

POLISHING AMALGAM RESTORATIONS

A Self-Study Module

Developed by
Carlene Paarmann, RDH, Med
Department of Dental Hygiene
Idaho State University
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Revised June 2005 by Terrie Beckman ,CDA ,BSEd

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INTRODUCTION

In order for Idaho dental assistants to legally polish amalgam restorations under the direct supervision of a dentist, they must first successfully complete coursework approved by the Idaho State Board of Dentistry. A certificate or diploma of course completion as issued by the teaching institution will be the assistant's verification of compliance with Board standards. This module was designed to be utilized by Board-approved teaching entities. It offers basic information which is intended to be supplemented with formal classroom, laboratory and clinical instruction.

There are a variety of techniques for polishing amalgam restorations. To minimize confusion, this module describes only one technique. This technique provides the basic knowledge necessary to learn the skill of polishing amalgam restorations. The polishing of a Class II amalgam restorations is described so that the student will have an opportunity to learn the technique for polishing both the occlusal and interproximal surfaces. By so doing, both concave and convex surfaces will be polished, and the skills gained from polishing a Class II can be easily transferred to other classifications of amalgam restorations (e.g., Class I, Class V).

It should be pointed out that the polishing technique described herein does not include the technique for removing amalgam overhangs. Overhang removal (i.e., margination) is a procedure which requires training in itself. This polishing technique includes only those margination procedures which can be accomplished using the armamentarium listed in the module. As such, only minute amounts of excess amalgam from any margin of the restoration will be removed. Any restoration with substantial excess amalgam at the proximal margins, particularly the gingival proximal margin, will require the attention of a person skilled in overhang removal/margination procedures prior to completion of the amalgam polish procedure.

OBJECTIVES

1. List and explain the major reasons for polishing amalgam restorations.
2. Explain the function of each component of the amalgam polishing armamentarium.
3. Explain and use aseptic technique as it applies to this procedure.
4. Explain what to look for when evaluating the accuracy of dental anatomy given restoration.
5. Distinguish between a serviceable restoration and one which should be replaced.
6. Recognize and use effective instrument grasp and stable fulcrum.
7. List and demonstrate the sequence of steps for polishing procedure and describe how they will be accomplished.
8. Explain the precautions which must be taken during the polishing procedure and describe how they will be accomplished.
9. Explain the criteria for an adequately polished amalgam restoration.
10. Evaluate polished amalgam restorations to determine if they meet criteria for acceptability and determine ways to improve or modify, if necessary.

BACKGROUND INFORMATION

Placement of amalgam restorations is just one aspect of achieving and maintaining optimal dental health. When teeth are restored with amalgam restorations, those restorations must not detract from the health of the teeth and the surrounding tissues. A properly contoured, polished restoration will contribute to the longevity of the restoration and the health of the surrounding periodontium.

Whether or not it is necessary to finish and polish an amalgam restoration remains to some a controversial subject. Some dentists will argue that a correctly carved amalgam does not require any more manipulation. Despite this argument, there remain some very valid reasons to carefully finish the margins, smooth the surfaces, and polish the restoration. An amalgam restoration that will contribute to the long-term dental health of a patient requires proper finishing and polishing procedures.

Finishing amalgam restorations involves removing marginal irregularities, defining anatomical contours, and smoothing the surface roughness of the restoration. Polishing is performed to obtain a smooth, shiny luster on the surface of the amalgam. In some cases, restorations may also need to be recontoured. This involves changing the form or shape of the restoration, which is necessary if the restoration does not reproduce the original contours of the tooth. Uncorrected marginal excess or improper contouring can make oral hygiene difficult or impossible since adjacent areas may become inaccessible to a tooth brush or dental floss, thus leading to an accumulation of dental plaque.

PURPOSES OF POLISHING RESTORATIONS

The next few paragraphs of this module explain several important reasons why amalgam restorations should be polished: prevention of recurrent decay, prevention of deterioration of the amalgam surface, maintenance of periodontal health, and prevention of occlusal problems. The information presented in this section is *Operative Dentistry Procedures for Dental Auxiliaries* (Spohn, E., Halowski, W., and Berry, T., The C.V. Mosby Company, 1981).

Both previously placed “old” and newly placed amalgam restorations will be improved by finishing and polishing. Because old restorations have undergone some degree of tarnish and corrosion, they take a little longer to finish and may not exhibit the same smooth, shiny surface as can be achieved by polishing new restorations. An additional benefit of polishing amalgams is that of increased patient motivation. Because the amalgam is more esthetically pleasing, it may be perceived as more valuable and contribute to the patient’s desire and motivation to clean and take care of the restoration.

Prevention of recurrent decay. After carving is completed, the surface of the amalgam is still somewhat rough and the margins are not as smooth as they can be. As a result, the potential of increased plaque accumulation and retention of debris exists, both on the surface of the restoration and along the margins. These conditions increase the likelihood of recurrent decay around the restoration. Finishing and polishing amalgam restorations result in a smooth, lustrous finish of surfaces and margins. Plaque and debris collection are reduced, and the restoration is easier to clean.

Prevention of amalgam deterioration. One of the shortcomings of amalgam as a restorative material is its tendency to tarnish and corrode. Tarnish is a discoloration on the surface of the amalgam, primarily a film of sulfides which usually results from certain foods or oral debris. As the tarnish layer becomes thicker and darker with the aging of the amalgam, it becomes readily visible. By itself it is not particularly damaging to the amalgam, but it is unsightly. It can occur on a polished amalgam, but generally at a much slower rate than on an unpolished restoration. Corrosion, on the other hand, is a destructive attack on both the surface and subsurface of the restoration, and is one of the causes of surface pitting and/or the breakdown of the margins of the restorations. Marginal breakdown may, in turn, lead to recurrent caries or fracture of the restoration. Corrosion is an actual chemical deterioration of the amalgam resulting from the reaction of the metal with such things as air, moisture, acid or alkaline solutions and other chemicals. A smooth, polished surface is less likely to accumulate acids, plaque, and debris, which may encourage galvanic action on the surface, and thus is less likely to develop a tarnished appearance.

Maintenance of periodontal health. Any restoration must not only maintain a healthy environment for the soft tissues but must also ensure the patient's ability to cleanse the area. The facial, lingual, and proximal surfaces are critical areas that may affect the patient's oral hygiene and the periodontium. Proximal contact areas are surrounded by "spaces", known as embrasures, on all four sides of the contact areas; occlusal, gingival buccal, and lingual. And they are named according to their location. The gingival embrasure may not be as easily visible as the other embrasures because it houses the interdental papilla which usually fills the entire space. Embrasures are vital to the maintenance of healthy periodontium. They serve as spillways or escape ways for the passage of food from the occlusal surfaces and provide stimulation to the surrounding soft tissues. Proximal contours of the teeth and embrasure spaces are intimately related since the shape of the spaces is dependent upon the shape of the proximal surfaces. Figures 1 and 2 below demonstrate normal proximal contours and embrasure spaces.

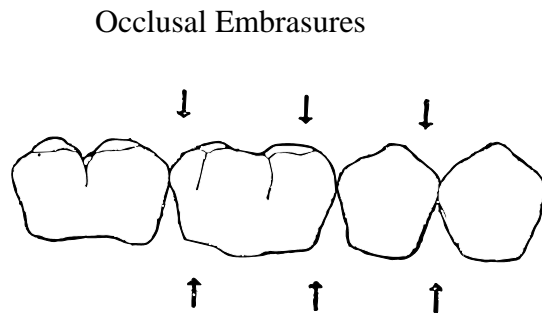


Figure 1. Proper anatomic contour. Arrows are pointing to the occlusal and gingival embrasure spaces.

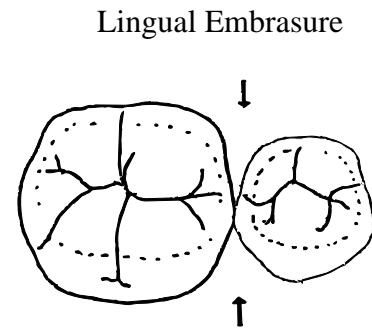


Figure 2. Proper anatomic contour. Arrows are pointing to the buccal and lingual embrasure spaces.

Restoration that are improperly contoured contribute to periodontal breakdown. An over contoured surface presents an area that quickly collects and harbors plaque, resulting in irritation. This bulky contour may interfere with the patient's ability to cleanse the area. A slightly under contoured restoration is less of a potential problem because it is less likely to interfere with the patient's ability to clean the area. The restoration over contoured in the gingival embrasure leaves less space for the papilla. This encroachment on the space may lead to strangulation or physical displacement of the papilla. Either situation increases the likelihood of tissue breakdown. An under contoured proximal area may have a poor contact, which increases the potential for food impaction. Food impaction is not only frustrating for the patient but irritating to the soft tissues. A properly contoured proximal surface is easily cleansed with dental floss. A contact area that is too tight presents the potential for mechanical irritation form floss being forced through the contact. A rough contact area may tear the floss. The frustration of the patient may contribute to inadequate flossing. Figures 3 and 4 demonstrate improperly contoured proximal surfaces and embrasure spaces.

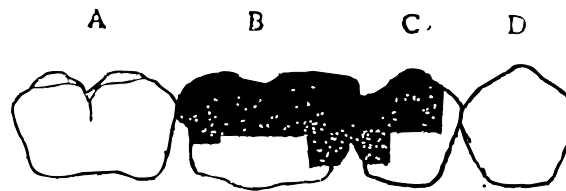


Figure 3. PROXIMAL CONTOURS

- A & D: proper anatomic contour
- B (distal): inadequate amalgam on distal (uncontoured)
- B (mesial): excess amalgam on gingival embrasure and occlusal embrasure (overcontoured)
- C: excess amalgam on distal (overcontoured)

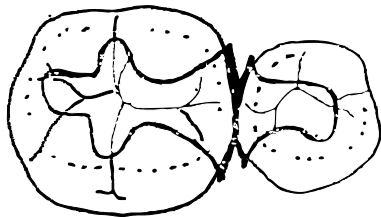


Figure 4. BULKY EMBRASURES (buccal and lingual)

The gingival floor of the proximal box is frequently subgingival, and restorations with extreme excess in these areas can lead to severe periodontal trauma. As mentioned in the introduction to this module, excess amalgam at the gingival margin of the restoration (overhang) that is too bulky to remove with armamentarium other than that listed for the polishing procedure described herein, will require the attention of a person skilled in overhang removal/margination procedures prior to completion of the amalgam polish procedure.

Recontouring, finishing, and polishing provide an opportunity to correct discrepancies in the anatomical contours of the restoration. With the use of specific instruments, the contours of the amalgam can be altered, and the health of the adjacent tissues can be preserved if recontouring and finishing procedures are accomplished within a reasonable timeframe.

Prevention of occlusal problems. Potential occlusal problems may be prevented by the finishing of amalgam restorations. Occasionally, a restoration may be left in premature occlusion, which can lead to several problems. The tooth may exhibit pain or sensitivity, especially during mastication. In more severe cases, the restoration or the

opposing tooth may fracture. The tooth may undergo slight orthodontic movement because of the pressures of premature occlusion. This problem can be corrected during the recontouring process.

All of the above-listed reasons for performing finishing and polishing procedures lead to an increased serviceable lifetime of the restoration. The benefits gained from finishing and polishing amalgam restorations should be explained to your patients as part of your routine patient education program. The amount of discussion will, of course, vary with the individual patient, but generally your explanation should include: 1) reasons for polishing amalgam restorations; 2) the general sequence of procedures used to accomplish the task; and 3) sensations that the patient may experience during the polishing procedure.

The finishing and polishing procedures should not be initiated on an amalgam restoration until the amalgam has reached its final set, at least 24 hours after it has been placed and carved. Premature finishing and polishing will interfere with the crystalline structure of the hardening amalgam. The result will be a weakened restoration. Studies have been conducted on polishing high copper amalgams ten minutes after placement; however, it is presently recommended that at least 24 hours pass before the polishing procedure is attempted.

Single restorations may be polished at the next recall appointment. Multiple restorations should be polished at a specific polish appointment. An amalgam restoration is not considered complete until it is polished.

SELECTION OF RESTORATIONS TO BE POLISHED

All amalgam restorations must be evaluated carefully prior to polishing to determine if they are serviceable and what, if any, modifications are necessary. If there is doubt about the acceptability of their condition, they should be evaluated by a dentist for replacement.

Most newly placed amalgams will easily pass the criteria for acceptability; however, occasionally something will have occurred during placement or in the interim between the placement and polishing appointments which makes the amalgam a candidate for replacement (e.g., fracture, etc.). Older amalgams indicated for polishing should be evaluated carefully using the same criteria established for new amalgams. The criteria for serviceable amalgams that indicate polishing include:

1. *No fractures in the restoration.* When evaluating the restoration(s) to be polished, carefully assess it both visually and tactilely in good light. Dry the restoration if it is wet. Notice the rough non-reflective appearance of the surface. Look for fractures on the occlusal surface and marginal ridges. Use a mirror and light reflection to improve vision in all areas.

2. *Proximal contact is present in Class II restorations when tooth position makes it possible.* The contact area is checked by passing a piece of dental floss through it. Floss through the contact area just as if you were flossing to remove plaque. You should feel a slight resistance to passage through the contact area. In most cases extreme resistance or no resistance indicates the contact is not correct. Very tight contacts may be improved during the polishing procedure but lack of contact when one should be present indicates the amalgam should be replaced. Open contact trap food and debris and may lead to the breakdown of the periodontium in the area. The height and contour of the contact is evaluated visually to determine if any modifications are necessary.

3. *The anatomy can be maintained or improved.* Be aware that occasionally a patient's dental anatomy, occlusion or tooth position is vastly different from normal, ideal anatomy. In these cases the anatomy of the restoration is usually modified to suit the situation when it is being placed. This may mean the anatomy will be much flatter than normal or the height or position of a cusp or ridge may be modified. Perhaps the contact is in an unusual place. A look at the anatomy and position of the patient's other teeth will help you evaluate the appropriateness of the anatomy and occlusion of the restoration to be polished. Before making any alterations in anatomy confirm your decision with the supervising dentist.

Some examples of anatomy that could be improved during the polishing procedure include: bulky embrasures, broad contact areas, high areas of amalgam that contact first (premature contacts), marginal ridges that extend beyond the height of occlusion (if a marginal ridge is excessively high, it is likely that it will fracture from occlusal forces), and indistinct anatomy. On the other hand, excessively deep occlusal anatomy or marginal ridges below the plane of occlusion cannot be improved by finishing and polishing procedures and are, therefore, contraindicated for polishing.

4. *All margins can be contoured to be flush with the cavosurface margin of the cavity preparation.* Using an explorer, look and feel for excess amalgam or areas where amalgam is deficient at the margins. If the margin is rough and ragged rather than following the smooth line of the cavity preparation, there is most likely flashing and/or ditching present.

Flashing is an excess of amalgam which extends over the cavosurface margin of the cavity preparation. If the tip of the explorer catches when moving from tooth, it indicates there is an excess of amalgam which needs to be removed. If the flashing appears at the gingival margin of the restoration it is commonly referred to as an overhang.

Ditching is a deficiency of amalgam along the margin, preventing the margin of the cavity preparation from being flush. If the explorer catches going from amalgam to tooth structure, but not from tooth to amalgam, it indicates there is inadequate amalgam at the margin. An area of ditching is also commonly referred to as a submarginal area and it requires removing tooth structure or replacing the amalgam to correct the situation.

If the tip of the explorer catches when moved in both directions across the margin, it indicates there is an open margin (there is a distinct space between the amalgam and the wall of the cavity preparation) and the amalgam should probably be replaced. Figure 5 depicts flashing, ditching, and open margins.

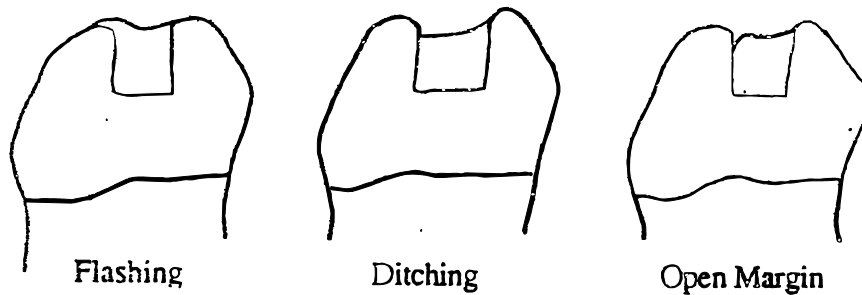


Figure 5.

At the completion of the polishing procedure, all of the margins should be flush (the explorer moves smoothly in either direction with no catching at all); areas with excess amalgam can be finished. Margins that are slightly deficient require the removal of enamel to assure smooth flush margins. According to Idaho state law, dental assistants or hygienists are not allowed to remove tooth structure. As such, the supervising dentist must remove tooth structure as needed. Margins that are greatly deficient or open cannot be corrected during the polishing procedure and are considered contraindications to polishing.

5. *The occlusion can be maintained or improved.* Occlusion must be checked prior to isolating the teeth involved in the procedure to determine what, if any, modifications must be made to correct it. The occlusion can be checked visually to identify shiny burnished areas on the amalgam where the restoration has become worn because it prematurely contacts the opposing teeth. Occasionally these areas look flat due to the premature occlusion. These areas are called wear facets. Wear facets should be polished down to correct the occlusion.

Examples of restorations that are contraindicated for polishing that do not fit into one of the five categories above include: 1) restorations with gross overhangs that need to be replaced; 2) restorations in teeth to be extracted or crowned; and 3) restorations with recurrent decay that need to be replaced.

PRINCIPLES OF POLISHING

Finish vs Polish

Finishing and polishing the restoration can be divided into two separate procedures performed with different abrasive agents. Finishing the restoration involves contouring, removal of marginal discrepancies, defining the anatomy, and smoothing the amalgam surface. Polishing enhances the quality of the restoration by producing the smoothest shiniest surface possible—one which will offer better resistance to corrosion and tarnish. These procedures are significantly interrelated and can be distinguished by the abrasive used. Finishing procedures are completed prior to polishing and require abrasive agents that are coarse enough to remove the bulk from the surface. Polishing procedures require more mildly abrasive materials for smoothing and shining the amalgam surface.

Abrasive Steps

An abrasive changes the surface of the tooth by frictional grinding, rubbing, scraping, scratching, etc., to remove irregularities. As this process proceeds from coarse abrasion (finishing) to very fine abrasion (polishing), the surface of the restoration passes through various stages: from an irregular surface, to a grooved surface, to a finely scratched surface which is much smoother and better reflects light. The last state, finely scratched surface, is regarded as the polished surface and, to the human eye, will appear as a high shine. Therefore, it is extremely important to use abrasive agents in the order of decreasing coarseness, concluding with the least abrasive material. The likelihood of achieving a high shine with a mirror-like finish is decreased if very coarse abrasive agents are immediately followed by fine abrasive agents. The fine abrasive agents will not remove the large, deep scratches left by the coarse abrasive agents.

Characteristics of Abrasives

Factors determining the abrasiveness or polishing potential of an agent include its hardness, size, shape, and concentration of abrasive material. Different abrasives vary considerably in their hardness and shape. Within the same abrasive, sizes are graded from coarse to fine. With abrasive compounds that are harder, of rougher shape, increased particle size, or high concentration, abrasiveness is increased. For example, both garnet disks and cuttle disks are available in coarse, medium, fine, and extra fine varieties. However, garnet is more abrasive than cuttle because of its hardness, size, and shape. As such, a coarse garnet disk will remove many more irregularities than will the coarse cuttle disk.

Additional Factors

Additional factors which relate to abrasiveness must also be considered. These include the pressure and speed used to apply the abrasive material. The greater the pressure or speed used while applying the abrasive, the greater the friction which results in the production of heat.

Precautions

The patient's health and safety are your responsibility during this procedure. It is the moral and ethical responsibility of every dental auxiliary engaged in polishing amalgam restorations to prepare her/himself carefully to perform at a high standard of competence. One of the most important precautions to be aware of during this procedure is the minimization of heat production. **The creation of heat during the polishing procedure is potentially dangerous** for two reasons: 1) heat can cause thermal damage to the pulp (and pain to the patient!); and 2) heat brings the mercury to the surface of the restoration which results in a dull, cloudy surface, and surface that is more susceptible to corrosion.

To minimize heat production:

1. Use light, intermittent pressure with rotary instruments lifting the instrument off of the restoration frequently. Heavy or prolonged pressure generates heat.
2. Use slow to moderate speed with rotary instruments. High speeds increase friction and thus generate heat. Increase speed only to produce the final high shine.
3. Use abrasive agents that are wet rather than dry. Some abrasive materials (pumice and tin oxide, for example) can be mixed with water or alcohol to help lubricate and cool the agents.
4. Use compressed air directed at the amalgam surface during polishing.

There are several other important precautions which should be taken during this procedure to prevent damage to the tooth, the restoration, and the patient's soft tissue:

Maintain functional anatomy by using polishing instruments in the prescribed manner. Do not destroy functional anatomy by flattening cusps or marginal ridges, by removing the contact, or by ditching or grooving the restoration. To prevent loss of anatomy:

1. Start all rotary instruments just prior to touching the restoration.
2. Keep instruments moving over the surface.
3. Use short overlapping strokes.
4. Use each polishing instrument on the surface it was designed for.

Do not weaken the restoration by improper contouring. Excessively deep grooves and pits, flattened embrasures, excessive reduction of marginal ridge heights, and excessive removal of amalgam around the cavosurface margins are examples of damaging the original tooth anatomy by improper use of the burs and disks. Too much pressure and improper direction of force on the tip of a bur can cause gouging and/or

grooving of the amalgam surface. The application of excessive pressure on one area or lack of movement of any bur or disk can also cause undesired grooving.

Prevent damage to the patient's soft tissues. Some of the abrasive materials used for this procedure (particularly disks and finishing strips) can be very painful and/or damaging to the patient if the operator should accidentally “slip” off the tooth. To avoid such situations always:

1. Retract the tongue, cheeks and lips during the procedure.
2. Position instruments so they will not abrade or lacerate gingival tissues while polishing.
3. Use a secure grasp and stable fulcrum with all instruments.
4. Rinse all abrasive agents out of sulcus area and mouth after polishing.

Protect the patient from polishing debris. Protect the patient from the possibility of aspirating polishing agents and debris by carefully vacuuming up all materials as they accumulate. Prevent potential damage to the patient's eyes from flying debris by having the patient close his eyes or provide a shield (e.g. glasses, a towel, etc.) during the procedure. In addition, do not carry instruments or other armamentarium over the patient's eyes or face.

ARMAMENTARIUM

There is a wide variety of instruments available for recontouring, finishing, and polishing amalgam restorations. Because many of the instruments serve essentially the same purpose and achieve duplicate results, it is important to select a few instruments that can be adapted to the majority of clinical situations. Limiting the number of instruments will help keep the technique simple and will contribute to speed and efficiency in performing the procedure. This section of the module will describe armamentarium that is recommended for the particular technique presented in this module.

Basically, the instruments can be divided into rotary instruments and hand instruments. As discussed previously, the more abrasive materials are used for recontouring and finishing, while the mildly abrasive materials are used for the final polishing to achieve a high shine. There is a large variety of materials/instruments available—the list is limited only by operator preference—and it is not the intent of this module to describe all of the available instruments.

Rotary Instruments: The most commonly used are abrasive stones, disks and finishing burs. They are available in a variety of shapes, sizes, degrees of abrasiveness, and in either high speed or slow speed. To reduce the frictional heat and thus minimize the

potential for damage to the tooth and/or restoration, the technique described in this module recommends the use of a slow speed handpiece. The choice of abrasive stones, disks, and burs is dependent upon the size of the restoration and adaptability to tooth surface.

- a. Finishing burs differ from cutting burs (used for cavity preparations) in that their blades are finer, their sizes smaller, and their number of blades greater. They, too, are available in a variety of shapes and sizes. It is recommended that a #4 or #6 (whichever best fits the area) finishing bur is used to smooth the cavosurface margins and smooth the occlusal amalgam surface. Finishing burs should be operated in the burnishing direction rather than cutting direction. To test the direction of the bur, use a plastic test stick (or fingernail if in the laboratory situation). If it “grabs” or “catches” it is moving in the cutting direction. Adjust your handpiece to reverse the direction that the bur is rotating—the bur should now run smoothly across the plastic test stick rather than grab.
- b. Finishing disks are also available in variety of sizes and grits. The appropriate disks determined by the accessibility to the area. Use of a medium grit disk is always followed by the application of a finer grit disk which cuts less. Disks are used primarily on the proximal, buccal, lingual surfaces. Because of their flatness, they are not routinely used on the convex and concave areas of the occlusal surface.

Disks have a hole in the middle which is either plain (to allow it to be used with the screw—on type mandrel) or the hole has a metal rim to allow it to be snapped or popped directly onto the head of the mandrel. Select the type of disks which may be used with the mandrel you have selected. The disks may be mounted on the mandrel so the abrasive faces either toward the contra angle or away from it depending on the accessibility of the area being polished.

Because the rotary instruments (other than burs) do not have blades, all rotary instruments may be run in the same direction as the finishing bur. The only exception to this is the finishing disks. Sometimes it is necessary to change the direction of the finishing disks. You will know when to change direction—the disk will “grab” in the intrproximal area. Stop and reverse the direction of your handpiece to avoid damaging the restoration or adjacent tissues.

Polishing Agents: Pumice and tin oxide are two commonly used polishing agents. Pumice is an abrasive powder of volcanic origin and is available in a variety of grits. Fine grades of pumice are used for polishing amalgam restorations. It is usually mixed with water (slurry of pumice) to help reduce the heat created by the friction of the abrasive particles during polishing. Tin oxide or Amalgloss is used as the finest abrasive agent. It may be applied in a slurry, applied dry, applied first as a slurry followed by dry tin oxide. Both pumice and tin oxide are applied to the tooth with separate rubber polishing cups.

Other polishing agents are available in the form of abrasive-impregnated points and cups (Shofu Brownies, Greenies, Super Greenies). These points and cups are very easy to use, readily adapt into all areas of the restoration, and are less messy than the pumice and tin oxide. The drawbacks to their use are expense and the fact that the rubber contributes to heat generation (refer to precautions for minimizing heat precaution). They are to be used in the following order (most abrasive to least abrasive): Brownies, Greenies, followed by Super greenies.

There are no unique aseptic procedures required for finishing and polishing amalgams. The same precautions for patient and self-protection (e.g., gloves, facemask, and eyeglasses) and for sterilization are required for this procedure as for any other intra-oral procedures. All reusable items should be appropriately sterilized after use, while all contaminated disposable items should be disposed of in a biohazardous waste receptacle.

AMALGAM POLISHING PROCEDURES

This section of the module will introduce one technique for polishing amalgam restorations. Each operator has her/his own favorite equipment and technique for most effectively polishing amalgam restorations. A step-by-step approach is offered so that the student may first become competent with this method, and may then develop her/his own particular technique through practice activities. The following armamentarium is needed for this procedure (see Figure 8):

Mouth mirror	2 rubber polishing cups (latch type)
Explorer	2 dappen dishes
Cotton pliers/forceps	flour of pumice
Slow-speed handpiece	tin oxide or Amalgloss
Contra-angle	Shofu Brownies, Greenies, Super greenies
Mandrel to fit contra-angle	dental tape
Polishing disks to fit mandrel:	dental floss
-fine garnet	
-medium cuttle	saliva ejector
-fine cuttle	vacuum tip
-OR assorted Sof-lex disks	air/water syringe tip
Finishing burs to fit contra angle	articulating paper
-#4 and #6 round	supplies for maintaining a dry field:
	-rubber dam instructions OR
	-cotton roll isolation (e.g., garmer clamps or other cotton roll holders)

STEP 1. REVIEW PROCEDURE WITH PATIENT

Patients should be carefully educated about the value of the polish procedure. Explain to your patients why you are doing this; what it will do for them; how you are going to do it; and, when you are finished, show them the polished restoration.

STEP 2. EVALUATE RESTORATION TO BE POLISHED

Using an explorer, evaluate the cavosurface margins for marginal integrity (ditching, flashing, open margins). Determine the presence and extent of any marginal discrepancies. Critically evaluate the contour of the restoration. Using a mouth mirror, look at all embrasure spaces to determine the patient's ability to brush or floss around the restoration. Is the health of adjacent tissues being affected because of improper contours? It is helpful to compare the tooth you are working on with the contralateral tooth (same tooth on the opposite side of the mouth) and the adjacent teeth as guides for improper contour. Refer to page 8 of this module for criteria for selecting restorations to be polished. If you have any doubt about the acceptability of a restoration, ask your supervising dentist to evaluate it.

STEP 3. CHECK OCCLUSION OF RESTORATION

Articulating paper is used to help identify the occlusal pattern. Mark the occlusal contacts in centric occlusion and excursive (side to side) movements. The markings should be of the same intensity as the other occlusal contacts. Areas that need to be reduced will be identified by darker markings on the restoration. Occlusion should be modified by the supervising dentist.

STEP 4. ISOLATE

After proper occlusion has been established, the restorations to be polished should be isolated. A rubber dam is recommended to increase vision and accessibility in the area, control moisture, and help protect the patient's soft tissue by retracting gingival tissues, tongue, and lips. The dam also prevents polishing particles from entering the oral cavity and simplifies washing and evacuating debris during the procedure. Generally, patients will not be anaesthetized for this procedure; therefore, care must be taken to prevent discomfort from the rubber dam clamp. Occasionally, a little topical anesthetic will be needed on the gingival tissue to maintain patient comfort.

Cotton roll isolation is commonly used during the amalgam polishing procedure rather than a rubber dam. Garmer clamps are very effective in maintaining a dry field. With

these clamps, a long cotton roll may be placed in the mandibular vestibule and wrapped in a horseshoe-shape fashion to extend to the maxillary vestibule thus isolating the maxillary and mandibular teeth of the same side at the same time. A garmer clamp also may be used with two short cotton rolls for isolation of the mandibular teeth. Small plastic disposable cotton roll holders are useful in cases where patient management is not a problem or salivary flow is minimal.

STEP 5. SMOOTH OCCLUSAL CAVOSURFACE MARGINS

The primary objective of amalgam polishing is to achieve smooth, flush cavosurface margins which will resist plaque accumulation and contribute to the health of the tooth and surrounding soft tissues. The margins can be smoothed easily by using a round bur. Choose a #4 or #6 round finishing bur—whichever will best fit the area you are working on. Place the side of the bur against both amalgam and tooth surface. Use medium speed and light pressure to prevent excessive reduction of the amalgam or cutting away tooth structure. Move the bur along all cavosurface margins. This procedure is not designed to reshape, rather it is to assure that the blend of tooth structure to amalgam is perfect. Run the tip of an explorer back and forth across the margins to ascertain if they are smooth and flush.

STEP 6. SMOOTH OCCLUSAL SURFACE

Further smoothing of the amalgam surface is accomplished with the use of a large round finishing bur. Again, choose a #4 or #6, whichever best fits the area you are working on. This step is often times completed in conjunction with step 7. If marginal discrepancies are minimal, it is possible to smooth the broad occlusal surfaces and marginal ridges while working on the cavosurface margins. To save time and decrease the possibility of creating unwanted ridges, select the largest bur that will fit the area.

The bur is used to eliminate scratches and graininess from the amalgam. After its use the amalgam should appear smooth and will have a shine. Very minute scratches will still be present (these will be difficult to detect with the human eye), but they will be removed during the final polishing.

This is one of the most critical steps in polishing amalgam restorations and is probably the most difficult for beginners, only because they have not yet developed an “eye” for what the surface should look like. Once you have gained that “eye” this step is easy and fun because you begin to see a dramatic difference in the appearance of the amalgam. Using the side of the finishing bur, smooth the entire occlusal surface and marginal ridges. It is suggested that you start working in one area (e.g. the mesio-buccal cusp) and continue in that area until all scratches and irregularities are removed. Then move on to a new area (e.g. mesio-lingual cusp). By so doing, you will be assured of removing all scratches and will get less frustrated than going back over the entire restoration time and time again to remove scratches.

Use light pressure and moderate speed as you move the bur back and forth across all surfaces. Do not hold the bur in one spot too long or use unequal pressure—either case can result in unwanted grooves or ridges in the amalgam. It is important that all strokes overlap each other to prevent that occurrence. Move the bur mesio-distally, overlapping each stroke. Then cover the same area in a bucco-lingual direction, overlapping each stroke (see figure 14). If you follow this sequence and use equal pressure the unwanted grooves or ridges will be avoided. Do not move on to a new area of the restoration until the area you are working on is smooth.

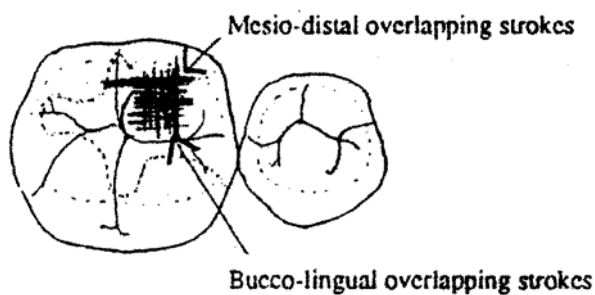


Figure 14. When using the finishing bur, overlap each stroke to achieve the smoothest surface possible.

STEP 7. SMOOTH PROXIMAL CAVOSURFACE MARGINS AND SURFACE

Check the restoration frequently with the explorer to evaluate the integrity of the margins and to determine the smoothness/roughness of the polished surface. A finishing strip may be needed to complete the smoothing and polishing of the gingival cavosurface margins and interproximal space if these surfaces cannot be reached adequately with other polishing instruments (disks, etc.).

To eliminate the possibility of opening the contact, do not polish the contact area with a polishing strip unless it is extremely tight or broad. Rather, pass the smooth area of the strip through the contact and polish back and forth across the restoration below the contact area while using a stable fulcrum. Be careful in handling the polishing strip as the edge of the strip will easily cut gingival tissues, tongue, or lips.

STEP 8. SMOOTH FACIAL AND LINGUAL SURFACES

Smooth convex facial and lingual surfaces with finishing disks. Adapt the edge of the disk to the margin of the restoration and, using a light sweeping stroke, move the disk toward the occlusal surface of the tooth. Smooth the amalgam with a less abrasive (fine) disk. When a concave area is involved, such as near the buccal or lingual grooves, use a finishing bur to smooth the area. Select one that best fits the area and use it in the same manner as described earlier in (step 8).

STEP 9. POLISHING THE RESTORATION

The polishing phase consists of first removing the very light scratches remaining after use of the finishing burs. It is achieved by using progressively finer abrasive agents and can be accomplished by the use of a couple of different methods—or a combination of the two methods. Either method is acceptable and both will be discussed.

- A. *PUMICE AND TIN OXIDE*: flour of pumice is mixed with water to form slurry. It is applied to all surfaces with a rubber cup (see figure 16). Use fairly light pressure and sweeping strokes, adapting the cup to marginal ridges and as far interproximally as possible. Do not hold the cup in one place or use too much pressure, as either will create heat. Replenish the moist pumice often since the pumice should do the polishing—not the rubber cup. Rinse and evacuate all pumice from the area. The amalgam should have a smooth, satin finish (dull luster). If deep scratches and irregularities are present, return to the appropriate finishing bur. It may be necessary to use a little more pressure with the bur in the areas where scratches and irregularities are present.

Use waxed dental tape and wet pumice to polish the gingival cavosurface margins and interproximal surface below the contact area. Floss the tape through the contact area. Then carry the pumice slurry into the interproximal area using your gloved finger. Use a back and forth motion and up and down stroke to distribute the pumice over the interproximal surface to polish. It is critical that all abrasive pumice particles be rinsed away before applying tin oxide.

Tin oxide may be used in a wet slurry or dry (see Figure 18). It is applied in the same manner as the pumice. If you do not change rubber cups after applying the pumice, be certain to wash the pumice out of the cup to remove the coarser pumice particles before applying the tin oxide. Use a light buffing motion and a slightly higher speed with the handpiece to create a shiny, mirror-like finish.

- B. *ABRASIVE POINTS*: Adapt the Brownie abrasive point into the concavities of the occlusal surface and rest the side of the cavosurface margin. Using light pressure and slow speed, move the point over all areas of the amalgam that are accessible. As with pumice, the surface should be a dull luster after use of the brownie. The abrasive material on these points wears away fairly quickly, leaving a metal shank, which can scratch the amalgam. Dispose of the tips before they are worn that low.

Using the same technique as described for the Brownie, use the Greenie. The surface will become much shinier, but will not yet have a mirror-like finish (see Figure 20). Repeat above steps using the Super-greenie. It is the least abrasive of the three points (equivalent to tin oxide), and its use should result in a mirror-like shine on the surface of the amalgam.

STEP 10. RINSE AND EVACUATE ALL DEBRIS

Rinse and evacuate all debris completely. Floss the interproximal surface with clean dental floss just as though you were removing plaque from the area to help remove any remaining abrasive from the interproximal space.

STEP 11. EVALUATE POLISHED AMALGAM

Evaluate all margins and surfaces of the restoration to see that the polish meets the following criteria for a finished amalgam polish:

- a. The margins are flush with the adjacent tooth surface.
- b. The contour of the restoration is consistent with surrounding tooth structure, the contact areas have been maintained, and the grooves are well defined.
- c. The entire surface is smooth with no scratches or graininess.
- d. The surface is lustrous, with a mirror-like shine.
- e. There is no damage to the restoration or adjacent tooth structure.

STEP 12. RECHECK OCCLUSION

Remove the rubber dam or cotton rolls and recheck the occlusion with articulating paper. Have the final product checked by the supervising dentist before dismissing the patient.

STEP 13. CHART ENTRY

The amalgam polish procedure should be legibly recorded in the patient's dental chart. The final chart entry should be in ink, dated, and signed by the person performing the procedure. The chart entry should include the number of each tooth and the names of the surfaces involved (e.g., #30-MO amalgam polished).

STUDY QUESTIONS

Directions: Answer the following questions on a separate piece of paper to the best of your ability. You may use the module to look up needed information. Upon completion of the questions, review all responses to familiarize yourself with pertinent information.

1. Your patient wants to know why his amalgams need to be polished. List four reasons why he should have his amalgams polished.
2. How does polishing an amalgam help to prevent recurrent decay?
3. Explain the difference between tarnish and corrosion. Which is more destructive?
4. How does and improper proximal contact (either too tight or open) contribute to the patient's periodontal breakdown?
5. What are wear facets?
6. What are possible results of leaving a restoration in premature occlusal contact?
7. Why is amalgam so popular for use as a posterior restorative material?
8. After the restoration has been carved, how much time should pass before finishing and polishing takes place?
9. Why is it necessary to wait the time period mentioned in question #8 above?
10. List five criteria that indicate an amalgam is serviceable and acceptable for polishing.
11. List three contraindications for polishing amalgams.
12. Explain the term "ditching".
13. Explain the term "flashing".
14. What is an "open" margin?
15. What is the difference between finishing and polishing? Which is performed first?
16. Why is it important to use abrasive agents in order of decreasing coarseness?
17. What factors determine the abrasiveness of a material?

18. Why is the production of heat potentially dangerous?
19. How can heat production be minimized?
20. Besides minimizing heat production, what precautions should be taken during amalgam polishing procedures? Explain what they are, why each is important, and how to best accomplish each precaution.
21. How and why is a disk used?
22. Describe the various polishing agents that may be used for final polishing and their order of use.
23. How should a patient's occlusion be checked and altered for amalgam polishing?
24. Beside rubber dam, what are other methods of isolating the area?
25. Why do the cavosurface margins need to be smoothed? How is it best accomplished?
26. Explain how to smooth the occlusal surface with a large finishing bur.
27. What should the surface look like after each step of the finishing and polishing procedure (i.e. after green stone? After bur? After pumice? After tin oxide? After Brownie? After Greenie? After super Greenie?)
28. How can the proximal cavosurface margins smoothed?
29. Discuss the criteria used to evaluate a polished amalgam restoration.

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