Resin-Based Pit & Fissure Dental Sealants

Gold Foil

Abrasives
Resin-Based Pit & Fissure Dental Sealants

A. Use

*Physical Barrier*

Which bacteria?
What 3 prominent bacteria are associated with dental decay?

1. Lactobacilli

2. Mutans streptococci

3. Streptococcus sobrinus

Different bacteria are responsible for periodontal disease. The 3 prominent bacteria are A actinocystemcomitans, P gingivalis, & B forsythia.
B. Types

1. Unfilled

2. Filled

3. Fluoride releasing
C. Composition

1. Resin matrix

2. Filler particles

3. Sodium fluoride additive
D. Characteristics

1. ↓ thermal conductivity

2. ↓ strength

3. ↓ wear resistance – 15% volume loss of material during 1st 6 months after placement.

E. Polymerization

1. Autopolymerization

2. Photopolymerization
F. Acid etch

1. Purpose

* retention mechanism?

2. Application

Successful etching appears:
G. Patient & Tooth selection

1. Indications
2. Contraindications

*Reference handout!!
H. Anatomy of Pits & Fissures

1. U shape
2. V shape
3. I shape
I. Tooth Preparation

1. Polish

2. Air polish

3. Acid etch

4. Controversy
   a. Is polishing necessary?
   b. Rinsing – how long is sufficient?
J. Placement

CLINICAL PROCEDURE OF SEALANT PLACEMENT

1. __________ to remove plaque.

2. __________ to maintain a dry field.

3. __________ the tooth surface.

4. __________ to open enamel surface for sealant retention.

5. __________ to remove etchant.

6. __________ enamel should appear frosted.

7. __________ to cover pits & fissures.

Opt'l step:

- 5 sec.
K. Contamination

1. Saliva
2. Fluoride
3. Etchant

L. Effects of polishing

M. Life expectancy of a sealant
N. Reduced sealant longevity — what could have caused it?

1.

2.

3.

4.

5.
O. Dental Charting
Any Questions regarding Pit & Fissure Sealants?

Sealant Misfortune and Neglect

*Dental misfortune and neglect. Occlusal sealants and subsequent interproximal decay. Modern occlusal sealants can close the natural pits and fissures of healthy teeth and render the chewing surfaces impermeable to decay. The interproximal tooth surfaces, however, require the daily hygiene attention of dental floss. This 16-year-old boy almost lost this second molar due to neglect. He thought the sealants made his teeth "bullet proof" and no longer in need of any attention.*
Direct Filling Gold:

Gold Foil
I. Use – small I, II, III, V
II. Characteristics

- ↑ ductility
- Malleable
- ↑ thermal conductivity
- ↓ strength – non-stress bearing applications
- ↓ wear resistance (easily abraded)
- Thermal expansion similar to tooth structure
- Biocompatible
- Aesthetical quality – matter of opinion
- Corrosion and tarnish resistant
- KHN: 75 – 345 WHY? composition
III. Composition

- Pure gold – noble metal (does not corrode)
- Gold alloy – gold, platinum, calcium (increased strength & hardness)

IV. Types – several forms

- Gold foil – thin sheets (25 µ)
- Mat gold – clumps of fine particles
- Mat foil – particles placed between thin sheets
- Powdered gold – pressed powder that is cut into pieces
V. Handling & Placement

- Establish a dry field (dental dam).
- Removal of contaminated outer surface coating of gold foil (annealing); foil is passed over an alcohol burner flame.
- Gold foil is condensed with heavy force into the cavity preparation (use of condenser as with amalgam).
- Placed in small increments (built-up slowly).
- Gold welds together by the condensation process & patient’s own body heat (cold-welded – no external heat source). RESULT: cohesive unit of gold!
- Margins are burnished for adaptation & surface smoothness. Burnishing also hardens the surface of the restoration and improves abrasion & scratch resistance.
VI. Finishing – Polish gold with a slurry of tin oxide.

VII. Charting
VIII. Clinical Success

- Gold is the most resistant of all the metals to corrosion.
- Gold is the most ductile and malleable of all metals.
- Gold is considered one of the closest restorative materials to the “ideal” dental material. However – the greatest drawback is the clinician’s technique – highly technique sensitive!

- Clinical drawbacks:
  - difficult & timely to place
  - costly
  - danger of pulpal injury due to forces applied during condensation
  - minimal strength and resistance to abrasion
Any Questions regarding Gold Foil restorations?
Abrasives:

Cutting,          Finishing,         Polishing
I. Use

A. To produce a smooth, lustrous surface on a restoration, tooth structure, or appliance.

B. To produce a more hygienic restoration or appliance.

C. To reduce intraoral corrosion of metal restorations.

D. To maintain correct occlusal relationships.

E. To prepare a tooth for a restorative material.
II. Definitions

A. Abrasion: the wearing away or removal of material by the act of rubbing, cutting, or scraping.

B. Abrasive: the element/object that does the abrading; particulate matter or dental burs (precise cutting patterns).

C. Finishing: the process by which a restoration or app’l is contoured to remove excess material & produce a reasonably smooth surface.

D. Polishing: the process of creating a smooth, scratch-free, highly reflective surface by no change in contour.

** Finishing & polishing are 2 abrasive procedures; they differ by intent & degree.**
III. Characteristics of Abrasives & Influencing Factors

A. Hardness

1. Defin: measure of a mat’ls ability to resist indentation.

2. Moh’s scale – ranks materials according to their ability to resist scratching (abrasion).
   Scale of 1 – 10  
   1 = softest [talc]  
   10 = hardest [diamond]

3. The greater the difference in the hardness between the abrasive agent & the material (dental or tooth), the more rapid & efficient the cutting and abrasion.
TABLE 14-1. Relative Ranking of Abrasion Resistance for Materials Using the Moh’s Scale

<table>
<thead>
<tr>
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<th>MOH’S VALUE</th>
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<td>9–10</td>
</tr>
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<td>9</td>
</tr>
<tr>
<td>Zirconium silicate</td>
<td>7–7.5</td>
</tr>
<tr>
<td>Cuttle</td>
<td>7</td>
</tr>
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<td>Pumice</td>
<td>6</td>
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<td>Chalk (whiting)</td>
<td>3</td>
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<td>Gypsum</td>
<td>2</td>
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B. Shape

1. The sharper the abrasive is, the more efficient it is as an abrasive.

2. Once the sharp edge is lost, apply more particulate matter (paste) or dispose & replace dental bur.
C. Size

1. Larger particles abrade a surface more rapidly than small ones.

2. Abrasives of all sizes are used in dentistry.

3. Process for finishing & polishing: **sequential reduction** in the size of the abrasive particles. Technically – larger scratches are replaced with finer scratches, until eventually they are not visible to the naked eye.

Larger scratches to finer scratches.
D. Pressure

1. Great care must be exhibited in exerting pressure.
   a. rapid removal of surface materials.
   b. frictional heat is generated-
      - thermal conductivity – injurious to pulp.
      - weakening of margins – amalgam; Hg is drawn to outer surface.
      - physical distortions – acrylic appliances.

2. Danger of over-abrading – over contouring.
   RESULT: altered occlusion and/or margins.
E. Speed

1. Influences cutting/abrasion efficiency – faster speeds greatly increase rate of abrasion.

2. CONTROL of speed, coupled with pressure **must** be exhibited by clinician.

3. speed = temperature + over cutting/abrading
F. Lubrication

Water – most common lubricant intraorally.

1. Coolant – carries heat away from the surface.

2. Debris removal – carries away debris that clog the burs cutting ability; cleans area for visual purpose.
IV. Composition of Abrasives

A. Diamond – burs & polishing agents

1. hardest substance known; virtually cuts anything
2. dental burs – chips of varying sizes bonded to shanks to cut tooth structure.
3. polishing pastes – mixed with glycerin, water for composites, ceramics, & porcelain.

B. Carbides

1. nearly as hard as diamond
2. particles attached to burs, stones – “green stone”
3. particles pressed on to discs
C. Emery
1. sandy appearance ex: emery boards – nails!!
2. particles attached to discs, paper strips
3. applied to lab rag wheel for acrylic app’l finishing

D. Aluminum oxide – composite & acrylic polishing
1. sandy appearance – has replaced emery
2. particles attached to discs, strips, “white stones”
3. finishing of metal alloys & ceramic materials
E. Zirconium silicate – particles attached to discs, strips; used in prophy paste.

F. Cuttle – quartz particles attached to paper discs; finishing gold alloys, acrylics, composites.

G. Tin oxide – less abrasive; polishing agent for metallic restor.: gold, amalgam and also enamel.

H. Garnet – (reddish color) supplied on discs; acrylic app’l polishing

I. Tripoli – supplied in bar form, applied to rag wheel, gold alloy polishing

J. Pumice – lava rock; prophy paste; lab – polish acrylics (RPDs, RFDs)

K. Rouge – facial make-up! – supplied in bar form, applied to rag wheel, gold alloy appl polishing
V. Instruments used in cutting tooth structure

A.  Hand instruments – excavators, chisel, hatch, hoe, etc

B.  Rotary instruments – handpiece and bur

1. Use – cutting the prep, removing existing restor., finishing or polishing restor.

2. dental burs – diamond, carbide steel
C. Air abrasive devices

- allows for conservative treatment; painless, fast, messy

1. Aluminum oxide particles (27 – 50 µ) propelled by compressed air at a rate of more than 4 million particles per second.

2. Tooth adjacent prepped tooth *must* be protected by covering it with a dental dam or metal matrix band.

3. Removes caries and resin – NOT amalgam. **WHY??**
D. Laser – highly concentrated beam of light
   Light amplification by simulated emission of radiation

- Can be used to cut, vaporize, or cauterize tissue *(hard or soft)*
- Use of shielded eyewear by dental staff & patient
- Matte finished instruments *(non-reflective surface)*
VI. Prophy Pastes, Dentifrices, & Denture Cleaners

A. Prophy paste – remove surface plaque & stain without damaging tooth structure
   Composition: moderately abrasive particles: pumice, very fine particles of silicone dioxide or zirconium silicate.

B. Dentifrices – home removal of surface pellicle, plaque & stain
   Composition: abrasive (manufacturer specific), water, fluoride, humectant, binder, coloring agent, flavoring agent.

C. Denture cleaners – remove surface stain & debris, freshen the app’l. Denture soaks (bath) – chemical means to remove stain & debris.
   Composition: sodium perborate, hypochlorite, alkaline peroxide, etc.
   Ok for full acrylic denture; DO NOT USE chlorine (bleach) solutions for RPD – metal may tarnish or corrode!!!
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**QUESTION:**
Should a patient use their tooth dentifrice on their RPD or RFD??

Gladwin Textbook
Table 16
p. 210

Ferracane, J. P. 295
NO – it will abrade or scratch the acrylic portion of the RPD or RFD. Encourage denture-wearing patients to use dentifrices that are formulated specifically for dentures. Educate patients: Dentures are not as hard as natural teeth. Toothpaste is abrasive, it will scratch your dentures. These scratches give bacteria a place to attach and multiply. Bacteria can cause recurrent decay to remaining natural teeth and cause bad breath.
Any questions regarding:

- Pit & Fissure Dental Sealants
- Gold Foil
- Abrasives

TEST #2 – next class:
Test #2 Review

COMPOSITE, GLASS IONOMER, SEALANTS, GOLD FOIL, ABRASIVES

Chapters: 4, 5, 6 (gold only), 14, 16, 25

Class Handouts

TEST FORMAT: T/F, M.C., MATCHING, SHORT ANSWER

- Terminology
- Use, composition, polymerization
- Special considerations & characteristics
- Retention mechanisms, hybrid zone
- Differences between finishing & polishing
- Abrasives utilized (make references to lab)
- Rationale for polishing restorations
- Polishing technique: characteristics of abrasives, technique concerns