

The Six Lessons Approach to Biomimetic Dentistry

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Why biomimetic dentistry?

Treat 3-D Problems

1. Deep Boxes
2. Deep Cracks
3. Deep Decay

Dental Outcomes

- Fully addresses the causes of biologic failures
- Makes clinical failures easy to fix
- Prevents catastrophic failures

Six Lessons: The Hierarchy of Importance

1. Dx & Tx of caries
2. Dx & Tx of structural compromises
3. Immediate dentin sealing and resin coating
4. C-factor control by decoupling & fiber placement
5. Enamel preparation & onlay design
6. Occlusal adjustment

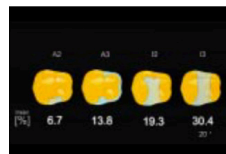


Fig 13 Comparison of tooth structure removal associated with the different preparation designs for a mandibular left second premolar. * = tooth structure removal for preparations performed for cast-metal restorations.¹³

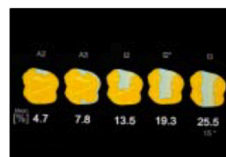
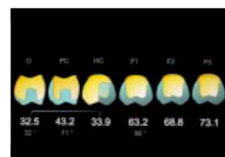


Fig 14 Comparison of tooth structure removal associated with the different preparation designs for a maxillary right first molar. * = tooth structure removal for preparations performed for cast-metal restorations¹³; values connected with a line were not statistically significantly different.



Edelhoff D, Sorensen J. Tooth Structure Removal Associated with Various Preparation Designs for Posterior Teeth. Int J Periodontics Restorative Dent 2002; 22:241-249

“The life of a dentist is not incipient!”

- David Alleman DDS

Notes

“An adhesive restoration... has many advantages over conventional non-adhesive restorative techniques except that it cannot yet be realized in a simple way”

- Bart Van Meerbeek

“The goal of biomimetic dentistry is to not kill pulps and conserve tooth structure.”

- Davey Alleman DMD

Notes

Lesson 1: Dx & Tx of Caries

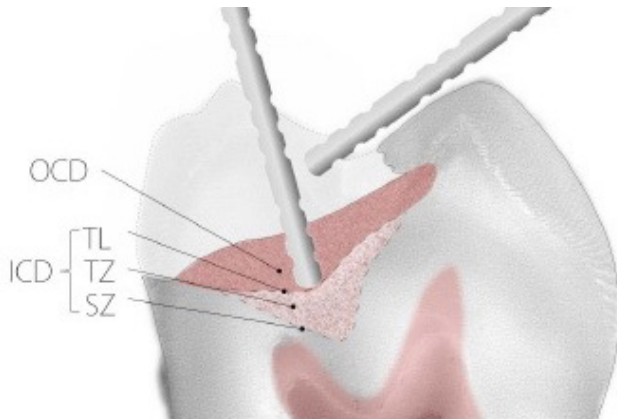
Traditional caries treatment

60% of unintentional decay is left behind with a tactile approach

Anderson H, et al. A comparison of digital and optical criteria for detecting carious dentin. J Prosthet Dent. 1985

Predictable caries treatment

Use caries detector dye (CDD) with caries removal endpoints (CRE) to achieve a caries-free peripheral seal zone (PSZ)



Alleman D, Magne P. A systematic approach to deep caries removal endpoints: The peripheral seal concept in adhesive dentistry. Quintessence Int, 2012; 43:197-208

“Caries treatment, our most important professional duty”

-Takao Fusayma DDS, PhD

Notes

Lesson 2: Structural Analysis

Crack treatment

- Cracks into dentin are not biomimetic and need to be removed
- Use the same measurements as CRE for your crack removal endpoints (CrRE) to achieve a crack-free PSZ
- Remove cracks completely with a round diamond

Larson D, et al Effect of Prepared Cavities on the Strength of Teeth. Oper Dent. 1981;6:2-5

Magne P, Oganessian T. CT Scan-Based Finite Element Analysis of Premolar Cuspal Deflection Following Operative Procedures. 2009 Quintessence Int, 2009; 29:361-369

Milicich G, Rainey J. Clinical Presentations of Stress Distribution in Teeth and the Significance in Operative Dentistry. PPAD. 2000; 12(7):695-700

Bransstrom M. The Hydrodynamic Theory of Dental Pain: Sensation in Preparations, Caries, and the Dental Crack Syndrome. J of Endodontics. 1986; 12:453-457



Lesson 3: Immediate Dentin Sealing & Resin Coating

Advanced adhesion

In order to do partial coverage, adhesion becomes your retention

Hierarchy of Bondability

1. Enamel 30 MPa
2. Superficial Dentin 50 MPa
3. Deep Dentin 40 MPa
4. Inner Caries 30 MPa
5. Outer Caries 15 MPa

Bond strength

Sealing the dentin before impression with the dentin bonding adhesive (DBA) increases bond strength 400%

Magne P, et al. Immediate Dentin Sealing Improves Bond Strength of Indirect Restorations. J Prosthet Dent. 2005; 94(6)

Gold Standard bonding systems

- SE Protect: 2 step self etch, monomer MDP and MDPB, 40 micron thickness, antibacterial
- Optibond FL: 3 step total etch, monomer GPDM, 80 micron thickness

“Novel resin bonding systems have the tensile and cohesive strength of the DEJ region. Accordingly, these materials have sufficient bonding performance.... [therefore] New principles for restoration... should be established.”

Urabe I, Nakajima M, Sano H, Tagami J. Physical properties of the dentin-enamel junction region. Am J Dent. 2000; 13:129-135

Notes

Lesson 4: C-factor & Fiber Placement

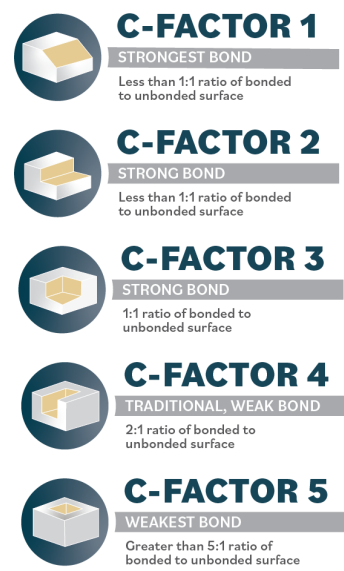
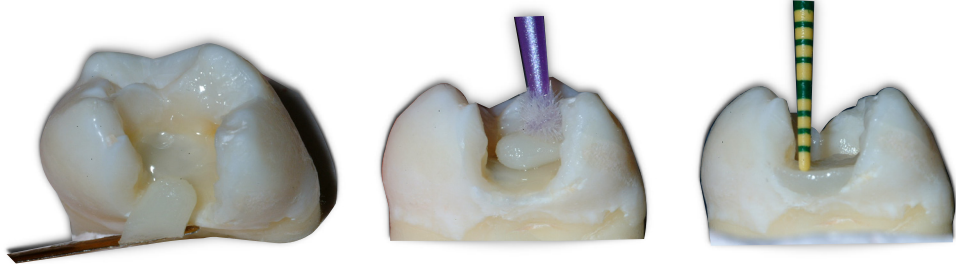
Direct restorations

Every biomimetic restoration will have a direct component

Layering to improve bond performance

Use thin horizontal increments

Nikolaenko S, et al. Influence of c-factor and layering technique on microtensile bond strength bond strength to dentin. Dent Mater. 2004 (20)579-585



Feilzer A, Gee A, Davidson C. Setting Stress in Composite Resin in Relation to Configuration of Restoration. J Dent Res. 1987; 66(11):1636-1639

Lesson 4: C-factor & Fiber Placement *continued...*

Ribbon placement

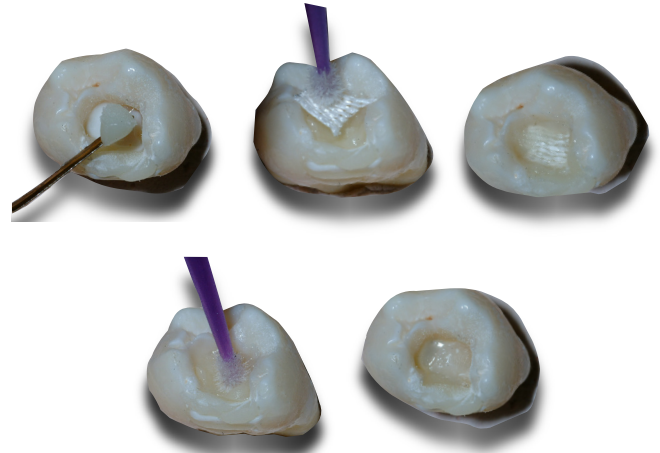
The stress relief from fiber inserts decreases crack and gap formation, decreasing potential micro leakage

Belli S, et al. The Effect of Fiber Placement or Flowable Resin Lining on Microleakage in Class II Adhesive Restorations. *J Adhes Dent*; (9): 175-181

Deep margin elevation vs crown lengthening surgery

With deep margin elevation few or no signs of clinical inflammation present

Sarfati A, Tirlet G. Deep margin elevation versus crown lengthening: biologic width revisited. *Inter J Esthet Dent*. 2018; (13) 334-356



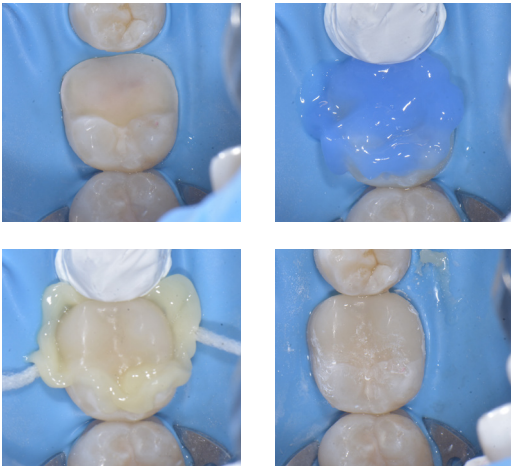
Lesson 5: Prep Design & Cementation

Prep design

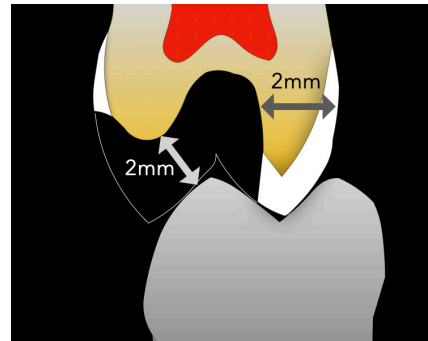
Preps should be relatively flat with rounded internal line angles

Cementation

Cement with heated AP-X



Magne P, et al. Luting of inlays, inlays and overlays with preheated restorative composite resin does not prevent seating accuracy. *Int J of Esthet Dent*. 2018; 13(3) 318-332



Ferraris F. Posterior indirect adhesive restorations (PIAR): preparation designs and aesthetics clinical protocol. *Int J of Esth*. 2017; 12(4): 482-502

Notes

Lesson 6: Occlusion

3 paper technique

2 papers on the working side, 1 on the non-working side, repeat without anesthesia if necessary