Restoring Primary Molars:

A Workshop on Pulp Therapy and Stainless Steel Crowns

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with thanks to the Pediatric Dentistry Department, Case Western Reserve University School of Dental Medicine

ENDODONTIC TREATMENT OF PRIMARY TEETH

The aim of endodontic therapy in children is the removal of infection and chronic inflammation and thus the relief of associated pain. The pulpal tissue of primary teeth usually become involved earlier in the advancing carious lesion than in permanent teeth. Exposure occurs more frequently during cavity preparation due to the enamel and dentin being thinner and the extended pulp horns being relatively larger than in permanent teeth.

All pulp chambers are near the middle of the primary tooth occlusal anatomy. Be sure to remove the entire roof of the pulp chamber before proceeding with any pulp therapy.

VITAL PULPOTOMY TECHNIQUES

Pulpotomy is a procedure based on the idea that the radicular pulp tissue is healthy or is capable of healing after amputation of the infected coronal pulp though it is unlikely that there exists uninfected tissue elsewhere in the canal. Success is dependent on hemostasis and maintaining cleanliness (it is virtually impossible to remove all bacteria during debridement therefore your chosen medication may be antibiotic or not promote bacterial growth)

Pulpotomy is contraindicated when any of the following is present:

- Swelling (of pulpal origin)
- Fistula
- Pathologic mobility
- External root resorption
- Internal root resorption
- Periapical or interradicular radiolucency
- Pulp calcifications
- Excessive bleeding from radicular stumps
- Nonrestorability including decay that is subcrestal

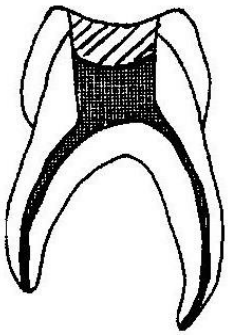
Instrumentation for primary tooth endodontic therapy:

1. Burrs: 330, latch type 6,8
2. Wooden wedges and matrix bands for proximal restorations

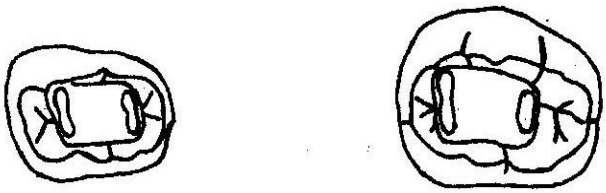
3. Rubber dam and clamps (8A, 14A)
4. Large spoon excavator
5. Cotton pliers
6. Lentulo spirals up to 40
7. Endodontic files
8. Irrigant
9. Paper points
10. Cotton pellets
11. Glass ionomer or RMGI, Composite (etch, prime, bond and necessary instruments) or SSC (cement and necessary instruments)

PULPOTOMY

1) Anesthetize and isolate tooth with rubber dam.
2) Remove all carious dentin to minimize bacterial contamination following exposure. If proximal lesion restore before proceeding.
3) Expose pulp chamber and remove the roof of the chamber with a 330 fissure bur.
4) Create a large enough access in order to remove all the coronal pulp tissue. (See Figure 1.)
5) Having adequate access, use a large round bur in a *slow speed* handpiece or a sharp spoon excavator to amputate the coronal pulpal tissue. Be sure to use light pressure to avoid perforation of the pulpal floor.
6) Remove all debris from the pulp chamber with a spoon excavator.
7) Be sure to remove all coronal pulp tissue. Lateral tags of tissue left behind when removing coronal pulp will continue to bleed when trying to control hemorrhage.
8) If amputation has been of vital tissue, hemorrhage must be arrested at this time with dry cotton pellets with or without a hemostatic agent for success.
9) Use of antihemorrhagic agents such as ferric sulfate will help the outcome of the procedure.
    i. Excessive bleeding that persists in spite of cotton pellet pressure may indicate that the inflammation has extended to the radicular pulp.
    ii. Such signs indicate that the tooth may need a pulpectomy, or may need to be extracted and appropriate space maintenance placed..
10) Remove pellet. There should be very little or no hemorrhage present.
11) Place a base of Biodentine or Vitapex over the amputation site and condense to cover the pulpal floor.
12) Refresh the dentin and enamel with a slow speed round bur.
13) Place a thin layer of GI or RMGI over the medicated layer.
14) Bond a composite over this layer keeping the tooth in very light occlusion
15) The final restoration ideally is a stainless steel crown to prevent subsequent fracture of the weakened tooth.



Properly cut access



Location and shape of the canal orifices of mandibular right 1st and 2nd primary molars

Location and shape of the canal orifices of maxillary right 1st and 2nd primary molars

Following any form of endodontic treatment, regular clinical and radiographic reviews must be made of the tooth involved and its successor. If rarefaction of the bone in the furcation area is seen, a pulpectomy may be possible, but extraction may be indicated. Radiographs should also be checked for evidence of internal resorption which may progress to cause perforation of the root.

Stainless Steel Crown (SSC) K and L

The stainless steel crown remains one of the most useful and long lasting restorations in Pediatric Dentistry. Its ability to restore severely broken down teeth allows for teeth to be retained for space maintenance and mastication, in instances when amalgam and composites would be sure to fail.
Learning to place stainless steel crowns requires some skill and much practice. It reverses your normal train of thought in that the tooth must be prepared to fit the crown. Although rules are given for preparation and crown adaptation, they are no substitute for analytical thought during tooth preparation and placement of the crown.

Clinical note:

- A local anesthetic should be used even when the involved tooth is non-vital, due to the potential for soft tissue trauma during tooth preparation.
- A rubber dam should be used for better visibility, patient control and safety when handling the crowns. Opening the wings of the clamp allows the crown to be seated with the dam in place.

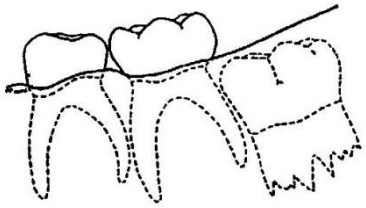
- Wedges may be placed proximally for better tissue retraction and to help avoid contact of the bur with adjacent teeth.

Armamentarium (in addition to above)

1. Stainless Steel Crowns
2. 169L tapered fissure burr, 330 fissure burr, 6 round bur for high speed
3. Wooden wedges
4. Crown scissors
5. Contouring pliers
6. Crimping pliers
7. Glass ionomer cement or other cementing agent

Steps for Preparation:

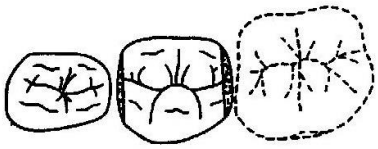
Check occlusion. Note the dental midline and the cusp-fossa relationship bilaterally.
Place rubber dam to isolate the tooth and separate tooth from adjacent teeth using wedges.



Tooth at start of preparation

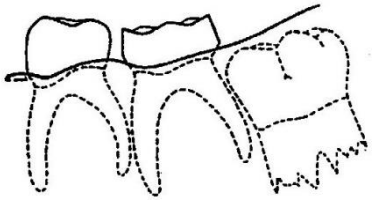
Reduce occlusal surface by **1.0 – 1.5 mm** with the high speed handpiece using a #169L taper fissure bur or a football diamond. Round off all sharp line angles.

Use a taper fissure bur or a thin, tapered diamond to cut through the contacts after placing wooden wedges. Cut down to the wedges and be sure to break contact



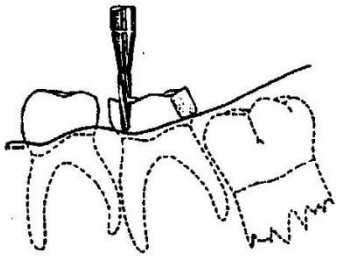
Completed mesial and distal slices should be straight and smooth.

Contact with adjacent tooth must be broken gingivally and buccolingually, maintaining vertical walls with only a slight convergence in an occlusal direction.
The gingival proximal **margin** should have a **feather-edge finish line**. (Figure 33)



Occlusal and proximal reduction completed.

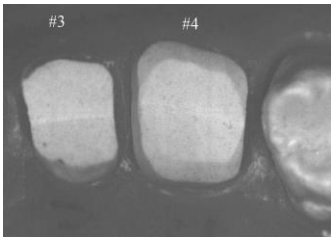
Buccolingual reduction is often limited to the occlusal one third of the tooth.
Further reduction may be necessary if there is a large mesiobuccal bulge. The bulge aids in retention.



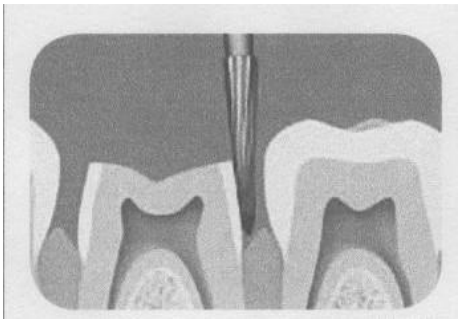
Excessive undercuts are reduced.

All angles of the preparation should be rounded to remove corners. The prep should resemble the inside of the crown.

The occlusal line angles are rounded.



The completed crown preparations demonstrating rounded line angles.



The mesial and distal contact points are cleared and a smooth taper from occlusal to gingival should be obtained that is free from ledges or shoulders.

Selecting and seating the crown:

There are two commonly used types of SSC's:

1. Ni-Chro Ion (Hu-Friedy)
    i. These are pretrimmed, precontoured and precrimped. They are composed of a softer metal so that they can snap over the prep without any alterations. If trimming of these crowns becomes necessary, the precontour will be lost and the crown will fit more loosely needing to be crimped and contoured.

2. Stainless Steel
    i. These are pretrimmed, but they must be contoured and crimped. They are primarily composed of chromium and steel and are stronger than ion crowns.

Buccal view of two types of stainless steel crowns. On the left is aHu- Friedy Ni-Chro Ion crown.. On the right is a classic stainless steel crown. Note how much longer the SSC is, as well as its straight, noncontoured proximal surfaces.

Select the smallest crown that can be seated on the tooth. Start with #4 crown, that is the most commonly used, and progress to a larger or smaller crown as necessary. Seat the lingual first

and apply pressure in a buccal direction so that the crown slides over the buccal surface into the gingival sulcus

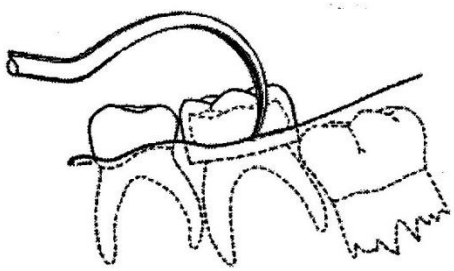
Slight resistance should be felt as the crown slips over the buccal bulge.
After seating the crown, check preliminary occlusal relationship by comparing adjacent marginal ridge heights.

<u>If the crown does not seat</u>:

a. occlusal reduction may be inadequate;
b. the crown may be too long,
c. a gingival proximal ledge may exist; or
d. contact may not have been broken with the adjacent tooth.

An extensive area of gingival blanching around the crown indicates that the crown is too long or is grossly over contoured. Ideally the crown should extend 1 mm into the gingival sulcus.

If the crown is too long, place the crown onto the preparation and lightly mark the level of the gingival crest on the crown with a sharp instrument.

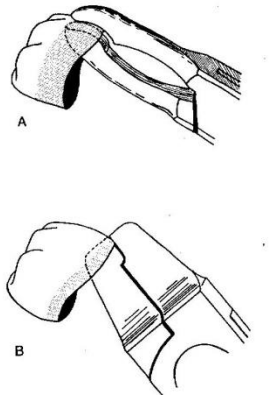


Scoring a line at the gingival margin prior to final trimming and seating of the stainless steel crown.

The crown is then removed and trimmed 1 mm below the mark with crown-and –bridge scissors or a heatless wheel on the low speed straight hand piece.

Contour and crimp the crown to form a tightly fitting crown.
Contouring involves bending the gingival one third of the crown's margins inward to restore anatomic features of the natural crown and to reduce the marginal circumference of the crown. This aids in ensuring a good fit.

Contouring is accomplished with a #114 ball-and-socket pliers.
Final adaptation of the crown is achieved by crimping the cervical margin 1 mm circumferentially with a #800-417 pliers.



A. #114 pliers are used for contouring. **B. #** 800-417 pliers are used for final crimping.

After contouring and crimping, resistance should be encountered when the crown is seated. (Figure 41)

Mesio-distal cross section of crown (left) and bucco-lingual cross section of crown (right).

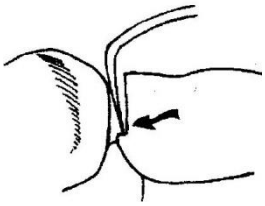
When removing the crown, a spoon excavator can be used to engage the gingival margin and dislodge the crown.

Remove rubber dam. Replace crown and check occlusion.

Rinse and dry the crown.
Use glass ionomer cement .
The crown is filled 2/3 with glass ionomer cement .
Dry the tooth with compressed air and seat the crown completely. Cement should be expressed from all sides. Check centric occlusion prior to the cement setting.

Remove excess cement from gingival sulcus with a sharp explorer or proximal carver. The interproximal areas can be cleaned by tying a knot in a piece of dental floss and drawing the floss through the interproximal region.

PROBLEMS SEATING THE CROWN?

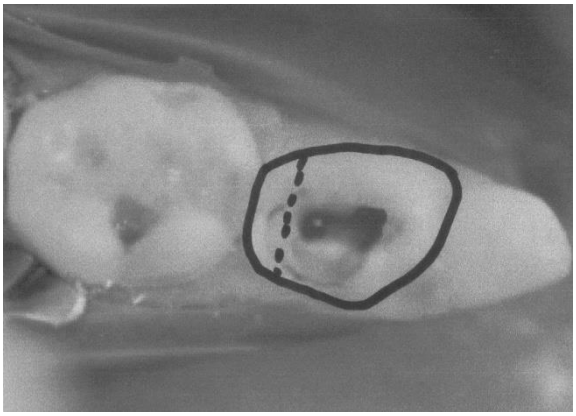


Gingival ledge; contact is not broken.

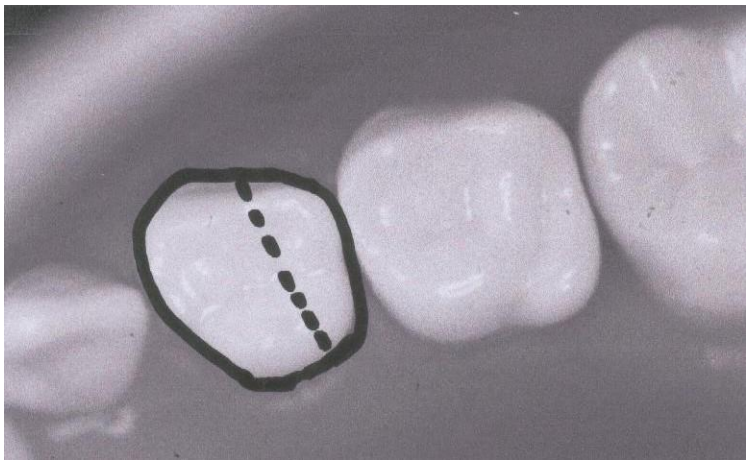
- Inadequate occlusal reduction
- Inadequate reduction of buccal cervical bulge
- SSC too long or too short
- Gingival ledge

Special Clinical Situations:

- CHOOSING A CROWN IN AREAS OF SPACE LOSS
- Rectangles vs. squares (mandibular 1st molars vs. maxillary 1st molars)
    - Extensive distal caries on a mandibular or maxillary primary 1st molar will change its shape to look more like a square or rectangle, respectively. (See figures below)
    - When this happens, choose a primary 1st molar crown from the opposite quadrant (opposite side, opposite quadrant). LRQ=ULQ, LLQ=URQ.
    - Note the space loss is due to mesial drift of the 2nd primary molar.



Mandibular left 1st primary molar. Tooth structure distal to dotted line lost to extensive distal caries would change the shape from a rectangle to a square.



Maxillary left 1st primary molar. If tooth structure distal to the dotted line is lost due to extensive distal decay, a right mandibular 1st primary SSC crown is rotated to fit the preparation.

Additionally, by holding a crown at the height of contour between the beaks of a belling plier in the M-D dimension, you can decrease the M-D dimension. You can also change the contact area by turning the belling plier reversing the way you normally use it and creating a concave contact.