Lesion - Specific Restorations

Class I and II Composite Restorations

Principles & Techniques

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Classes of Cavitated Lesions

Class I - pits and fissures
Class II - proximal surfaces of posterior teeth
Restorative Materials

Amalgam

Composite
### Lesion-Specific Restoration vs Material Specific Restoration

<table>
<thead>
<tr>
<th>Material-Specific</th>
<th>Lesion-Specific</th>
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<tbody>
<tr>
<td>E.g. The use of amalgam to restore Class I and II caries lesion</td>
<td>E.g. The use of composite resin to restore Class I and II caries lesion</td>
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<tr>
<td>Cavity form is based on the physical properties and the technique used for placing the material</td>
<td>Cavity form is based on the location and size of the lesion</td>
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Contraindications

- Unable to establish **ABSOLUTE** isolation
- Establish ideal proximal contour/contact
- Location of caries/defect - out of reach of the curing light
- Cavosurface margins that are not all in enamel
- Occlusal contacts for the tooth solely on the restoration; wide isthmus width
Advantages (vs amalgam)

- Conservation of tooth structure - overall a stronger restored tooth
- More esthetic
Disadvantages (vs amalgam)

- Cost
- Extremely technique sensitive
Lesion-Specific Restoration
Cavity Preparation

**PRINCIPLE**

- The outline form/extension of the preparation should be dictated by the size and the location of the lesion.
- Cavosurface margin and all internal surfaces are smooth

**RATIONALE**

- Conservation of tooth structure
- Viscous composite material will not adapt well into rough or irregular surface
Lesion-Specific Restoration
Cavity Preparation

**PRINCIPLE**

- No sharp internal line angles
- All “loose” enamel at the cavosurface margin should be removed

**RATIONALE**

- Sharp internal line angle serve as stress concentration area where fracture can initiate
- Prevent breaking of enamel during polymerization shrinkage
### Lesion-Specific Restoration

#### Cavity Preparation

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<th><strong>PRINCIPLE</strong></th>
<th><strong>RATIONALE</strong></th>
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<td>1. All aspects of the preparation should be accessible to the curing light</td>
<td>1. Direct light contact is required for polymerization of the resin</td>
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<td>2. The preparation should be free of foreign debris</td>
<td>2. Allow for optimal bonding</td>
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Pits and Fissures Caries (Class I)
Cavity Preparation

- Locate lesions (diagnosis of lesions)
- Use of an appropriate bur (about the size of the lesion) to gain access to the lesion through the groove/pit
- Remove lesion and loose enamel
Histopathology of Pits and Fissures Caries

Enamel

Dentin

Demineralization around the wall and bottom of the pits

Once demineralization reach the DEJ, it begins spreading laterally
Diagnosis of Pits and Fissures Lesions

- Radiographs - limited usefulness except for deep lesions
- Explorer - limited usefulness (wedging effect)
- Visual - primary diagnostic tool
Diagnosis of Pits and Fissures Lesions

- Use an explorer to remove plaque and food debris from the fissure orifice
- Under good lighting, isolation (dry) and magnification; visually inspect for any damage to the enamel
- Look for any subtle color changes around the pits and fissures
Diagnosis of Pits and Fissures Lesions

- Enamel is low in opacity, thus any changes in color (e.g. caries dentin) in the underlying dentin will show through the enamel
- Look for a gray shadow or opaque area around the pits and fissures - a “halo”
- Ignore the color change within the pits and fissures
Accessing the lesion through the groove/pit

245 fissure bur

Enamel

DEJ

Dentin
Direct visual access to the lesion
Caries removal using a round bur on a slow speed handpiece
Unable to remove all the lesion due to limited access
Increase access - remove remaining lesion

Because caries start spreading laterally at the DEJ, any discoloration at DEJ is an indication of the presence of caries.

Enlarge the access area until you are able to visually inspect the DEJ;
Class I Cavity Preparation

Pre-Op

Preparation
Preventive Resin Restoration (PRR)
Proximal Caries (Class II) Cavity Preparation

- Locate lesion
- Approach lesion from the marginal ridge
- Penetrate, find and remove caries lesion with #245 bur on a high speed handpiece - handpiece parallel to the long axis of the tooth
- Remove loose enamel
- Examine buccal and lingual proximal walls to ensure complete removal of caries
Diagnosis of Proximal Caries

Primary diagnostic tool
- bitewing radiographs

Secondary diagnostic tool
- visual (looking for changes in the optical properties of the marginal ridge under bright light)
Proximal Caries (Class II) Cavity Preparation

- Proximal caries lesion is usually located lingual and gingival to the proximal contact.
Locating Proximal Lesion

Reference point = proximal contact

Lesion = gingival and lingual to the proximal contact
Class II Composite Restoration
Cavity Preparation

• Approach lesion from the marginal ridge;
• Handpiece parallel to the long axis of the tooth;
• Starting point: lingual half of the contact; start of the lingual embrasure
Penetrate through the marginal ridge until you reach the lesion, then extend buccally, gingivally and lingually (as needed) to remove the lesion.

Initially leave a thin layer of enamel at the proximal area to prevent accidental...
Class II Composite Restoration
Cavity Preparation

Due to the shape of the bur, there will be "loose" enamel at the margin (buccal and lingual proximal)
Class II Composite Restoration
Cavity Preparation

Following the complete removal of the caries lesion, remove loose enamel (buccal and lingual proximal margin) using a hatchet.
Class II Composite Restoration
Cavity Preparation

Evaluate buccal and lingual proximal wall for complete caries removal
Loose enamel removed
Class II Composite Restoration
Cavity Preparation

Typical cavity preparation
Matrix

Wood wedge placed at gingival embrasure (control gingival excess, restoring proximal contact)

.0015 or .0010 toffelmire band (ho-band)
Matrix

- **Toffelmire matrix system**
  - Dr. Hildebrandt’s manual pp. 3.C.24 - 3.C.26
  - .0015 or .001 (ho-band)
  - Good wedging is vital to getting good proximal contact (if lesion dictate the complete removal of the proximal contact area)
  - Well burnished

- **Other matrix systems**
  - Palodent System - Bitine ring
Tofflemire Matrix System

- Instruction - Dr. Hildebrandt’s manual pp. 3.C.24

- Burnish the band using an egg burnisher on a 2x2 gauze (at least 3 layers)
Tofflemire Matrix System

- Burnished band - resulting in a more convex proximal surface
Placement Techniques for Posterior Composite

- Etch (clinically)/sandblast (in lab), application of bonding agent
- Fill with multiple increments - first increment should be in the neighborhood of 1/2 mm thick; subsequent increment should be about 1 mm
- Using the Super Plugger and applying light pressure, adapt the resin into the preparation
- Avoid direct operatory light
- Remove excess resin before curing
- Cure for 20 - 40 seconds (follow curing instruction)
Plugger - for placing posterior composite

Super Plugger
Using an explorer, remove excess from the embrasure area before curing. Avoid direct operatory light.
Minimize the excess material presence in the embrasure area
Build to “slightly overcontour”
Establish occlusal embrasure

Using the Half-Hollenbeck
After curing of the final increment, ready to remove the tofflemire band
Finishing/Polishing Techniques

- **Finishing burs**
  - Needle shape finishing bur (7902) for bulk removal of excess composite at the embrasures (buccal, lingual and occlusal)
  - Egg shape finishing bur (7404) for creating occlusal anatomy and adjusting occlusal contact

- #12 Bard-Parker blade for removing gingival overhang and excesses at the buccal and lingual embrasures

- Soflex disks for final finishing and polishing at the embrasures (buccal, occlusal, lingual)

- Enhance/PoGo composite finishing system (occlusal surface)
Soflex Disks

- For finishing and polishing
- Course, medium, fine and superfine
- Course and medium - finishing
- Fine - finishing/polishing
- Superfine - polishing
- Extra-thin series - excellent for finishing/polishing embrasures area

Paper backed; thicker series

Plastic backed; extra thin series
After removal of matrix band
#7404 finishing bur for occlusal anatomy and adjustment
#7902 finishing bur for gross removal of excesses on bu, li and occl embrasures
#12 Bard-Parker blade for removing gingival overhang and excesses on buccal/lingual embrasure area
Alternative instruments to #12 Bard-Parker

2-3 Knife
Contour 1-2
Solflex disks to finish the embrasures/margin area; in a **SLOW/continuously moving** motion.
Initial access to the lesion through the marginal ridge
Lesion becoming accessible/visible
Removal of lesion
Removing loose enamel using a hatchet
Finished Preparation
Toffelmire Matrix
Total Etching
Placement (adapting) composite into the preparation
Remove excess adhesive/composite
Occlusal adjustment using #7404 finishing bur
Using #7902 finishing bur for gross removal of excess on bu, li and occlusal embrasures
Using the solfex disk for final finishing and polishing
Final Restoration
Problems with posterior composite

- **Wear**
  - Should not be a great concern with the latest generation of composites. Most hybrid composite should has a wear rate of less than 10 micron per year.

- **Secondary caries**
  - Due to incomplete polymerization or lack of adhesion at the gingival margin.
  - Use of the proper adhesive technique and the incremental placement method should minimize the problem.
Problems with posterior composite

- Post-operative sensitivity
  » Most common reasons:
    - Polymerization shrinkage
    - Incomplete polymerization
    - Bond failure

- Polymerization shrinkage
  » Material characteristic, out of our control

- Incomplete polymerization
  » 1/2 mm first layer

- Bond failure
  » Follow the proper adhesive technique
Laboratory exercise

- Distal composite on tooth #20
- Box form
- Buccal extension
  » Buccal wall still in contact
- Gingival extension
  » 1/2 mm clearance from adjacent tooth
- Buccal-lingual dimension
  » 3 mm
  » Lingual wall clear contact
- Mesial-distal dimension
  » 1 to 11/4 mm axial depth