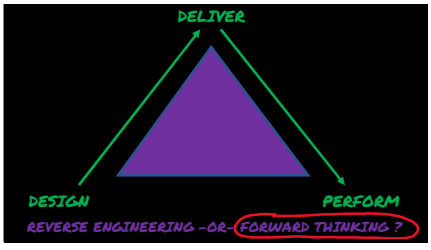

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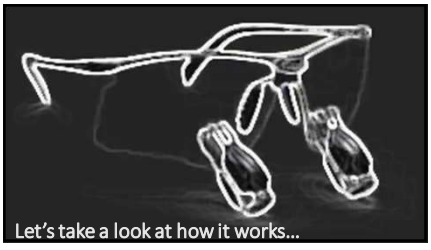

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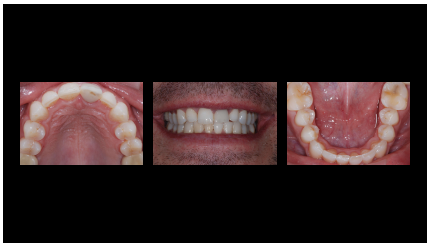

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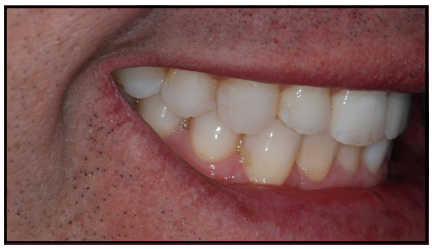

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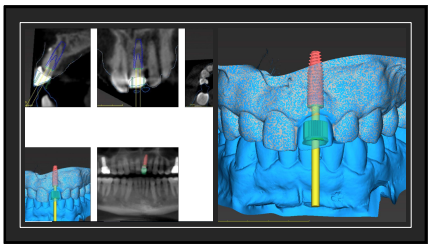

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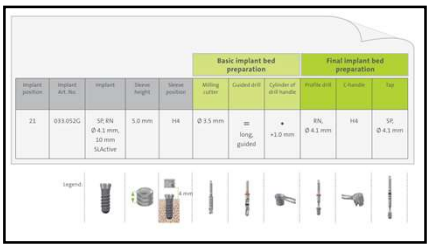

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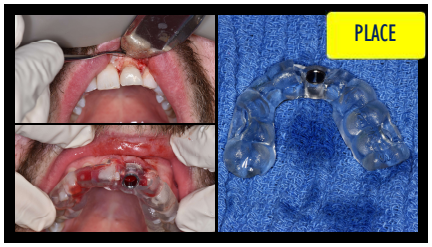

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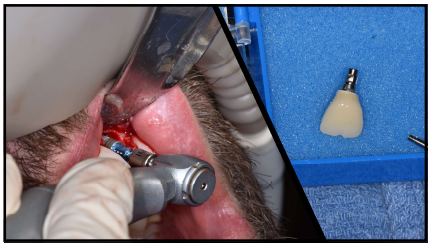

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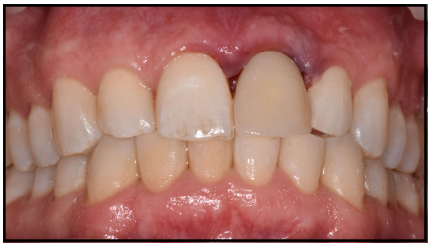

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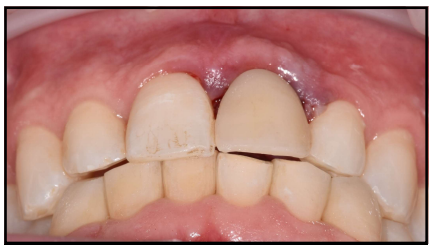

433

Let's talk about immediate loading…

434

Immediate Loading DEFINITION

- **The placement of an implant and a provisional at the same appointment**
- **Otherwise known as "Immediate Provisionalization"**

435

Immediate Loading of Single Tooth Implants CONSIDERATIONS

1. **Implant features**
   - Tapered
   - Grooves /Osteoconductive
   - 10-13 mm in length
2. **Bone quality and quantity**
   - Volume, density, previous extraction site, is grafting necessary?
3. **Initial stability**

http://www.dentistryiq.com/articles/wfj/print/volume-5/issue-4/you-and-your-practice/immediate-load-implants.html

436

Immediate Loading of Single Tooth Implants

INITIAL STABILITY

- **Key Factor**
- **Well anchored**
- **35 Ncm torque at placement**
- **"no difference in implant success when comparing a two-stage approach to an implant that is loaded immediately as long as it is initially stable"***

*Tarnow DP, Emtiaz S, Classi A. Immediate loading of threaded implants at stage 1 surgery in edentulous arches: six consecutive case reports with 1- to 2-year data and a discussion of the osseointegration literature. Int J Oral Maxillofac Implants. 1997 Mar-Apr;12(2):319-24.

437

Immediate Loading

Advantages

1. One surgical procedure
2. Treatment time is shortened, no need to uncover the implant.
3. Fixed provisionalization is possible.
4. Ability to sculpt soft tissues with a tooth form

Disadvantages

1. It requires coordination between the surgeon and the restorative dentist, unless the same person is performing both.
2. The definitive, tooth-colored abutment is somewhat difficult to prepare during the placement of the implant.

438

Immediate Loading KEYPOINT…

MAKE SURE THAT THE PROVISIONAL HAS NO CENTRIC OR EXCURSIVE CONTACTS!!!

http://www.dentistryiq.com/articles/wfj/print/volume-5/issue-4/you-and-your-practice/immediate-load-implants.html

439

Excellent Article

Cooper LF, et al. The immediate loading of dental implants. Compend Contin Educ Dent. 2007 Apr;28(4):216-25.

- Investigative article and literature review of numerous studies.
- Relays positive findings on immediate loading for single teeth and both arches.

440

FAST FORWARD 3 MONTHS

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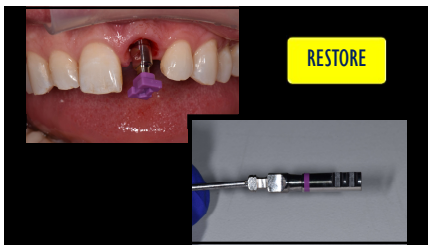

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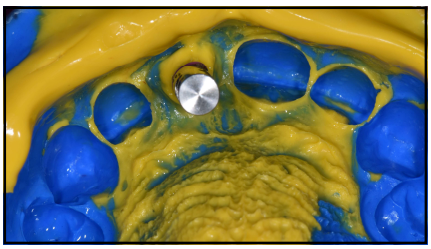

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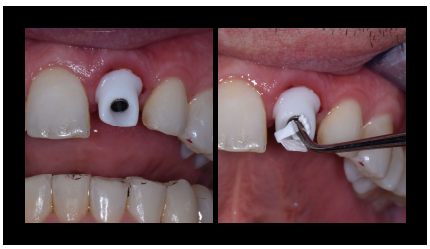

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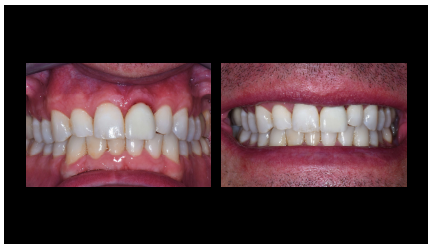

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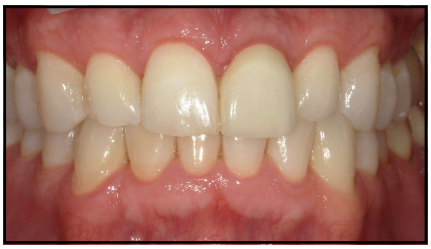

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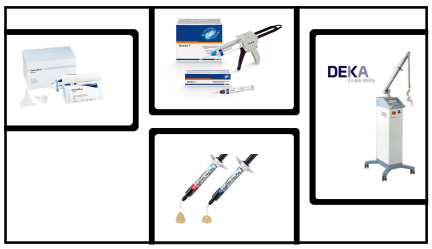

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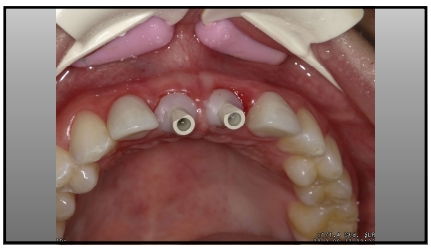

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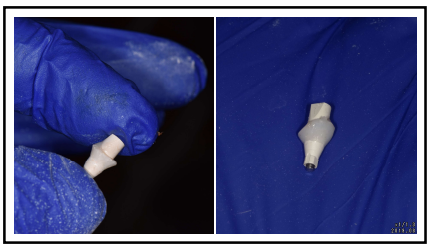

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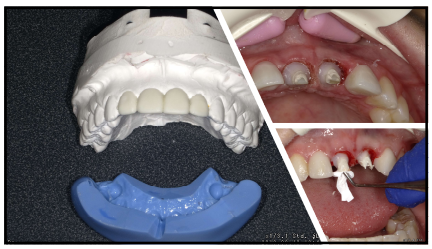

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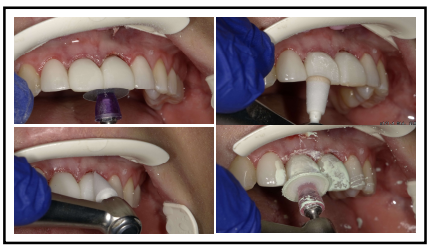

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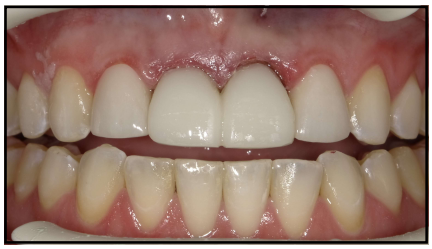

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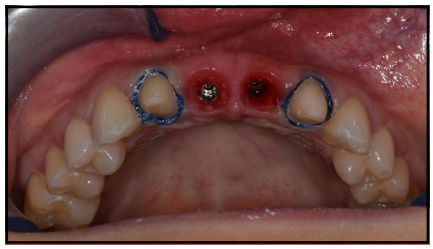

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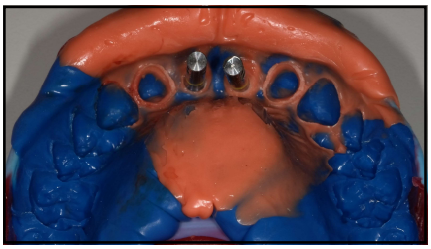

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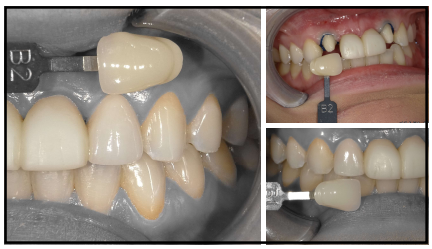

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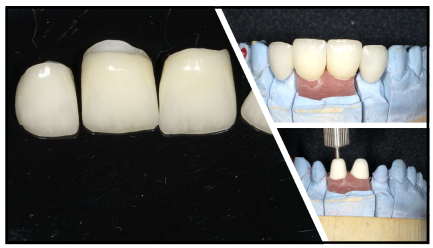

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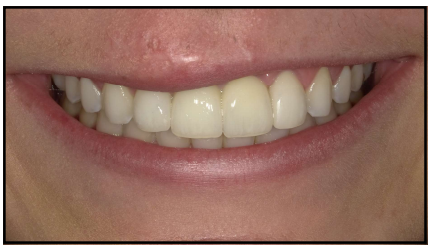

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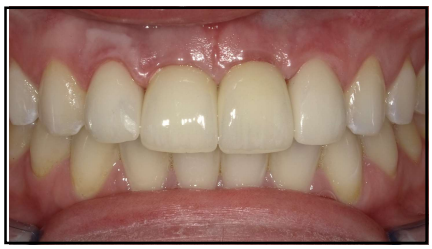

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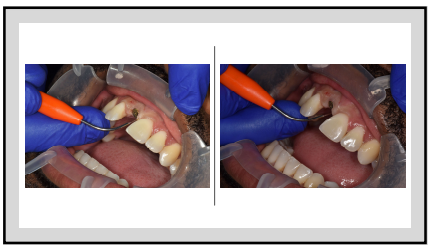

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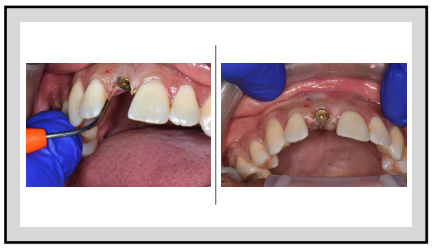

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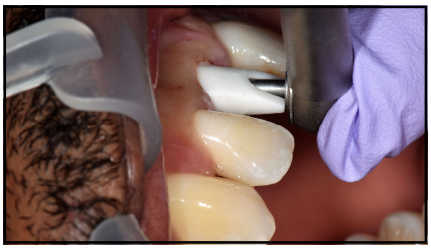

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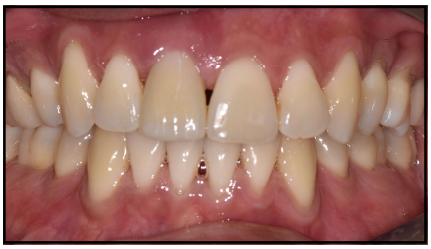

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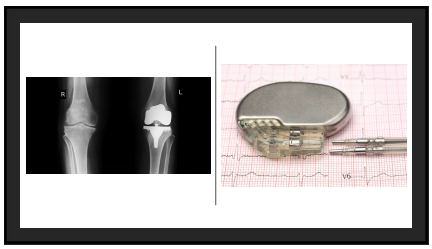

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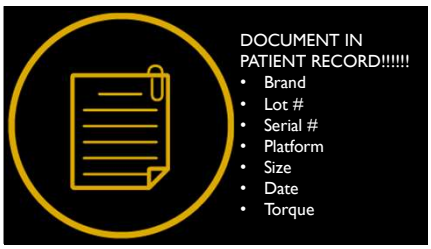

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RULE #1

VERIFY INTEGRATION

469

ISQ – IMPLANT STABILITY QUOTIENT

- indicates the level of stability and osseointegration in dental implants
- ranges from 1 to 100
- higher values indicate greater stability
- acceptable stability range lies between 55-85 ISQ
- higher values are generally found in the mandible than the maxilla
- The ISQ scale is a patented technology of the Sweden-based company Osstell AB

https://www.osstell.com/clinical-guidelines/the-isq-scale/

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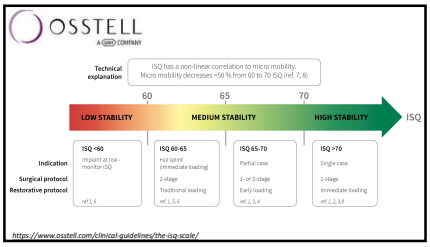

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PenguinRFA

- ISQ values are obtained using resonance frequency analysis (RFA)
- PenguinRFA provides accurate and objective measurements of implant stability and in turn osseointegration, serving as reliable support when making the decision on whether or not to load.

https://aseptico.com/store/implant-surgery/implant-systems/penguin-rfa/

Aseptico

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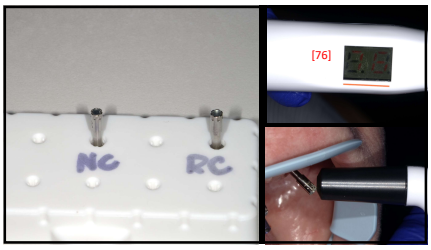

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Stock Abutments

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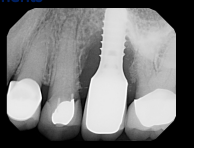
Stock vs. Custom Abutment

Photos courtesy of STRAUMANN

475

Stock Abutments



"Both peri-implant mucositis and peri-implantitis are characterized by an inflammatory reaction in the tissues surrounding a dental implant that can lead to tissue destruction and ultimately, implant failure."
-American Academy of Periodontology

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Custom Abutments

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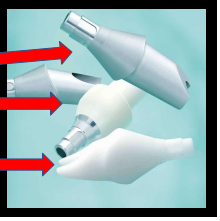
Custom Abutments

Titanium Abutment

Ti-base Abutment

Zirconia Abutment



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Advantages of Patient Specific Custom Abutments:

- Superior contours of soft tissue and emergence profile
- Reduces risk of cement issues
- Superior fit of copings to the abutment and greater retention from more surface area of custom abutment vs. stock
- Ability to precisely correct angulation
- Less use and expense of precious metals

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Suggested Uses:

- Titanium:
  - Advantage – STRENGTH!
  - Disadvantage – COLOR!
  - PFM Restorations
  - Zirconia Based Restorations

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Suggested Uses:

- Zirconia:
  - Advantage – COLOR!
  - Disadvantage – STRENGTH!
  - Zirconia Based Restorations?
  - Glass Ceramic Restorations

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Suggested Uses:

- Ti-base:
  - Advantage – COLOR!
  - Disadvantage – STRENGTH, LUTING STREN
  - Zirconia Based Restorations?
  - Glass Ceramic Restorations?

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- Ask Dr. Christensen…

- ***"Strength and reliability were significantly higher for the titanium abutments compared to the zirconia abutments."***

http://www.dentistryiq.com/articles/2010/12/current-research-titanium-implant-abutments-stronger-than-zirconia-abutments.html

483

- Ask Dr. Christensen…
  - ***"When would you want to use a zirconia abutment in spite of its lower strength? When the implant is significantly below the gingival tissues and the potential abutment would extend to the implant with a collar of metal from the implant to the apical margin of the restoration, there is a high likelihood of the gray color of the abutment metal showing through the gingival tissues. Also, if an all-ceramic crown is planned for an implant abutment, zirconia abutments provide a better esthetic result than metal abutments. In these two example situations zirconia abutments are indicated. Otherwise, why go to the expense and uncertainty of a zirconia abutment?"***

http://www.dentistryiq.com/articles/2010/12/current-research-titanium-implant-abutments-stronger-than-zirconia-abutments.html

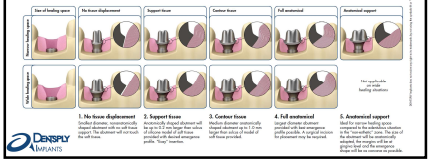
484

ATLANTIS™

Emergence width options

The functional and esthetic outcome achieved with Atlantis abutments is a result of the size of the healing space, the emergence width option selected and the position of the restorative margin.

Note: The default emergence width option for Atlantis abutments is contour tissue.



DENTSPLY IMPLANTS

485

The Restoration

486

Restorations: Screw Retained vs. Cement Retained

- Digitally, both options are available
- Comprehensive decision and planning process
- Advantages and disadvantages of both

487

488

Screw Retained Restorations

- Advantages:
  - Retrievability
    - Cleaning
    - Screw replacement
  - Can be used with limited interocclusal distance
  - Absence of cement irritant at restoration abutment interface

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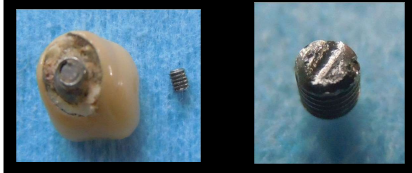
Screw Retained Restorations

- Disadvantages:
  - Esthetics of access hole
  - Implant angulation may result in inability to use a screw retained restoration

490

Screw Failures



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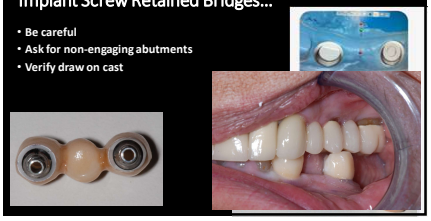
Implant Screw Retained Bridges…

- Be careful
- Ask for non-engaging abutments
- Verify draw on cast



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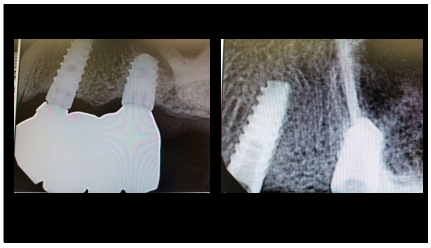

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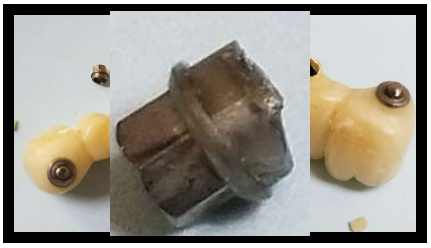

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Cement Retained Restorations

- Advantages:
  - Independent of implant angulation
  - Enhanced esthetics
  - No screw access hole
  - Flexibility of fixture form
  - Allows for passive fit of restoration

497

Cement Retained Restorations

- Disadvantages:
  - Ability to control the cement line
  - Retrievability
  - Subgingival cement line
  - Cleaning of excess cement
    - Peri-implantitis
  - Crown retention

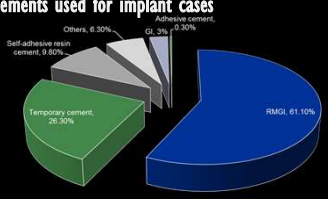
498

Cementation to Implant Abutments

- Survey of US dental schools and postgraduate programs
- Results
  - RMGI most frequently used for cementing implant restorations (~68%)

499

Cements used for implant cases



AFG Market Research 2012; sponsored by 3M

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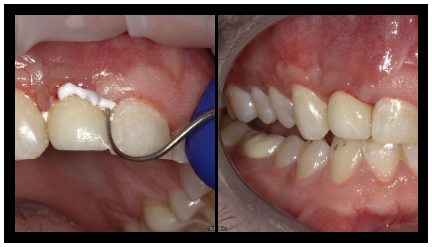

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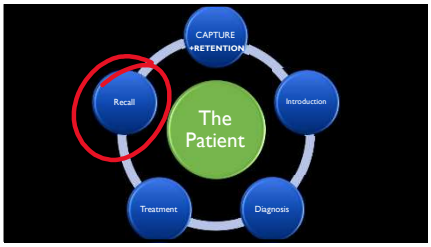

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Ensure adequate systems are in place

- Recall
- Reactivation
- VOIP phone systems are GREAT for this!
- ALWAYS schedule the next appointment when in the chair
- Offer products that you believe in!

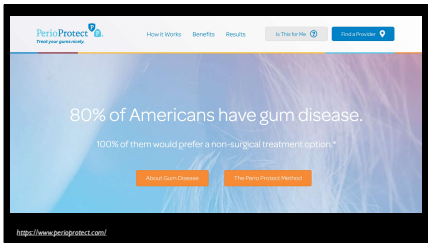
506

507

Whitening

- Offer in-office
- Offer take home
- Offer "one size fits all"
- Offer white spot therapy treatments

508



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What about aligner therapy?

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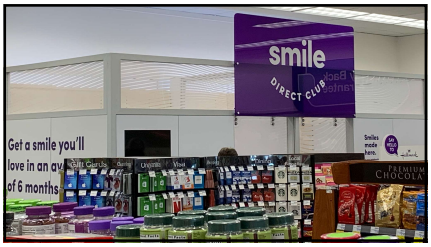

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Clear Aligners

- My motto:
  - Develop great relationships with your specialists
  - Don't jeopardize those relationships
  - Choose your cases wisely!
  - DON'T GET IN OVER YOUR HEAD
  - It's "OK" to be profitable by providing a great service!

514

KNOW WHEN TO TREAT -AND- WHEN TO REFER!!!

515

CLASS I Occlusion

GP to TREAT	REFER to ORTHO
• Permanent dentition	• Mixed dentition
• Anterior crossbite	
• Molar crossbite (not being corrected)	• Molar crossbite (to be corrected)
• Open bites ≤ 2mm	• Open bites ≥ 2mm
• Like arches	• Unlike arches

*based upon suggestions by Align Technology, Invisalign ©2017

516

CLASS II Occlusion

GP to TREAT	REFER to ORTHO
• No A-p correction	• A-P correction
• Overjet ≤ 3mm	• Overjet ≥ 3mm

*based upon suggestions by Align Technology, Invisalign ©2017

517

CLASS III Occlusion

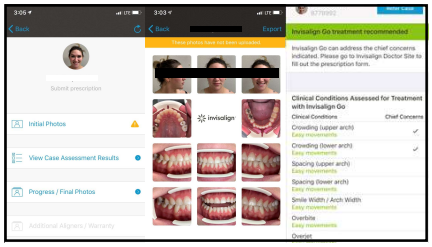
GP to TREAT	REFER to ORTHO
• NONE	• All cases

*based upon suggestions by Align Technology, Invisalign ©2017

518

- Automated, chairside case assessments and notifications
- Simplified prescription form
- Automated multiple treatment plans and filters
- Up to 20 stages of aligners

519



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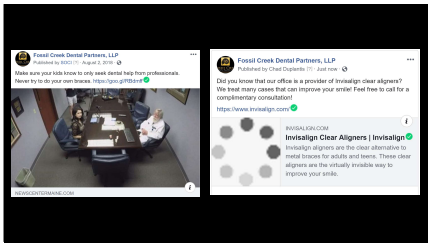

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3-D Printers

522

What are the capabilities?

- Models
  - Orthodontic, Diagnostic, Restorative
- Temporaries
- Clear aligners
- Orthodontic transfer trays
- Surgical guides
- Custom impression trays
- Splints
- Nightguards
- Dentures (temporary and long term)

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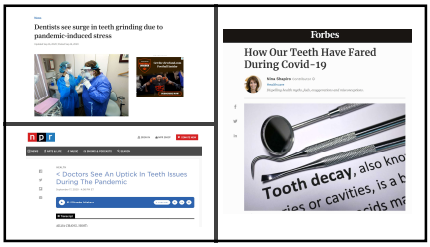

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Prevalence of Bruxism

- Estimated 20% prevalence in the general population
- Approximately 22% reported that they grind their teeth at night,
- 67% of participants reported that they did not
- 11% either were not sure, bruxed occasionally, or did not have teeth

Lavigne GJ, Khoury S, Abe S, Yamaguchi T, Raphael K. Bruxism physiology and pathology: an overview for clinicians. J Oral Rehabil. 2008 Jul;35(7):476-94.

525

Consequences of Bruxism

- Stomatognathic breakdown will occur
- Wear facets
- CR-CO (MI) discrepancy
- Tooth fractures.
- Hypersensitivity
- Mobility
- Cheek biting or lip biting
- Hypertrophy of masseter / tenderness or fatigue of masticatory muscles
- Tenderness of TMJ which may manifest as "ear pain"

Lal SI, Weber KK. Bruxism Management. [Updated 2020 Aug 17]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK482466/

526

Treatment of Bruxism

- *Occlusal adjustments*
- *Occlusal Splints*
- *Psychotherapy*
- *Restorative Treatment*
- *Physical Therapy*
- *Relaxation Training*
- *Drugs*
- *Biofeedback*
- *Electrical Method*
- *Equilibration Therapy*

Lal SI, Weber KK. Bruxism Management. [Updated 2020 Aug 17]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK482466/

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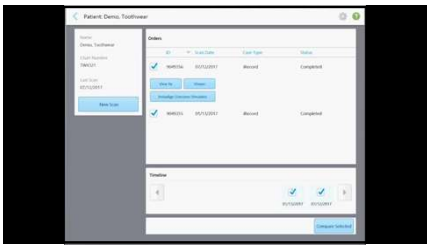

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Occlusal Guard Therapy Reasons

- Bruxism/parafunctional habits
- Fatigued muscles of mastication
- Headaches
- Neck Aches
- Worn teeth
- Malocclusion
- Popping/clicking/crepitus
- Protection of restorations/dentition

530

Occlusal Guard Purposes

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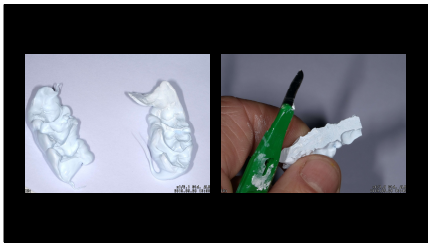

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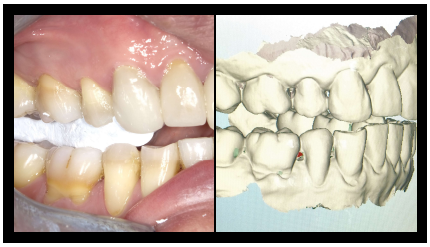

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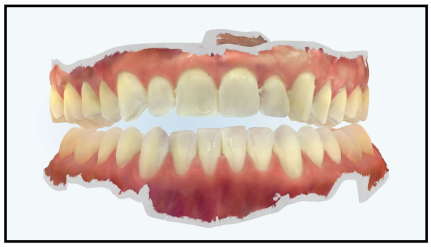

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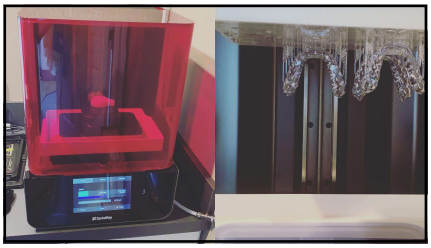

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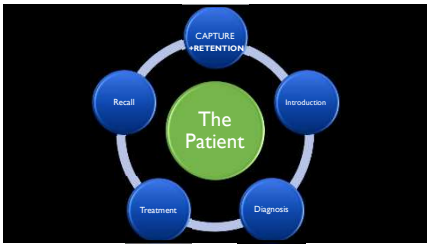

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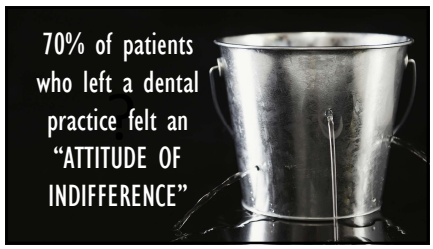

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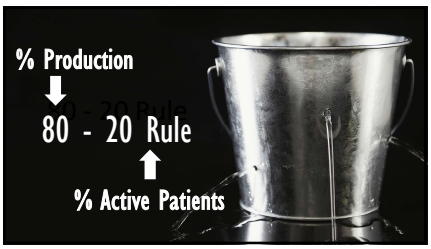

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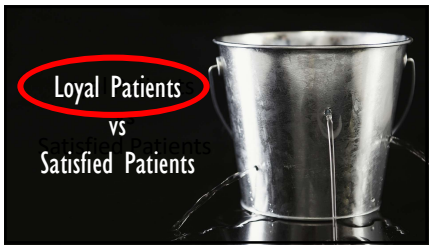

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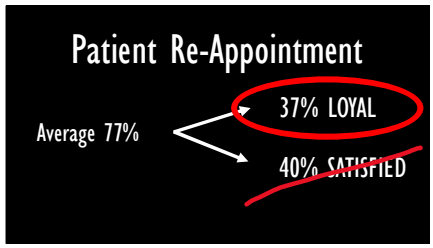

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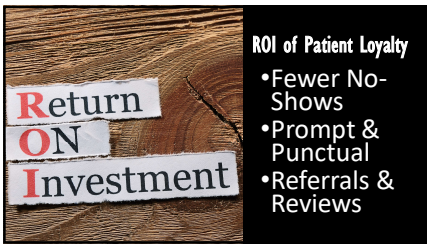

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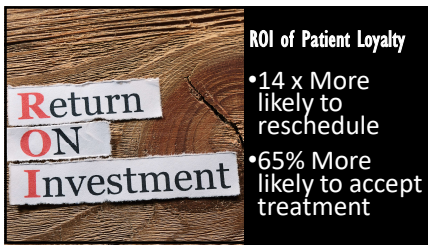

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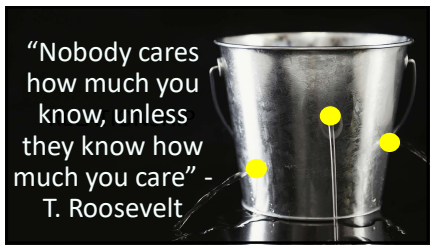

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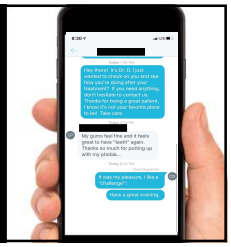
5 Minute Plan

- EVERY new patient
- Post-op Follow-up
- Pre-op Information



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IN CLOSING...

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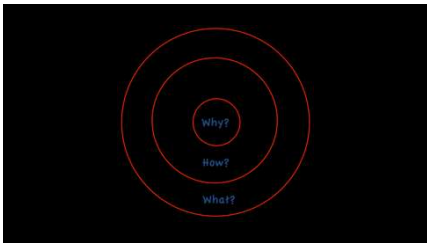

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"With new technology, there's always the question: 'What is the cost of adoption?' I've always preferred to ask, 'What is the cost of delay?' In dentistry, we must strive first and foremost to provide the best possible service for our patients. In following this creed, I've found that those of us looking to advance the industry — 'adapting at the speed of change' — end up benefiting greatly ourselves."
- JIM GLIDEWELL, CDT
Founder, President and CEO, Glidewell Dental

553

"PEOPLE WON'T REMEMBER WHAT YOU DID OR SAID, BUT THEY WILL REMEMBER HOW YOU MADE THEM FEEL."

-MAYA ANGELOU

554

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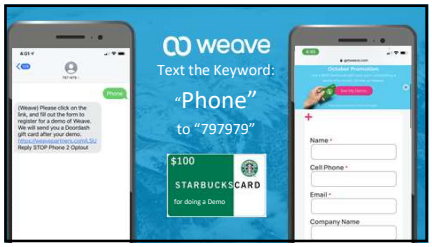
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