MINIA UNIVERSITY

RESTORATIVE DENTISTRY IN CHILDREN

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2018
I. WHY RESTORE PRIMARY TEETH?
- Our children deserve the best dental treatment
- Preventive and/or restorative procedures will shape their dental future
- Restore *Esthetic* and *Function*
- Protect pulp and remaining tooth structure
- Retain natural spaces for developing permanent dentition
- Provide ease in maintaining good oral hygiene

II. RECENT VS. CONVENTIONAL RESTORATIVE CONCEPTS

<table>
<thead>
<tr>
<th></th>
<th>G.V. Black</th>
<th>Microdentistry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Access</strong></td>
<td>- Gaining access to cavity</td>
<td>- Access gaining to caries then removed</td>
</tr>
<tr>
<td></td>
<td>- Prepare cavity to standard outline</td>
<td></td>
</tr>
<tr>
<td><strong>OLF</strong></td>
<td>Includes all pits and fissures which are not carious but susceptible to caries</td>
<td>Not defined and follow the lesion</td>
</tr>
<tr>
<td><strong>Extension</strong></td>
<td>Extension for prevention</td>
<td>Prevention of extension</td>
</tr>
<tr>
<td><strong>Resistance</strong></td>
<td>Removal of all undermined and unsupported tooth structure</td>
<td>Remove loose enamel rods at C.S.A. which are exposed to occlusal load while unsupported tooth structure may be conserved</td>
</tr>
<tr>
<td><strong>Retention</strong></td>
<td>Macromechanical</td>
<td>Micromechanical</td>
</tr>
<tr>
<td><strong>Cleanliness</strong></td>
<td>Finishing the walls and toilet of the cavity</td>
<td>Cleanliness of adhesive surfaces to ensure optimal bonding</td>
</tr>
</tbody>
</table>

III. CAVITY CLASSIFICATION

1. G.V. Black ‘s Classification

2. Mount and Hume Classification
This classification based on the site (Si) of occurrence and size (sta) of the cavity

<table>
<thead>
<tr>
<th></th>
<th>0 No cavity</th>
<th>1 Minimal</th>
<th>2 Moderate</th>
<th>3 Enlarged</th>
<th>4 Extensive</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1</strong></td>
<td>1.0</td>
<td>1.1</td>
<td>1.2</td>
<td>1.3</td>
<td>1.4</td>
</tr>
<tr>
<td><strong>2</strong></td>
<td>2.0</td>
<td>2.1</td>
<td>2.2</td>
<td>2.3</td>
<td>2.4</td>
</tr>
<tr>
<td><strong>3</strong></td>
<td>3.0</td>
<td>3.1</td>
<td>3.2</td>
<td>3.3</td>
<td>3.4</td>
</tr>
</tbody>
</table>
3. International Caries Detection and Assessment System (ICDAS)

<table>
<thead>
<tr>
<th>Score Code</th>
<th>Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Score 0</td>
<td>Sound</td>
</tr>
<tr>
<td>Score 1</td>
<td>Opacity (visual changes of enamel on dryness)</td>
</tr>
<tr>
<td>Score 2</td>
<td>Opacity (visual changes of enamel without dryness)</td>
</tr>
<tr>
<td>Score 3</td>
<td>Localized enamel breakdown (without clinical visual signs of dentinal involvement)</td>
</tr>
<tr>
<td>Score 4</td>
<td>Underlying dark shadow +/- surface integrity loss</td>
</tr>
<tr>
<td>Score 5</td>
<td>Distinct cavity with visible dentin</td>
</tr>
<tr>
<td>Score 6</td>
<td>Extensive distinct cavity with visible dentin</td>
</tr>
</tbody>
</table>

IV. INSTRUMENTATION AND CARIES REMOVAL

1. High-speed (100,000 to 300,000 rpm)
   Low-speed (500 to 15,000 rpm)

2. Erbium YAG laser
   - No vibration or noise
   - Minimal invasive cavity preparation
   - Minimal thermal increase of pulp chamber
   - No smear layer
   - Cavity produced with macroroughened surfaces which increase surface area for bonding

3. Air abrasion (aluminum oxide 27 to 50 μm) under 40 to 120 psi
   **Advantages**
   - No vibration or noise
   - No need for local anesthesia
   - Fast cavity preparation
   **Disadvantages**
   - High cost
   - Not totally eliminate the need of conventional hand-piece

4. Chemomechanical Caries Removal
   Application of chemical agent instead of drilling such as Carisolv or Papacarie plus the assistance of instrumentation
   **Advantages**
   1. No need for local anesthesia
   2. Cavity preservation
   3. Bonded restorative material for final restoration
   **Disadvantages**
   1. Increase operating time
   2. Limited to certain carious lesions
   3. Not totally eliminate the need of conventional hand-piece
V. Anatomic Considerations
1. Short crown
2. Thinner enamel and dentin
3. Large pulp and higher pulp horns
4. Enamel rods directed slightly occlusal at cervical region
5. Greater cervical constriction
6. Narrow occlusal table
7. Broad flat proximal contact

VI. TOOTH ISOLATION

1. Rubber Dam
   Advantages
   1. Save time
   2. Aid management
   3. Protection and retraction of soft tissues
   4. Control saliva
      ▪ improve access and visibility
      ▪ detect minute exposure
      ▪ detect degree of hemorrhage
      ▪ prevent foreign objects from come in contact with oral soft tissues that stimulate salivation
      ▪ Minimize mouth breathing especially when inhalation sedation is used
      ▪ Control cross infection
      ▪ Prevent swallowing or aspiration of foreign objects
   Disadvantages
      ▪ Discomfort during clamp placement, need for local anesthetic
      ▪ In some instances, difficulty in securely placing a clamp onto a partially erupted tooth
      ▪ Increase in the cost and need for sterilization of the armamentarium

2. Cotton Roll Isolation
   No anesthetic is necessary The primary disadvantage to cotton roll isolation is that it is almost a practical necessity that an assistant be used to provide four handed dentistry

3. Vac-Ejector Moisture Control System
   It consists of a bite block and rubber tongue shield that connect to the high-speed evacuation line
VII. CAVITY PREPARATION

1. Class I Amalgam Restoration

<table>
<thead>
<tr>
<th>OLF</th>
<th>All pits and fissures are included even they are non carious</th>
</tr>
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</table>
| Extension | - Cavity extend into self cleansable area  
- Cavity width is 1/3 the intercuspal distance |
| Resistance Form | - Pulpal floor depth is 0.5 below DEJ and flat or slightly round  
- Rounded internal line angles |
| Retention Form | Side walls are slightly converge toward the occlusal surface and CSA is 90° |

2. Class II Amalgam Restoration

<table>
<thead>
<tr>
<th>Occlusal</th>
<th>As in class I</th>
</tr>
</thead>
</table>
| Isthmus | - Its width is approximately 1/2 of the intercuspal distance  
- Rounded axio-pulpal line |
| Proximal | - Buccal and lingual walls converge occlusally and extend into a self cleansable area  
- Axio-buccal and axio-lingual retentive grooves will aid in the retention of the restoration and will reduce the flow of the amalgam  
- Gingival seat just below the contact area (under the free gingival margin) |

Matrix Types for Primary Molars
1. Spot welded band
2. Sectional matrix
3. T-Band
4. Auto matrix on first primary molar

3. Adhesive Restoration
1. Proximal box preparation
2. Tunnel preparation

4. Sealant and Conservative Adhesive Restoration (CAR)
Pit and fissure sealant is not widely used in children due to difficult isolation especially in preschool children who can’t uncooperative and intolerant to rubber dam placement
5. Full Coronal Coverage of Primary Molars

Stainless Steel Crowns (SSCs)

- Untrimmed
- Pretrimmed
  Straight non contoured sides but festooned to follow a line parallel to the gingival crest
- Precontoured

Indications
1. Extensive Caries
   - Class II cavity where one or more cusps are weakened
   - Caries involving multiple surfaces
   - Rampant caries
2. Following pulp therapy
3. Developmental defects
   - Amelogenesis imperfecta
   - Dentinogenesis imperfecta
   - Enamel hypoplasia
4. Bruxism
5. Fractured incisors
6. Handicapped children
7. Abutment for space maintainer

Instruments
1. Bur no. 330
2. Fine tapered diamond stone
3. Football diamond
4. No. 417 crimping pliers—to produce marked curvature in cervical region
5. No. 112—to produce convexity and contact points
6. No. 137 Gordon—used for general contouring and shaping

Steps for Preparation
1. Crown selection
2. Preoperative occlusal evaluation
3. LA administration
4. Rubber dam application
5. Placement of wedges
6. Tooth preparation
   - Occlusal reduction
   - Proximal reduction
   - Buccal and lingual reduction
   - Finishing
7. Trial fitting, trimming and contouring the crown
8. Finishing the crown

Crown selection
A correctly selected crown should cover all the tooth preparation and provide resistance to removal
Considerations
1. Correct mesiodistal width of the tooth
2. Occlusal anatomy
3. The height of the crown should be same as that of the uncut tooth with cervical margin not more than 1 mm below and parallel to the gingival margin
4. Preserve Primate space
5. Follow gingival marginal contour

Tooth Preparation
Considerations
1. Occlusal reduction of 1-1.5 mm follows the anatomy of the occlusal surface
2. Proximal reduction to clear contact area gingivally and buccolingually. When finished one must be able to pass an explorer tip between the proximal surfaces
3. Buccolingual reduction is limited and limited to beveling the occlusal one third of the crown. Sometimes reduction of buccal and lingual sides may be required

6. Class III Adhesive Restoration
- Class III adhesive restoration on primary incisors is very challenging
- Slot cavity preparation with short cavosurface bevel can be prepared without a dovetail lock, but children with bruxism addition of dovetail is required
- The interproximal box should be perpendicular to a line tangent to the labial surface
- Cavity depth should be 0.5mm pulpal to the DEJ
- With closed contacts and for aesthetic reasons an indirect approach to the caries has to be adopted from the palatal surface of the tooth. A dovetail is done to facilitate access to the carious lesion
- Distal surface of primary canines is the most frequent site of caries so modified class III with dovetail is used in palatal surface of upper primary canines and buccal surface of lower primary canines

7. Class V cavity preparation
- Class V cavities are prepared like those in permanent teeth, although the depth is 1.5mm
- All decalcified areas should included in the outline form
- In deep lesions protection of the pulp is necessary
- No need for beveling the margins as the enamel rods are directed incisally or occlusally
- Fluoride releasing restorative materials could be used effectively for restoration these cavities

8. Full Coronal Coverage of Incisors

1. Stainless Steel Crowns
Advantages
- Very durable, wear well and are retentive.
- Time for placement is fast compared to other techniques
May be used when gingival haemorrhage or moisture is present
Fairly inexpensive

**Disadvantages**
Aesthetics are extremely poor.

2. Open Faced Stainless Steel Crowns
**Advantages**
- Fair aesthetics
- Very durable, wear well and retentive
- Fairly inexpensive

**Disadvantages**
- Long placement time
- Some metal is displayed

3. Composite Strip Crowns
**Advantages**
- Superior aesthetics.
- Reasonable cost
- Reasonable placement time

**Disadvantages**
- Extremely technique sensitive
- Durability depends on remaining tooth structure
- Adequate moisture control might be difficult on an uncooperative patient

4. Zerconia Crowns
**Advantages**
- Very aesthetic, with greater durability
- Not technique sensitive

**Disadvantages**
- Not recommended in patients with heavy bruxism
- Need greater tooth reduction
- Need relatively long placement time
- High cost

5. Pre-veneered Stainless Steel Crowns
**Advantages**
- Aesthetically pleasing
- Relatively short operating time
- Durability of a steel crown
- Less moisture sensitive during placement than composite strip crowns

**Disadvantages**
- More expensive
- Not allow for major recontouring or reshaping of the crown
- The tooth is adjusted to fit the crown, rather than adjusting the crown to fit the tooth
- Crimping is limited to lingual surfaces
VIII. RESTORATIVE MATERIALS IN PEDIATRIC DENTISTRY

1. Glass Ionomer (GI)

**Advantages**
1. Chemical bonding to both enamel and dentin;
2. Thermal expansion similar to that of tooth structure (COTE);
3. Biocompatibility;
4. Uptake and release of fluoride;
5. Decreased moisture sensitivity when compared to resins

**Disadvantages**
1. Brittle
2. Susceptible to erosion and wear
3. Questionable esthetic
4. High solubility

2. Resin-modified Glass Ionomers

**Advantages**
1. Improved wear resistance compared to the original GI
2. Improved esthetic
3. Fast setting

**Disadvantages**
1. Discoloration
2. Less fluoride release

3. Compomeras (polyacid-modified resins)

**Advantages**
1. Good esthetics and physical properties
2. Easily handling
3. No need for acid etching
4. Low thermal conductivity
5. Easy repair

**Disadvantages**
1. Discoloration
2. Less fluoride release
3. Technique sensitive

4. Composite resin

**Advantages**
1. Superior esthetics
2. Satisfactory physical and mechanical properties
3. With adhesives support the remaining tooth structure
4. Low thermal conductivity
5. Easy repair

**Disadvantages**
1. Questionable adaptation
   - High polymerization shrinkage
   - High Coefficient of thermal expansion
   - Poor tooth surface wettability
2. High water sorption  
3. No fluoride release  
4. Technique sensitive

5. Amalgam  
**Advantages**  
1. Simple  
2. Quick  
3. Cheap  
4. Technique insensitive  
5. Durable  

**Disadvantages**  
1. Not adhesive  
2. Requires mechanical retention in cavity  
3. Environmental and occupational hazards  
4. Public concerns

**IX. FACTORS AFFECTING SELECTION OF RESTORATIVE MATERIAL**  

**Factors related to the child**  
- Child’s age  
- Child’s cooperation  
- Oral habits  
- Caries risk  
- Moisture control

**Factors related to parents**  
Anticipated parental compliance and likelihood of recall

**Factors related to the tooth to be restored**  
- Life expectancy of the tooth  
- Form of the tooth and condition of calcification  
- Size and condition of the remaining coronal portion  
- Vitality of the pulp

**Factors related to restorative materials**  
- Properties  
- Adhesion  
- Ease of manipulation  
- Anticariogenic  
- Cost