Session #5
PEDS 730

Management of Pain and Infection in Children
[Pages 1 – 7]

CASE #5

EVERY PROJECT IS A PATIENT

Pulpotomy Procedure on Primary Teeth

Presented By Richard L. Grabowsky, D.D.S.

PULPOTOMY – TOOTH A

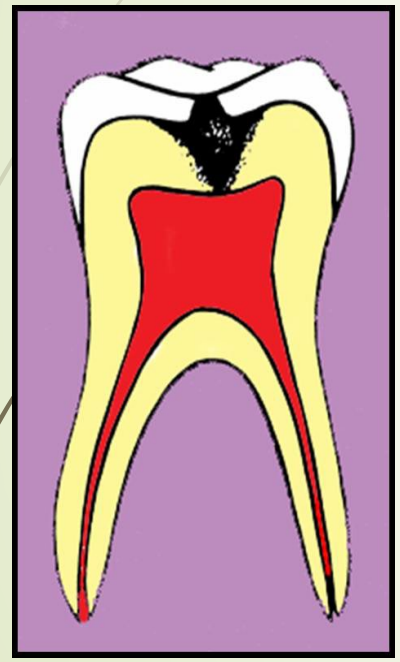
- The formocresol or ferric sulfate pulpotomy procedure is used to treat 1° teeth with infected but still **vital** pulps.

- There are 4 separate steps in performing a pulpotomy.

  1. Access to the pulp chamber and caries removal
  2. Removal of the pulp tissue from the pulp chamber
  3. Placement of the medicament
  4. Placement of base and completing the restoration

- In this exercise, steps 1 and 4 will be completed. These teeth have simulated pulp chamber spaces, but do not have simulated pulps. They are painted red inside to simulate a vital pulp.

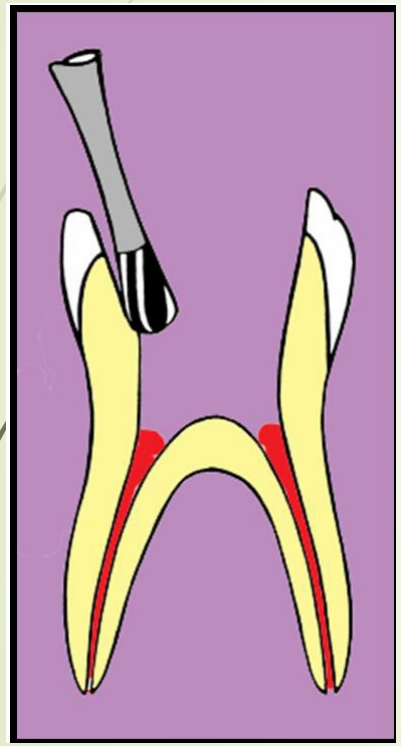
1. Access to and removal of roof of the pulp chamber

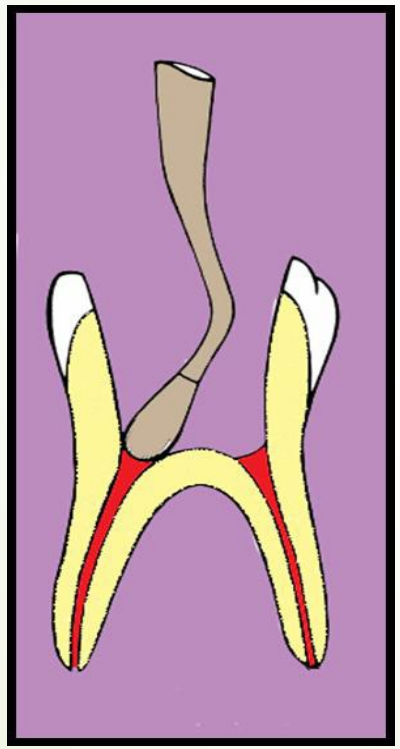


Using a #699 or #330 carbide bur, remove the carious dentin and undermined enamel, overlying the roof of the pulp chamber. Then, using the same bur, penetrate the roof of the chamber in the area of the pulp horn and move the bur laterally (not vertically!) to remove the entire roof. Remember that maxillary molars have three root canals and three pulp horns. You can now make use of all the training you received in school with the connect-the-dots puzzles. You need to connect the pulp horns to remove the roof of the pulp chamber.

Today's procedure: Pulpotomy Prep #A

2. **Remove the tissues from the pulp chamber**





Please note the size of the access prep in relation to the overall size of the tooth. This is a critical point for you to understand. Pulp chambers in primary molars are larger in relation to the overall size of the crown than in permanent teeth. The important point is that once a pulpotomy is completed on a primary molar, the tooth is very likely structurally compromised. This has important implications for restoring the tooth.

DO NOT CUT ON THE FLOOR OF THE CHAMBER. It is very thin and can be easily perforated. At times, the SSC preparation can be performed prior to pulp therapy, if the pulp therapy and SSC can be finished in one appointment. Take your project with completed access preparations to the instructor for your first check.

Vital pulpotomy medicaments

FERRIC SULPHATE PULPOTOMY:

1. The tooth is anesthetized and isolated with a rubber dam, and an inspection of the working field is made. The technique requires a clean field.
2. Complete caries removal is then accomplished, based upon the originally planned restoration (for posterior teeth the final restoration is a stainless steel crown).
3. Access to the pulp chamber is made with a high speed, water cooled bur. The chamber needs to be completely "unroofed" to afford access to all the canal openings. The outline of the access is made by tracing the points of the cusp tips of the molar.
4. Using either hand instruments, such as a sharp spoon excavator, or more frequently a low speed round bur, the coronal pulp tissue is amputated, and the chamber cleaned of all residual pulp tissue.
5. The chamber is irrigated with water, and dried using a cotton pellet. At this point you will probably experience bleeding from all the canals. If not, then the criteria for a vital pulpotomy have not been met (the pulp must be vital, not necrotic or partially necrotic), and other treatment options need be considered, such as a pulpectomy or extraction. In the case of pulp necrosis, you should refer to you text for treatment planning options.
6. Once the canal orifices are identified a cotton pellet lightly moistened with hemostatic agent (ferric sulfate) is placed over the pulp stumps. Over 1 minute this medicament should affect hemostasis of the vital pulp tissues. A darkened appearance of the canals should be seen. If oozing from any of the canals remains, ensure that you have removed all pulpal tissue from the coronal chamber, and then the pulp stumps can again be medicated with the hemostatic agent. If the pulp is hyperemic and hemostasis cannot be achieved, consider other options such as pulpectomy or extraction.
7. Upon complete hemostasis the chamber is rinsed gently and completely filled with IRM. It is especially important to obturate the IRM paste so it is well adapted against the pulpal floor and orifice openings of the pulp chamber - do not leave voids!

FORMOCRESOL PULPOTOMY:

Historically, the formocresol pulpotomy technique was recommended as the principal method for treating primary teeth with carious exposures. In recent times, there has been a shift away from its use over concerns about its toxic effects. Despite this, formocresol continues to be a commonly used pulpotomy medicament (studies have shown that formocresol's use in pediatric pulp therapy carries an inconsequential associated risk- Milne et al).

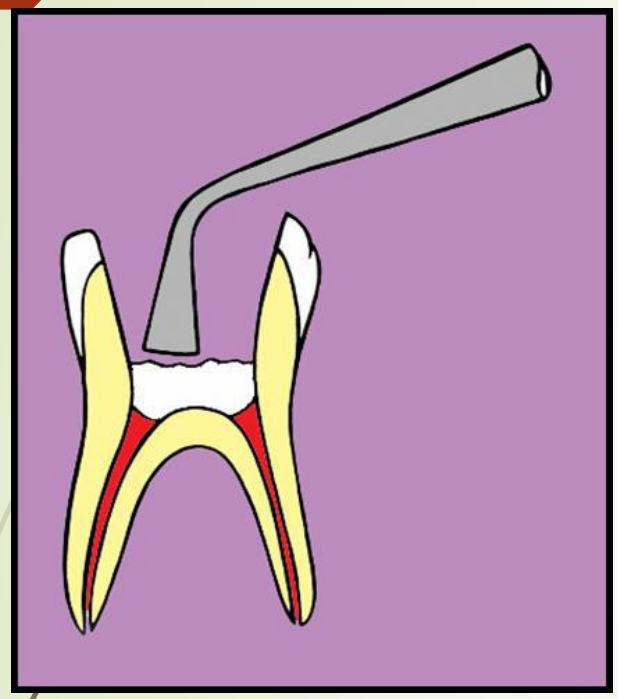
1. After complete removal of all caries, open pulp chamber
2. Remove coronal pulp with slow speed round bur
3. The pulp chamber is dried with sterile cotton pellets.
4. A pellet of cotton moistened with a 1:5 concentration of Buckley's formocresol and blotted on sterile gauze to remove the excess is placed in contact with the pulp stumps and is allowed to remain for 5 minutes. NOTE: Formocresol is caustic and care must be taken to avoid contact with oral tissues.
5. The pellets are removed and pulp chamber is dried with new pellets
6. IRM is placed over the pulp stumps
7. The tooth is restored with a SSC

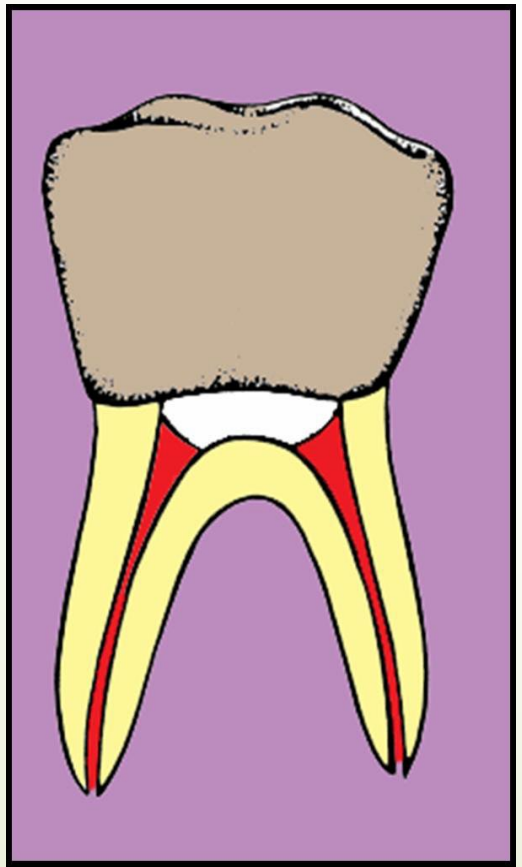
MTA PULPOTOMY:

In the past decade, an alternative material called mineral trioxide aggregate (MTA) became available for use in pulpal procedures.

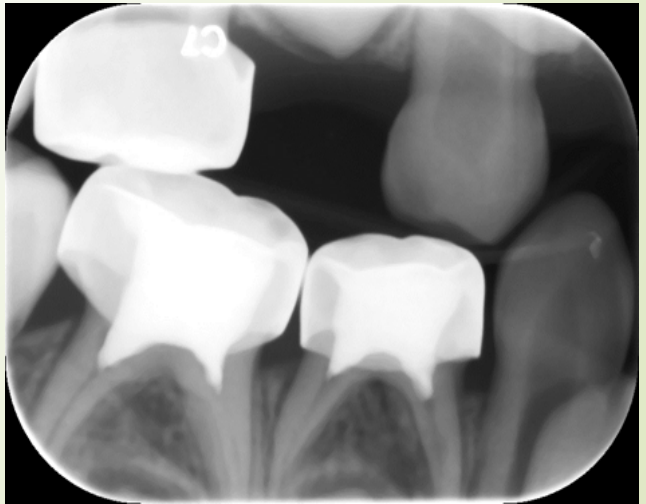
1. After complete removal of all caries, open pulp chamber
2. Remove coronal pulp with slow speed round bur
3. Rinse chamber with chlorhexidine (optional)
4. Using cotton pellets (moistened with saline or chlorhexidine) and moderate pressure achieve pulp hemostasis.
5. If bleeding does not stop after a 60 second application of moistened cotton with moderate pressure, then proceed to primary molar root canal therapy or extraction.
6. Apply MTA paste to cover the exposed radicular pulp surface and a margin of not less that 1mm beyond the pulp dentin interface
7. Seal with ZOE (IRM or other fortified ZOE) or Vitrebond
8. Restore with SSC using glass ionomer cement

3. **Placement of base and restoring**





After removal of the medicament of your choice, place a reinforced zinc oxide and eugenol temporary cement base like IRM or ZOE B&T, or plain ZOE in the pulp chamber. This base needs to be fully condensed to fill the entire pulp chamber right down to the pulp canals. Then restore with Stainless Steel crown.



Stainless Steel Crown Preparation and Restoration of Primary Teeth

Presented By Richard L. Grabowsky, D.D.S.

Preparation of A Molar Tooth

1. **Check centric occlusion** contacts with adjacent teeth and the tooth position in the arch.

2. **Occlusal reduction** – With a #699 bur or a diamond, make approximately 1.0 to 1.25 mm guide cuts in the occlusal grooves and on the cusps. Figure 2.

ALTHOUGH YOU MAY USE DIAMOND BURS FOR THIS PREPARATION, I RECOMMEND THE USE OF A 699 CARBIDE BUR. DIAMOND BURS ARE MORE EXPENSIVE AND CARBIDE BURS DO THE JOB.

3. Then with the side of the bur, uniformly reduce the remaining occlusal surfaces to 1.5 mm, maintaining the general outline of the occlusal anatomy. This is important because primary teeth can have very high pulp horns that can be easily exposed by doing a flat occlusal reduction. Figure 3.

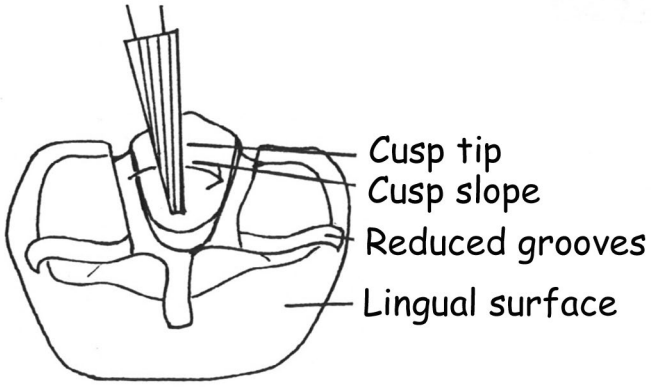


Figure 2 - Guide Cuts

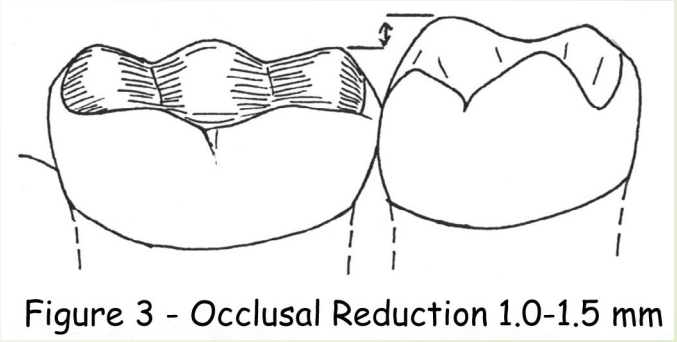


Figure 3 - Occlusal Reduction 1.0-1.5 mm

4. Bevel buccal and lingual occlusal line angles – Sweep the bur along the occlusal line angles, reduce the sharp angles and create a **short** bevel that is about **1.0 mm** wide and 45 degrees to the long axis of the tooth. In doing the bevels, place the bur so that its end cutting portion is beyond the bevel. See Figure 4.

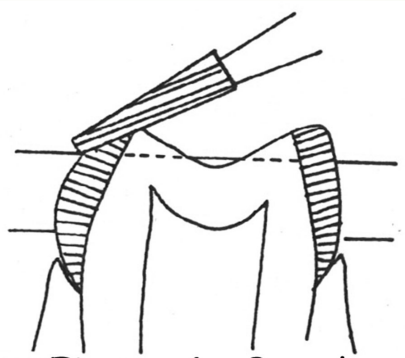


Figure 4 - Bevels

Rationale: The short bevel facilitates seating the crown. On the "other hand," a sharp, flat angle would act as a ledge when seating a crimped crown with a reduced cervical circumference. Placing the end of the cutting portion of the bur beyond the bevel avoids ledging.

5. Proximal reduction. Hold a #699 bur slightly convergent to the long axis and reduce the proximal surfaces from one embrasure, through the contact area into the other embrasure. See Figure 5.

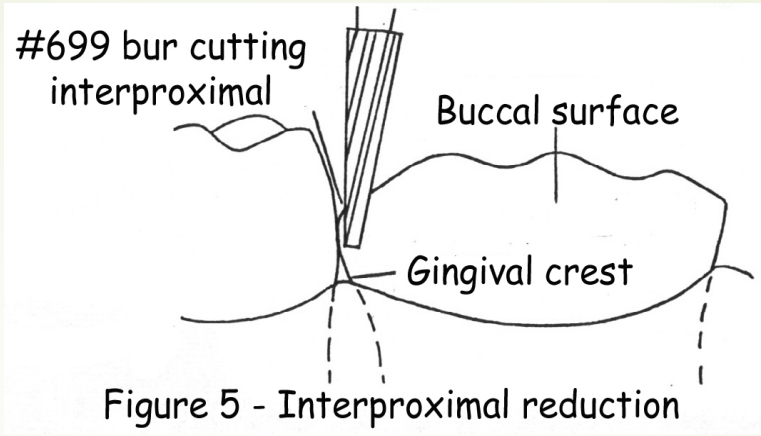


Figure 5 - Interproximal reduction

Exception: If no contact is present, proximal reduction may be **minimized**. Some reduction is still necessary. The proximal reduction should be relatively uniform bucco-lingually following the contour of the tooth, extending out to the buccal and lingual line angles.

Caution: Avoid damaging adjacent teeth (you may use a matrix for protection or place a wooden wedge interproximally.) An explorer should easily pass through the contact area and no ledge or chamfer be detected.

Rationale: If the contact is not broken, the crown will not seat completely.

Note: With the recommended burs, the mesial and distal gingival margins will be feather-edged and located at or slightly below (maximum 1.0 mm) the gingival crest.

6. **Round all line angles** – Using the side of the bur, round the proximal (MB, ML, DL and DB) and occlusal line angles and eliminate any ledges. See Figure 6.

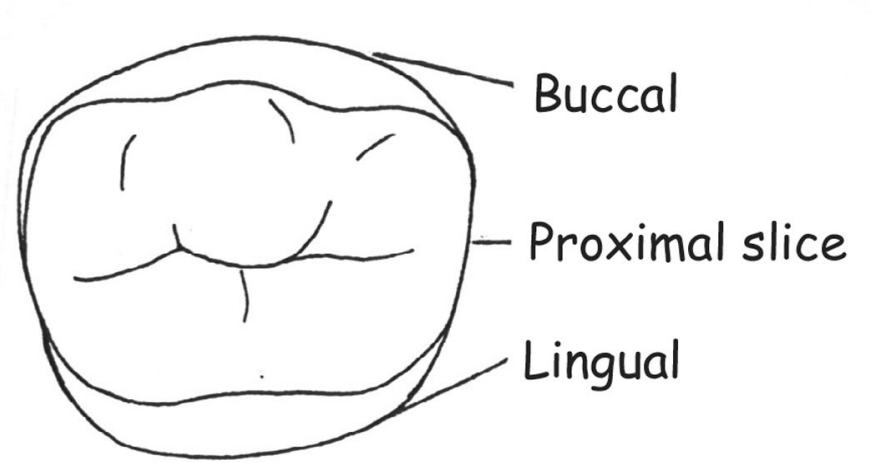


Figure 6 - Rounded line angles

Rationale: Rounded angles facilitate crown margin adaptation and seating of the crown. Square corners and ledges prevent correct fitting of a stainless steel crown.

Clinically, the stainless steel crown is best fabricated before the remaining caries is removed. Occasionally, a pulpotomy can be performed prior to crown fabrication when a definite pulp exposure is known to exist (i.e., by x-ray or during a cavity preparation.)

Stainless Steel Crown Preparation

A. TOOTH PREPARATION CRITERIA

1. Occlusal Reduction - The occlusal surface is reduced by 1 - 1.5 mm

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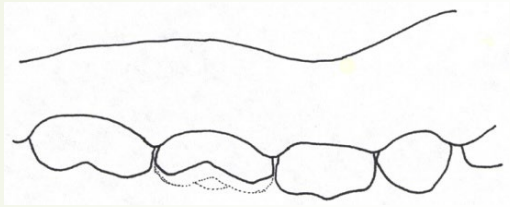

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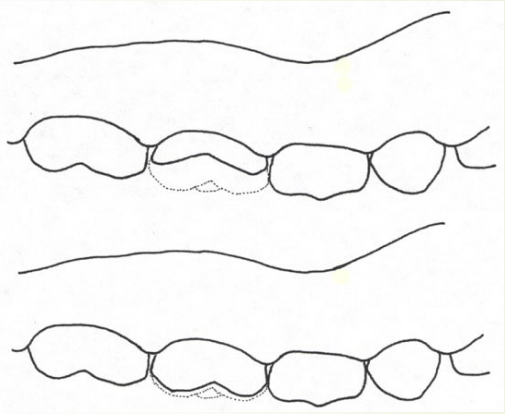

2. Contact is adequately broken. Explorer passes freely between adjacent teeth.

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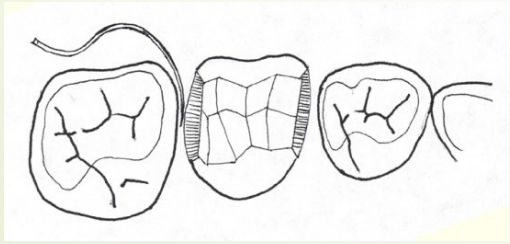

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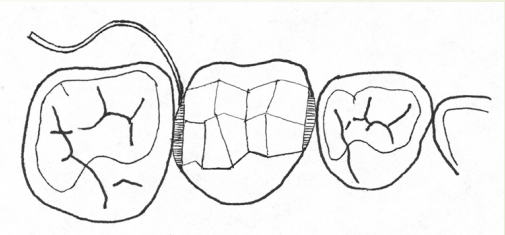

3. Proximal slices end in a feather edge and are free of ledges except those formed by deep caries.

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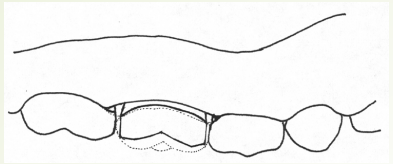

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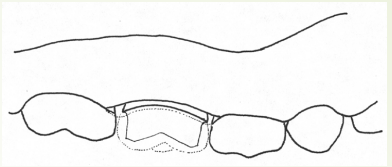
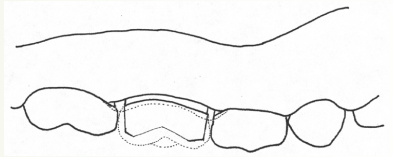


4. Proximal slices terminate at or 0.5 - 1.0 mm below the gingiva.

Acceptable



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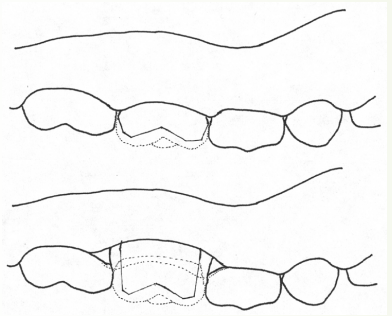

5. Proximal slices are straight (flat) and smooth when viewed from the occlusal.

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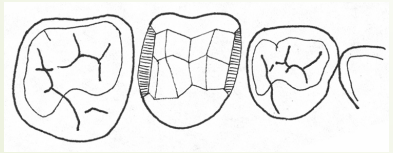

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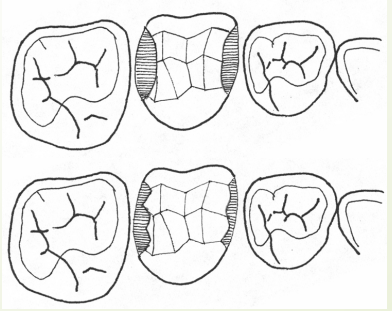

6. Proximal slices are slightly convergent to the occlusal.

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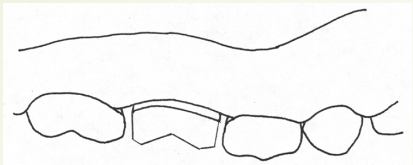

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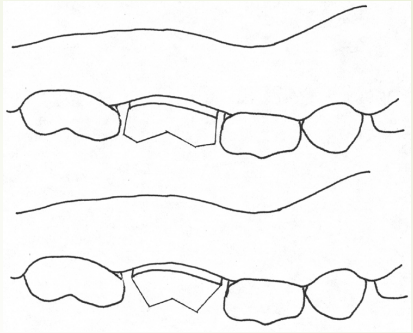

7. The B & L reduction is at 45° to the inclined occlusal planes, no greater than 1.0 mm wide.

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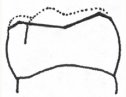

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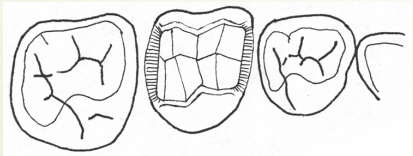
8. The line angles formed by the L, B and proximal surfaces are slightly rounded, but not so much that the tooth is round or oval.

Acceptable



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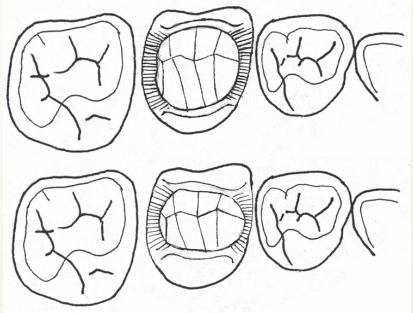

9. Adjacent teeth are undamaged.

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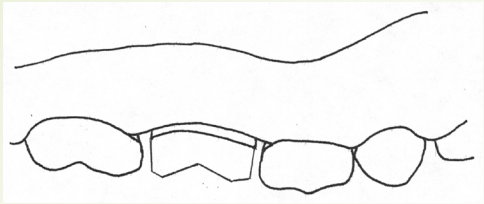

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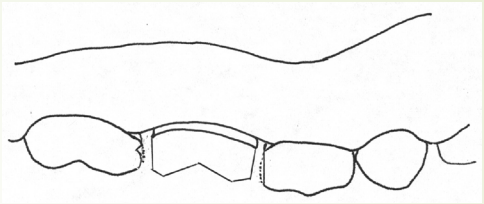


10. The final product - taking pride in your work.
    - Smooth prep
    - No burn marks
    - Teeth and typodont are clean and dust free
    - Gingiva is in a healthy condition
    - All the parts of the typodont are present and unbroken

Crown Fabrication

1. **Crown selection** – Starting with the middle size contoured crown (from a choice of six sizes), select the crown that most closely approximates the mesio-distal width of the tooth being restored. The selected crown is in contact with adjacent teeth except where open contacts were originally present.

Rationale: The crown should restore the width of the original tooth to preserve the integrity of the dental arch. **A well restored primary molar is the best space maintainer.**

Note: With an adequately sized crown, the margins will contact the gingiva all around.

2. **Establish height and length of crown.** Seat the crown and press it until margins are located approximately 1.0 mm subgingivally. See Figure 7.

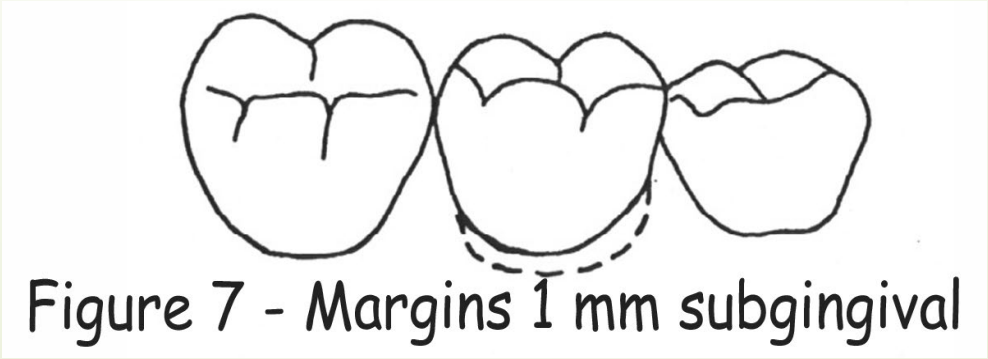


Figure 7 - Margins 1 mm subgingival

Adjustments:

a. Should the buccal and/or lingual margins extend over the gingiva, adapt them in with the contouring pliers, to bring them into the gingival sulcus.

b. The crown may need the M-D dimension reduced digitally or with the Howe pliers in the case of space loss or tooth-crown size discrepancy.

c. Using the small, curved crown and bridge scissors, reduce the margins approximately the same amount that the crown is in supra-occlusion. See Figure 8.

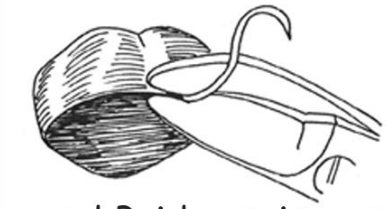


Figure 8 - Crown and Bridge scissors trimming crown

Rationale: The preliminary reduction will permit establishing the occlusal height without traumatizing the tissues or occlusion. The marginal ridges will be level with those of the adjacent teeth.

Complete the crown length: With a sharp instrument (e.g. chisel) scribe a line on the crown at the level of the height of the marginal gingiva. Then with the curved crown and bridge scissors, trim the gingival margin of the crown to 1.0 mm below the scribed line.

Rationale: The crown will be long enough to engage the cervical undercut stopping short of the gingival attachment. Clinically, there should be little or no blanching of the gingival tissues due to over-extension.

3. Contouring the crown margins – Contour the gingival third of the crown with the contouring pliers. Place the ball portion of the pliers inside the crown. As the pliers are squeezed and opened repeatedly, it is moved around the margin in small, overlapping increments, contouring the margin inwards. See Figure 9.

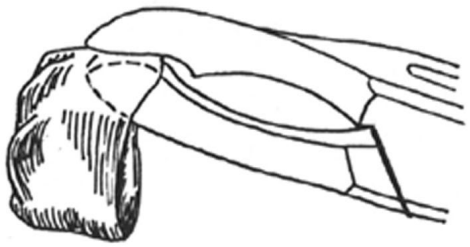


Figure 9 - Contouring the gingival third of the crown

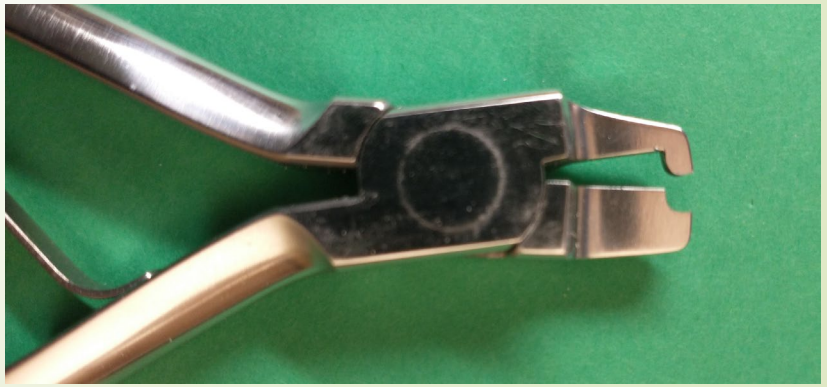
Rationale: Contouring the crown provides a tight fit of the crown on the tooth and also the proper anatomical form of the crown to protect the gingiva and restore the contacts.

The crown is tried on the tooth, inserting it from lingual to buccal (occasionally from buccal to lingual for maxillary molars).

With an explorer, check if any openings exist at the margins of the crown.

Crimping of the gingival margin of the crown should then be accomplished with light pressure using the Peeso pliers in a downward movement (See Figure 10-12), or the crimping plier.

Figure 10 - Peeso pliers crimping the gingival third of the margin for a tight fit. The longer beak of the pliers is on the outside.



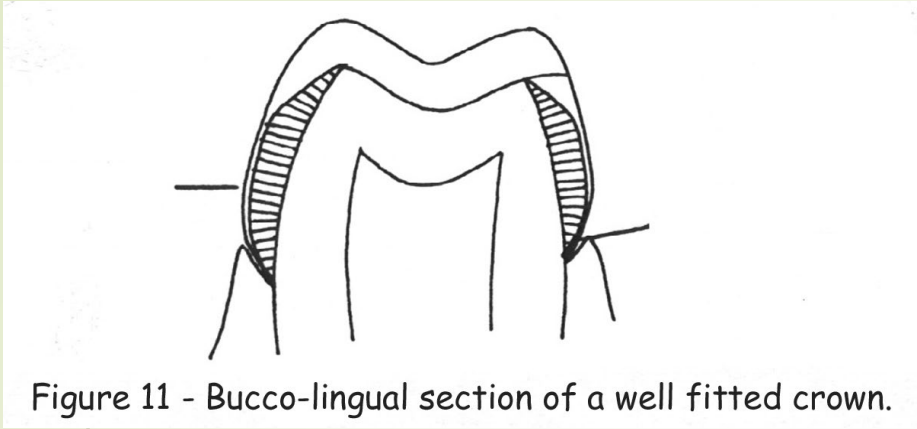


Figure 11 - Bucco-lingual section of a well fitted crown.

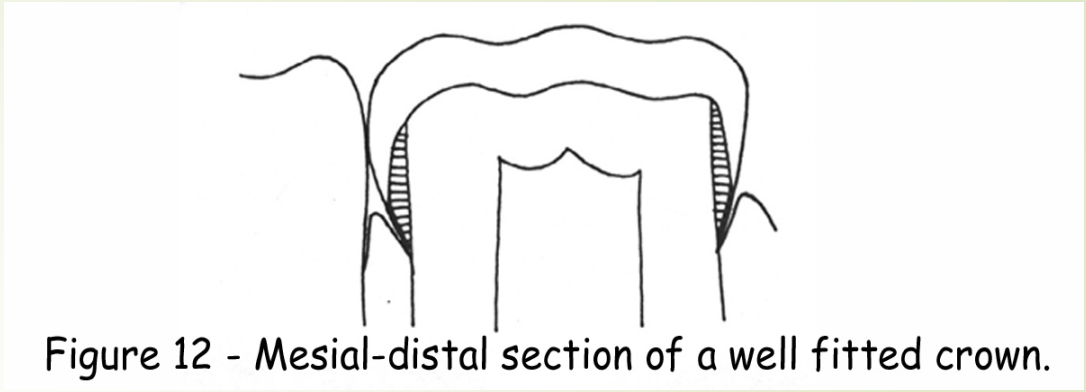


Figure 12 - Mesial-distal section of a well fitted crown.

Turn over to observe cervical aspect for irregularities; recrimp to eliminate ripples.

Note: Adequate margin adaptation can be checked before completely seating crown. After seating the crown on the lingual, the crown margins should come completely into contact with the bucco-occlusal bevel for mandibular molars.

When the crown is sufficiently contoured, it should "snap" on to the tooth when being seated and fit snugly. Clinically, a well-adapted crown may only seat completely when the patient occludes.

Check margins and occlusion again.

To remove a tightly fitted crown, insert a large spoon excavator under a margin and lift. When trying on and removing crowns, place a piece of 2x2 gauze at the back of the patient's mouth as protection from swallowing or aspirating.

4. **Finishing the margins.** Use a Busch silent wheel to smooth and **slightly** thin the cervical margin of the crown; rotate the stone toward and at a 45 degree angle to the edge of the crown. See Figure 13.

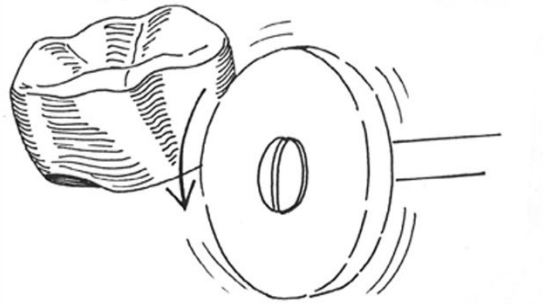


Figure 13 - Busch Silent stone smoothing and thinning the margin.

Also remove the steel burs on the inside surface of the margins. Then polish the margins with a rubber wheel.

Rationale: Smoothing and thinning the margins lessens the possibility of gingival irritation. A polished surface will decrease plaque retention.

Note: A crown that was not trimmed, or is very carefully trimmed without any rough edges, does not require finishing of the margins.

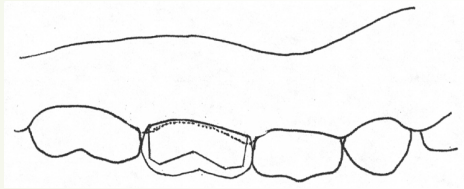
Caries Removal: The remaining caries is removed with a large, slow speed round bur to determine the need for pulp therapy.

Stainless Steel Crown Adaptation

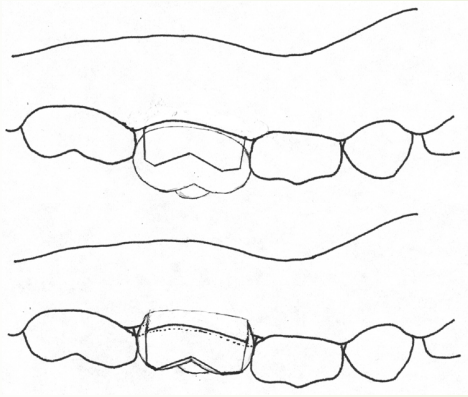
B. CROWN ADAPTATION CRITERIA

1. The occlusal surface of the crown is at the same level as the adjacent teeth and consistent with the plane of occlusion. The marginal ridges are level with the marginal ridges of the adjacent teeth.

Acceptable

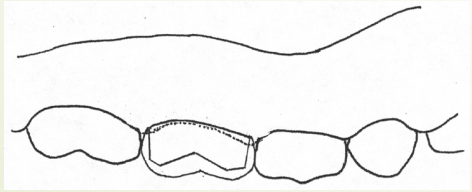


Not Acceptable



2. M and D contact areas restored and tight.

Acceptable



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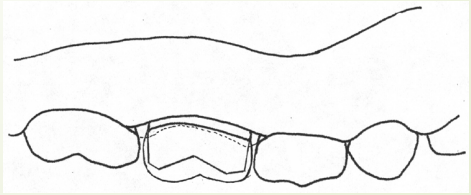


3. Margin adaptation - snug fit; explorer tip does not fit between the crowr margin and the tooth.

Acceptable	Not Acceptable
	

4. Crown length - margins crimped into cervical constriction - 1.0 mm beyonc gingival crest.

Acceptable	Not Acceptable
	 

5. The crown cannot be easily dislodged with an explorer.

Acceptable	Not Acceptable
	

6. The final product - taking pride in your work.
   - Crown is not scratched
   - Margin of crown is smooth with no burs
   - Crimping and contouring are even
   - Number is polished off
   - Gingiva is in a healthy condition
   - All the parts of the typodont are present and unbroken

CEMENTATION OF THE CROWN - (#K)

1. Isolate the tooth with cotton rolls if the rubber dam is not in place. With the air/water spray, wash and dry the tooth.

2. Mix the cement according to the manufacturer's instructions, avoiding air entrapment, flow the cement into the crown, almost filling it.

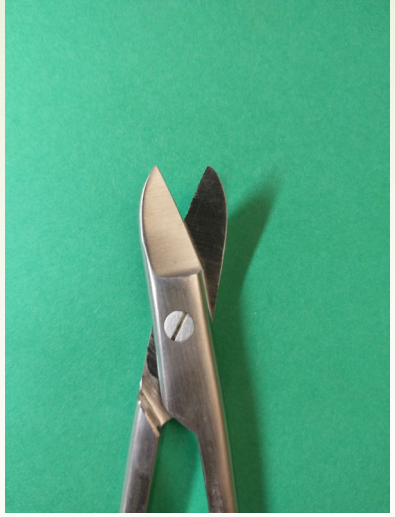
3. Place the crown on the tooth, seating it according to the direction determined during the try-in. The crown is seated with firm finger pressure. If additional pressure is required, the patient should occlude or bite on an orange woodstick or orthodontic band bitestick.

4. Check occlusion before the cement sets.

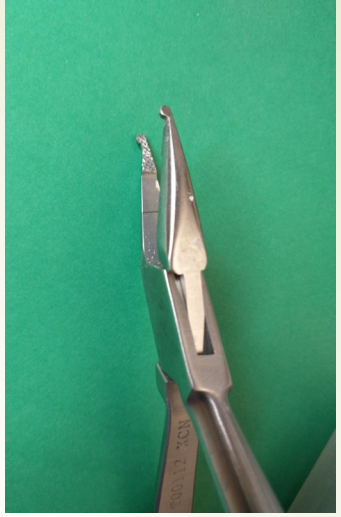
Remove excess cement with scaler, spoon, or explorer. Use dental floss with a small knot pulled through under the contact area to clean the interproximal. Blow air into the gingival sulcus to check that all excess cement has been removed.

Rationale: Excess cement will produce gingival irritation.

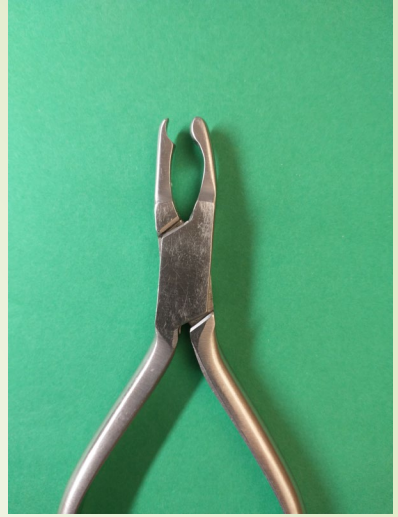
BIRD BEAK



CROWN & BRIDGE SISSORS

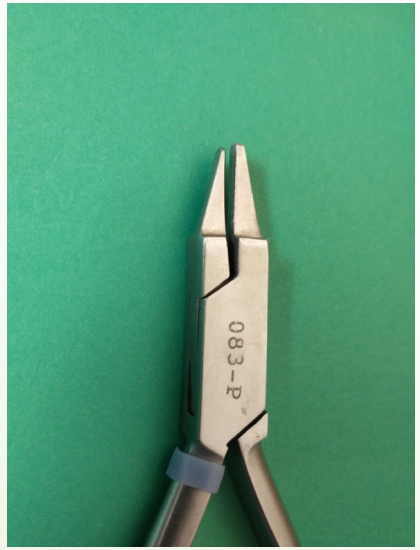


HOWE PLIER



CROWN CONTOURING PLIER

CROWN CRIMPING PLIER



PEESO PLIER

GOLD CURVED PEDO SCISSORS

3-PRONG PLIER

SimLab - Session #5

PEDS 730 - Pre-Clinical Skills Assessment for Pediatric Dentistry
Typodont Sim-Lab Exercise
Pulpotomy and Stainless Steel Crown #A (on crown)

Student Name:	[Type name here]	**Date:**	[Type date here]

Criteria Student was able to: ***Guidelines for Tooth Preparation and Restoration Found in the Pediatric Laboratory Manual***	**Self-Evaluation**	**Instructor Evaluation** (Comments required for Clinically Acceptable and Standard Not Met)	**Comments**
1. Correctly assemble typodont and identify tooth for preparation			
2. Access the pulpal chamber • Outline form • Depth of chamber access			
3. Obtain adequate removal of pulp tissue			
OBTAIN INSTRUCTOR SIGNATURE BEFORE PROCEEDING _____			
4. Place pulpal medicament and adequate obturation of coronal pulp chamber (not in this laboratory exercise)	N/A	N/A	N/A
5. Prepare the tooth for stainless steel crown (#A) • Adequate reduction ○ Occlusal ○ Mesial / Distal / Buccal / Lingual • No ledges. Knife edge margins • Beveling of occlusal/axial line angles			
OBTAIN INSTRUCTOR SIGNATURE BEFORE PROCEEDING _____			
6. Select appropriate size stainless steel crown			
7. Fit and seat SSC final restoration (do not cement in this laboratory exercise)			
8. Establish and evaluate appropriate occlusion	XXXXXXXXXXXX	XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXX
9. Complete procedure without damage to hard or soft tissues			
	Overall	**PASS**	

Instructor Signature:

Instructor Typed Name

_____

Double-tap to edit

Student Signature:

_____

SimLab - Session #5

PEDS 730 - Pre-Clinical Skills Assessment for Pediatric Dentistry
Typodont Sim-Lab Exercise

Stainless Steel Crown #K (Unitek crown), Cement SSC

Criteria Student was able to: ***Guidelines for Tooth Preparation and Restoration Found in the Pediatric Laboratory Manual***	**Self-Evaluation**	**Instructor Evaluation** (Comments required for Clinically Acceptable and Standard Not Met)	**Comments**
1. Correctly assemble typodont and identify tooth for preparation			
2. Prepare the tooth for stainless steel crown (#K) • Adequate reduction ○ Occlusal ○ Mesial / Distal • No ledges, No sharp LA, knife edge margins • Beveling of occlusal/axial line angles			
OBTAIN INSTRUCTOR SIGNATURE BEFORE PROCEEDING _____			
3. Select appropriate size stainless steel crown			
4. Adjust and Seat SSC final restoration			
5. Establish and evaluate appropriate occlusion			
6. Complete procedure without damage to hard or soft tissues			
OBTAIN INSTRUCTOR SIGNATURE BEFORE PROCEEDING _____			
7. Cement SSC onto #K after instructor signature obtained			
	Overall	**PASS**	

Instructor Signature:

Instructor Typed Name

_____

Double-tap to edit

Student Signature:

_____

Submission Instructions

Once complete, submit your signed evaluation as a PDF to Sakai with your instructor present. To do so:
- Tap the three dots in the upper right
- Tap Export and then PDF
- Select "Fit each sheet to single page", save to Files, and upload to Sakai.

LET'S GET STARTED!

4 GROUPS ~13/group

#1 = Stations 1-15, 67-70
#2 = Stations 50-66
#3 = Stations 16-25, 45-49
#4 = Stations 27-44