RESTORATIVE AND PULP TREATMENT OF PRIMARY AND YOUNG PERMANENT TEETH

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Restorative and pulp treatment of primary and young permanent teeth

Materials and techniques for restorative and pulp treatment of primary and young permanent teeth have improved ever since. Due to time constraints this presentation will focus on:

a) Local anesthesia
b) Rubber dam
c) Restorative procedures
d) Pulp treatment options
Local anesthesia

Always inject slowly, aspirating frequently

Use smaller needles (30-gauge), thus reducing discomfort

In patients with unerupted first permanent molars and due to greater deflection of smaller needles, perform mandibular block with a larger needle (27-gauge)
Local anesthesia (cont’d)

Calculating maximum pediatric dose for local anesthetic:

\[
\text{Maximum recommended dose (mg/Kg) x Child’s weight (Kg)}
\]
\[
\text{Anesthetic Concentration x Volume of cartridges}
\]

The maximum amount of Xylocaine (2%) for a child weighing 17 Kg would be:

\[
4.4 \text{ mg/Kg} \times 17 \text{ Kg} = 74.8 = 2.08 \text{ cartridges}
\]
\[
2\% \times 1.8 \text{ cc} = 36
\]
Rubber dam

Briefly, rubber dam is to be used at all times in restorative pediatric dentistry with the exception of:

a) Incompletely erupted tooth (inability to place the clamp)

b) When splinting the displaced tooth.
Restorative procedures for primary teeth

General considerations in cavity preparations for primary teeth:

1. Slightly rounded line angles to account for the bulk of the restorative material, its strength, as well as to conserve tooth structure.

2. Sharp cavo-surface angle with lateral walls parallel to external surfaces.

3. Slightly rounded pulpal floor.
Restorative procedures for primary teeth

General considerations in cavity preparations for primary teeth (cont’d):

1) Depth and width of the cavity preparation is usually 1 mm, unless dictated by the extent of the caries lesion.
2) Gingival preparation is slightly below gingival papilla.
3) Wedge (arrow) to reduce hemorrhage and prevent damaging of the adjacent surface.
Restorative procedures for primary teeth (cont’d)

Matrix application:

Highly recommended is the *T-band as it* allows placement of multiple matrices, no specific equipment is needed, easy to use, inexpensive
Composite vs. amalgam restorations in primary teeth

- In 1996 Health Canada has advised dentists to consider the use of non-mercury filling materials for restoring the primary teeth in instances when high tensile/compressive stresses are not encountered.

- Amalgams should not be placed in children with impaired kidney function on consultation with patient's physician or hypersensitivity to amalgam.
Composite vs. amalgam restorations in primary teeth (Cont’d)

- Controversy between the use of amalgam and/or composite resin has subsided.
- No solid scientific evidence has been established regarding the overall amalgam toxicity as a filling material.
- Composite resins have similar success rate over 5-10 years follow-up period.
- Composite resins require minimum needed removal of tooth structure.
Condensation of Amalgam

- Rinse & Dry Prep
- Place pulp protection as needed
- Place small amount amalgam into proximal (class II)
- Use small condenser, condense thrusting against gingival, buccal and lingual walls
- Class II- after proximal box condensation, proceed with condensation of occlusal surface
- Slightly over pack
- Trim off excess with large round ball burnisher
Carving

1. Use explorer at gingival embrasure, and the marginal ridge

2. Carve excess amalgam from cavo-surface using discoid-cleoid or T-3

3. Use #21 carving instrument & follow inclined planes into all grooves,

4. Restore accessory grooves and define occlusal anatomy using discoid-cleiod or #21

5. Carve excess amalgam

6. Remove matrix

7. Floss interproximal

8. Wipe amalgam with moist cotton pellet

9. Check occlusion
Composite restorations in primary dentition

- Etch, rinse and dry, leaving cavity slightly moistened.
- Apply primer and adhesive material. With an air syringe gently spread the material over the cavity preparation, light cure and reapply.
- After condensing and light curing the resin material partially remove the matrix band and light cure the resin 10 sec on the buccal and then 10 sec on the lingual surface.
Composite restorations in primary dentition (cont’d)

• Remove the matrix band and with the flame-shaped finishing bur, contour the interproximal areas. Remove any excess, maintaining normal tooth morphology.

• Apply etchant to the surrounding enamel, bond and seal to close enamel cracks which may occur with polymerization shrinkage.

• Floss and remove the rubber dam and with the articulating paper, check for premature contacts. Contour and polish the occlusal surfaces.
Pulp therapy in primary and young permanent teeth

The primary objectives of pulp treatment in primary and young permanent teeth are to:

1. Remove infection from the exposed pulp.
2. Promote repair on the surface of the remaining pulp.
3. Prevent further microbial infiltration.
Clinical Examination

- History of discomfort
- Inspection of tooth color and the condition of the surrounding soft tissues
- Assessment of tooth mobility and sensitivity to percussion
Pulp Treatment in Primary teeth

The following procedures could be implemented in treating a pulpally involved tooth:

- Indirect and direct pulp capping
- Pulpotomy
- Pulpectomy
Indirect and Direct Pulp Capping

Objectives:

• Preserve the vitality and normal functions of the pulp
• Act as a protective barrier between the restorative material and the tooth
• Promote tertiary dentin formation and caries dentin remineralization
Indirect Pulp Capping

Recommended due to high success rate (~90%) in primary teeth

**Indications:**
- Asymptomatic tooth
- Deep caries lesion
- Vital pulp

Google images, indirect pulp capping
Indirect Pulp Capping (Cont’d)

Indirect Pulp Capping:

- Remove soft, mushy dentin with a #8 round bur
- Cap hard and discolored dentin with Ca(OH)$_2$ and/or glass ionomer base
- Restore the cavity with a conventional filling material
Direct Pulp Capping

Recommended only in the case of mechanical pulp exposure of primary teeth

Direct Pulp Capping:

- Remove carious dentin with a #8 round bur
- Over a mechanical pinpoint pulp exposure place a $\text{Ca(OH)}_2$ or MTA to stimulate dentin formation
- Place permanent restoration
Direct Pulp Capping (Cont’d)

• MTA promotes cytokine release leading to osteoblast differentiation
• Found to maintain pulp integrity
• Has dentinogenic effect (dentin bridge formation)
Pulpotomy for Primary Teeth

Indications:
• Exposure of the pulp
• Absence of unprovoked pain
• No sensitivity to percussion or palpation
• No apical, periapical and furcation radiolucencies
Pulpotomy for Primary Teeth (Cont’d)

- Absence of pulp suppuration
- No abnormal mobility of tooth
- Controllable hemorrhage after removal of coronal pulp
- Not more than 1/3 of resorbed root
Pulp therapy in primary and young permanent teeth (cont’d)

Mineral trioxide aggregate or formocresol or ferric sulfate pulpotomy are the most common forms of pulp treatment for primary teeth.

It is recommended to use sterile round burr and the spoon excavator, when removing pulp tissue. This reduces hemorrhage and promotes healing.
Pulpotomy for Primary Teeth (Cont’d)

Negative effects of formocresol pulpotomy:

• Pulp obliteration (lower risk than for MTA)
• Succedaneous tooth damage a small risk
• Exfoliation accelerated
• Cellular toxicity (???)
• Immune sensitization risk (type I allergic reaction, ????)
• Mutagenic and carcinogenic potential (???)
Pulpotomy for Primary Teeth (Cont’d)

Procedure (Cont’d – mineral trioxide aggregate):

- Dental cement with discrete crystals and amorphous structure
- Method of action is mineralization
- Pulp canal obliteration common
- Multiple investigations to support efficacy
Pulpotomy for Primary Teeth (Cont’d)

• Mineral trioxide aggregate (MTA) has 3 material’s composition – calcium, aluminum and selenium

• MTA contact with humid environment produces high pH – 12.5

• Antibacterial effect and good marginal seal
Pulpotomy for Primary Teeth (Cont’d)

**Advantage for the use of MTA:**
- High success rate
- Less time needed for the procedure
- *Disadvantage for the use of MTA:*
  - Very expensive (used for a single patient)

Google images, expensive
Pulp therapy in primary and young permanent teeth (cont’d)

Pulpectomy of primary teeth is more commonly done for second primary molar prior to the eruption of first permanent molars.
Pulp therapy in primary and young permanent teeth (cont’d)

Apexification of young permanent teeth is used to facilitate closure of the apex of young permanent teeth, exhibiting extensive degeneration or necrosis.
Pulp therapy in primary and young permanent teeth (cont’d)

After filling and irrigating root canals place Ca (OH)$_2$ (preferably periapically). If needed revisit in 3 mo.
Stainless steel crown procedures

The stainless steel crown (SSC) is used to restore form and function to teeth which have lost structure due to caries, pulp therapy, or trauma.

Advantages:
- Simple preparation of tooth
- Easy to manipulate
- Inexpensive
- High success rate
Stainless steel crown procedures (cont’d)

Indications for primary teeth:

1. Severely broken down molars (involvement of $\geq 3$ surfaces) where an amalgam or composite is impractical or impossible.

2. For full coverage of a tooth where conditions are such that decay would certainly re-occur.

3. Where a pulpotomy or pulpectomy has been done.
Stainless steel crown procedures (cont’d)

Start preparing the occlusal surface and thus gain access to caries lesion.

Tooth prep, fit and the seat of the crown should be completed in 15 min.
Special Considerations for Stainless Steel Crown

Placing of Adjacent Crowns

1. Complete occlusal preparation of 1 tooth before beginning the other
2. Proximal reduction should produce a 1.5 mm of space at the gingival level
3. Cement both crowns at the same time
Special Considerations for Stainless Steel Crown (cont’d)

Preparing Crowns in Areas of Space Loss:

1. Contour pliers can be used (mesially and distally) to reduce mesiodistal dimension

2. Recontour proximal buccal and lingual walls
Special Considerations for Stainless Steel Crown (cont’d)

• Sometimes lower D tooth could be better restored with an upper, contra-lateral D crown.

• The scoop end of a T-3 is used to remove crowns when fitting them. At the same time when removing the crown hold with other hand the occlusal surface to avoid pushing of the crown further back.

• The beaks of the crimping pliers can be used to force a crown on.
Complex restorative treatment in pediatric dentistry

Patient K.M. age 12 has an advanced form of amelogenesis imperfecta.

Chief complaints: extreme sensitivity to cold as well as esthetics concerns
Complex restorative treatment in pediatric dentistry (cont’d)

Restorative treatment of severe form of enamel defects may require resin build-up and placement of stainless steel crowns.
What would you, what would I do?

P.C. age 7 presented with buccal swelling lower left.
A.J. age 4 presented with pain lower left. X-ray shoed caries lesions on teeth #74 and #73 and no signs of radiolucency.
M.S. age 8 presented with caries lesions on teeth #55 and #54. X-rays showed deep caries, but no signs of radiolucency.
A.E. age 11 presented with disto-occlusal caries on teeth #55 and #65 as well as deeply stained grooves on tooth #16. X-rays showed no signs of radiolucency.
M.K. age 7 presented with cellulitis upper left. Child was febrile (99.5º) and X-ray showed extensive caries and radiolucency in the furcation area of tooth #64.
What would you, what would I do?

J.J. age 5 presented with pain from tooth #75. There was no swelling and percussion and palpation was negative.
Note: Since dental caries and periodontal diseases are largely preventable, increased emphasis on prevention should be the goal of every dental practice.
Thank you for your attention