

ULTRASONIC SCALING FOR ORTHODONTIC CEMENT REMOVAL

CERTIFICATION COURSE MANUAL

Introduction:

An ultrasonic scaling instrument uses an alternating magnetic field to vibrate a water-cooled, working tip at ultrasonic frequency. When contacted by this working tip, orthodontic cement is disintegrated and washed away by the water. Compared to hand scaling, the advantages which have been attributed to ultrasonic scaling for cement removal are:

- The relative simplicity of use;
- The effectiveness of use;
- The expedience of the procedure by using an ultrasonic;
- The lack of necessity to sharpen hand instruments;
- Effectiveness of a tips ability to reach difficult or tight areas; and
- The effectiveness of the water spray to debride the field quickly.

There are, however, disadvantages to using an ultrasonic tip for cement removal, to include:

- Ultrasonic vibration may remove or loosen orthodontic bands and brackets if used incorrectly;
- Ultrasonic vibration may be annoying or intolerable to the patient;
- The operator has continuous water spray to manage during the procedure;
- Cost of the equipment may be prohibitive; and
- The operator still must check for remaining cement with hand instruments following ultrasonic scaling.

It is very important to remember that this procedure, and the certification for this procedure, is currently for the Registered Dental Assistant only, and may not be performed for the purposes of calculus or subgingival removal of deposits. The RDA performing ultrasonic scaling for cement removal may not:

- Perform any subgingival procedures with the ultrasonic device;
- Perform supragingival calculus removal with the ultrasonic device;
- Perform any procedure with the ultrasonic relating to a prophylaxis; and
- Perform this procedure without certification from a Board-approved provider and a current RDA license.

Ultrasonic scaling for cement removal is limited to orthodontic cement only and may not be used for cement removal of temporary or permanent cement relating to restorations.

Responsibilities of the Dentist

1. To prescribe only those scaling procedures that is necessary for treatment purposes.
2. To ensure all ultrasonic equipment is properly installed and maintained in a safe working condition.
3. To provide appropriate personal protective equipment/attire to protect staff and patients from the splash and splatter of the ultrasonic procedure.
4. To only allow this procedure to be performed by personnel who are properly trained, credentialed, and appropriately supervised in keeping with the state regulations.

Responsibilities of the Dental Assistant

1. To be knowledgeable about the current licensing requirements, rules, and regulations of California pertaining to all dental assisting duties.
2. To meet the certification and licensure requirements of California prior to the performance of ultrasonic scaling for cement removal.
3. To participate in obtaining informed consent from the patient to include:
 - a. explaining the purpose of the procedure to the patient
 - b. helping the patient to understand the benefit of using an ultrasonic
 - c. what the consequences might be should the ultrasonic loosen or free a band
 - d. if the patient is a minor, the parent or guardian must give the consent
4. To review the health questionnaire; the assistant should call the dentist's attention to any information that might contradict or change the direction of the treatment by the dentist.
5. To use *only* those techniques that will maintain the safety and well-being of the patient at all times.

Proper Use of Ultrasonic Equipment

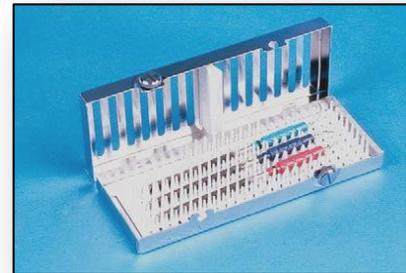
A few studies have been made available regarding the impact of improper use of an ultrasonic device against an orthodontic band. One study performed by dental faculty in Bergen, Norway, suggested that the key to successful orthodontic cement removal is the technique used in placing the ultrasonic tip next to the margins of the band rather than allow the tip to work on the band itself. The study suggested that the palatal surface of the upper incisors where it is often difficult to see the margins of the band is especially vulnerable to damage from the ultrasonic tip.

The primary negative outcome from improper operator use is the cement cracking under the band due to poor ultrasonic technique. It is likely that a rougher technique interferes with the homogeneity of the cement layer and thus causes increased risks of decalcification and loose bands.

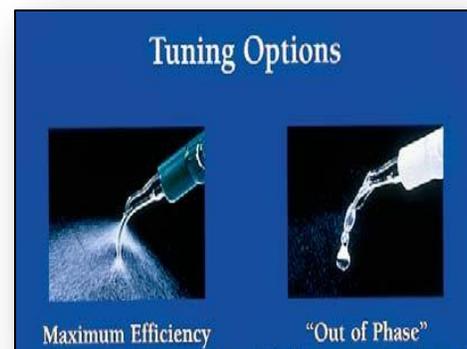
Care of Ultrasonic Equipment

Today's ultrasonic units are easier than ever to prepare for use, care, and disinfection. Many offices provide one at each operatory for easy access. They are light and compact, minimizing the amount of space required. Ultrasonic tips do not last forever and should periodically be evaluated for wear. As the tip of the insert wears, scaling efficiency decreases. A good rule of thumb to follow is one millimeter of tip wear results in approximately 25% loss of efficiency. Two millimeters of wear results in approximately 50% loss of efficiency, and, at this point, should be replaced.

The inserts are autoclavable for easy sterilization. The Dental Board of California Infection Control Regulations require that all handpiece and ultrasonic devices and tips be heat sterilized via the use of a FDA-cleared sterilization unit, such as a steam or heat autoclave or chemical vapor sterilization unit. Sonic inserts and ultrasonic tips can be placed inside a cassette or container system prior to sterilization to prevent damage.



It is required that all handpiece or air/water syringe lines be purged and flushed with water at the beginning of each day for at least two minutes (or the manufacturer's recommended guidelines) to clear stagnant water and reduce biofilm in the tubing (see the Dental Board of California's Infection Control Regulations). After the waterline is flushed, the selected tip can be inserted into the handpiece so the power and water can be adjusted for maximum efficiency with minimal patient discomfort. This can be achieved by adjusting the power at the lowest position possible, usually not above medium, and adjusting the water until a fine mist or a mist with water droplets is observed. Minimizing the mist from the ultrasonic tip minimizes aerosols outside the mouth.



INFECTION CONTROL DURING ULTRASONIC SCALING FOR CEMENT REMOVAL

Sonic and ultrasonic procedures present special infection control challenges, primarily because the operator contacts the patient's saliva and then moves about and must touch many things while performing the procedure. The mist from the ultrasonic tip can spread bacteria and microorganisms out into the operatory and onto the clothing of the operator and the patient.

Sources of Disease Transmission and Contamination during Ultrasonic Scaling:

- Instruments laying out on countertops carts and loosely arranged in the operatory.
- Dental chair headrest and chair adjustment controls.
- Operating light handle.
- Counter tops and carts.
- Floors, doorframes, light switches, and walls.
- Patient records.
- Any object the operator touches after the procedure has begun.

Protective Equipment

Personal Protective Equipment

The operator must wear gloves, mask, labcoat and glasses while the ultrasonic procedure is performed. Gloves must be worn whenever the operator comes in contact with oral mucosa and Other Potentially Infectious Materials, commonly referred to as OPIM. The Dental Board of California's Infection Control Regulations state the following:

Healthcare workers shall wear surgical facemasks in combination with either chin length plastic face shields or protective eyewear when treating patients whenever there is potential for splashing or spattering of blood or OPIM such as saliva in dental procedures. After each patient, and during patient treatment, if applicable, masks shall be changed if moist or contaminated. After each patient, face shields and protective eyewear shall be cleaned and disinfected, if contaminated.



Healthcare workers shall wear reusable or disposable protective attire when their clothing or skin is likely to be soiled with blood or OPIM such as saliva in dental procedures. Gowns must be changed daily or between patients if they should become moist or visibly soiled. Protective attire must be removed when leaving laboratories or areas of patient-care activities.



Reusable gowns shall be laundered in accordance with Cal-DOSH Bloodborne Pathogen Standards and the Federal Register and must be provided and laundered or cleaned by the employer.

Medical exam gloves shall be worn whenever there is a potential for contact with mucous membranes, blood, or OPIM such as saliva in dental procedures. Gloves must be discarded upon completion of treatment and before leaving laboratories or areas of patient-care activities such as operatories and sterilization areas. Healthcare workers shall perform hand hygiene procedures after removing and discarding gloves. Gloves shall not be washed before or after use.



Hand Hygiene

Healthcare workers shall wash contaminated or visibly soiled hands with soap and water and put on new gloves before treating each patient or performing housekeeping, laboratory or sterilization procedures. If hands are not visibly soiled or contaminated, an alcohol-based hand rub may be used as an alternative to soap and water.



Protective Barriers

Any object that the operator touches while performing treatment procedures must be covered with a removable barrier or disinfected after the patient is dismissed. Barriers must be placed over the dental chair headrest, all touch surfaces, equipment that is difficult or impossible to clean, and electrical equipment that cannot tolerate cold chemical disinfectants. These items cannot be sprayed with any liquid agent due to the potential for short-circuiting or electrical shock.

No electrical items should be directly sprayed in the dental operator. These items must be protected by the use of disposable barriers as indicated in the Dental Board of California Infection Control Regulations.



Barriers are single-use items only and must be changed after each and every patient, regardless of use. Areas of the operatory not protected by disposable barriers must be properly disinfected using the spray-wipe-spray or wipe-discard-wipe-wait technique.

Equipment such as the ultrasonic unit itself can be covered with a plastic protective barrier without causing damage to the unit. This is a very easy way to prevent cross-contamination while making adjustments to the unit during the ultrasonic procedure.



Care of Sonic and Ultrasonic Instruments

Ultrasonic instruments that are placed in the patient's mouth are semi-critical items as defined by the Regulations and must either be sterilized before re-use.

Today, all ultrasonic instruments are autoclavable and are clearly labeled as such. Cold chemical immersion of these devices is highly improper, not environmentally friendly, requires special handling in most local and state regulations, and requires a great deal of time to provide proper pathogenic and bacterial kill. By state regulations, ultrasonic instruments are considered semi-critical instruments and are required to be heat sterilized.



Cleaning and Sterilization of Ultrasonic Devices

For ultrasonic tips and sonic devices that are not harmed by the ultrasonic cleaning process, the items are placed in the ultrasonic cleaning unit following use as any other intra-oral instrument. Prior to doing so, the operator must don nitrile household gloves to disassemble the instrument tray, discard all disposable items, and gather all the contaminated instruments into the ultrasonic bath.

According to regulations:

All heat-stable critical and semi-critical instruments shall be cleaned before sterilization by use of an ultrasonic device. Instruments cleaned in an ultrasonic unit shall remain in the unit for no less than 10 minutes.

Instrument cassette systems (or containers) have become very popular in recent years. Dental washing machine units (such as Miele washers) hold cassette of instruments, including X-ray devices, and must run through an entire wash and dry cycle prior to removal of the cassettes from the washing unit and placed into a sterilization device. A washing unit for cassettes does not eliminate the use of a sterilization unit.

Following ultrasonic cleaning, the items are rinsed, patted dry, and placed in sterilization/autoclave bags, sealed, and placed into a steam or chemical autoclave.

An autoclave is the only device available to sterilize instruments through the use of time, heat and pressure. Sterilization only occurs when the proper amount of heat and pressure is applied for the proper amount of time for wrapped instruments. This is usually anywhere from 12 – 15 minutes, depending on the setting of the autoclave. ONLY through the use of an autoclave can complete microbial kill occur. Immersion into a liquid cold chemical will not produce total microbial kill.

Refer to the Dental Board of California Infection Control Regulations for specific definitions of critical and semi-critical instruments, their handling, and sterilization procedures required by regulation.

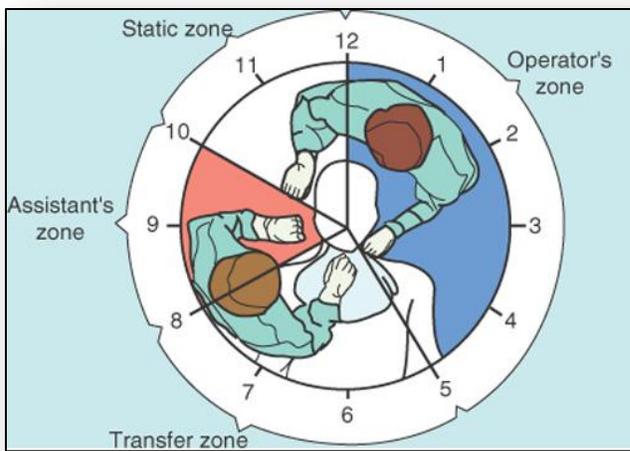
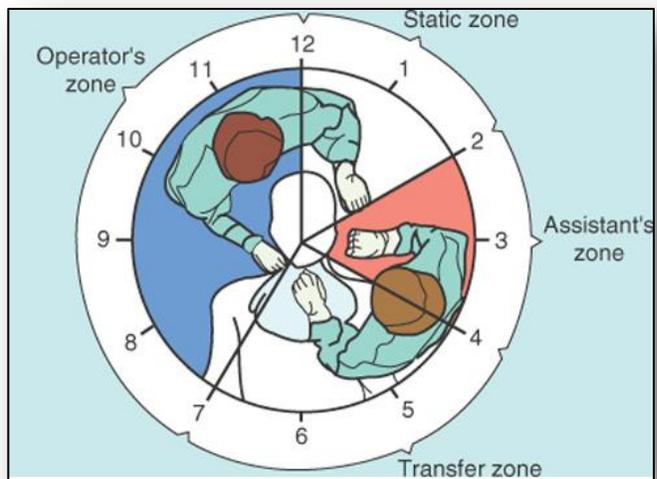


OPERATOR POSITIONING

Operator seating positions are typically the same as for hand instrumentation. The operator can be somewhat creative about seating positions, since a firm fulcrum and lateral pressure are contraindicated when using ultrasonic's. Direct vision is preferred when using an ultrasonic, since indirect vision is compromised due to the mist of the irrigant interfering with the mouth mirror. Saturating the mouth mirror with water alleviates this problem somewhat, though it has to be repeated frequently. It is also very helpful if a dry-tip or 2x2 gauze square is used to hold the upper and lower lips when working in the maxillary and mandibular anterior regions of the mouth. This makes retracting the lip easier for the practitioner, and minimizes the spray of water on the patient.

Right-Handed Operator

The assistant performing the ultrasonic scaling procedure will be seated in the operator chair. If right-handed, the operator's zone is between 7:00 pm and 12 midnight on the face of the clock (see illustration to indicate the correct position for the operator).



Left-Handed Operator

If left-handed, the operator's zone is between midnight and 5:00 am on the face of the clock as indicated in the illustration.

ULTRASONIC SCALING TECHNIQUE

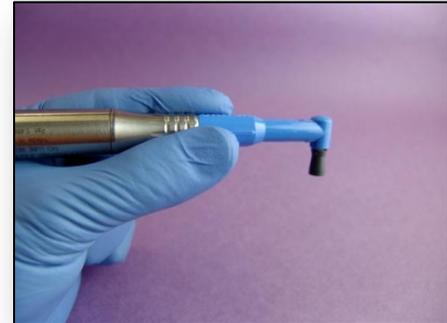
Device Grasp

1. Function
 - a. Holding an instrument in such a manner that freedom of action, control, tactile sensitivity and maneuverability are secured.
 - b. The chosen grasp should:
 - 1) Provide the fingertips with an increase in their tactile sensitivity.
 - 2) Decrease the opportunity to traumatize the tissue. Relieves fatigue of the operator's finger, hand and arm.

2. Types of instrument grasps:

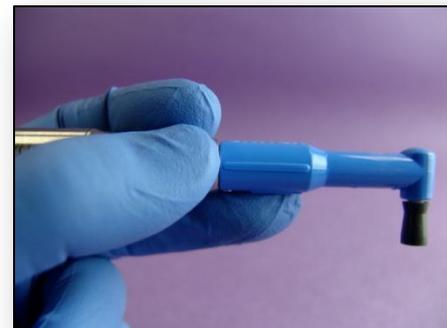
- a. Pen

- 1) Conventional grasp utilized for writing.
 - 2) Concentration of support is balanced where pads of the thumb, index and side of the third finger meet.



- b. Modified Pen:

- 1) Method used to grasp the prophy handpiece
 - 2) Procedure
 - a) Assume the pen grasp position
 - b) Place the pad of the middle finger (instead of side of handpiece) close to the working end of the prophy angle.
 - (a) 3rd finger is used to support handpiece.
 - (b) 3rd finger is used to guide handpiece.
 - (c) The handpiece may



rest against the hand at any point beyond the first joint of the index finger. This depends on the area you are scaling.

It is important that you always use direct vision when scaling, keeping the margins of the band or bracket in plain sight at all times. The use of the pen grasp and a fulcrum will assist you in controlling the scaler handpiece.

Device Types

There are two types of scaling devices: Magnetostrictive and Piezoelectric.

The Magnetostrictive tips are composed of a stack of metal strips or rods of ferromagnetic material capable of being magnetized resulting in an elliptical or figure eight motion of the working end. This type of motion allows the use of all sides (360°) of the working tip. Heat is generated when using Magnetostrictive inserts; therefore, water is used as a cooling agent.

Piezoelectric tips alternate electrical currents applied to reactive crystals horizontally, resulting in a linear or straight line motion. As a result, only the lateral (two) sides of the working tip are functioning. Little heat is generated when using these tips, minimizing the amount of water necessary.

When deciding whether to use the Magnetostrictive or Piezoelectric units, the advantages and disadvantages of each should be considered. Since Magnetostrictive tips operate in an elliptical motion, the tip leaves the tooth surface while it is activated, which causes a “banging” motion against the tooth structure. However, all sides of the tip can be utilized. Piezoelectric tips, with their two working sides, operate in a linear motion. This results in the tip never leaving the tooth while activated. While this makes adaptation very critical, it has been shown to result in less surface roughness. Piezoelectric tips are small and separate from the transducers (handpiece), reducing the cost of the tips and making storage easier.

The Piezoelectric ultrasonic scaler is the most popular device in the dental office as it serves the hygienist very well in debridement of the gingival pocket and the assistant in the removal of orthodontic cement which can be very difficult to remove in general. The ultrasonic style and slim tip design allow for access to smaller areas in the arch.

For the purposes of cement removal, the most popular and effective ultrasonic tip to use is called the beavertail. While there are many tips to choose from, the wider the tip the more effective in handling tough zinc-phosphate orthodontic cement.

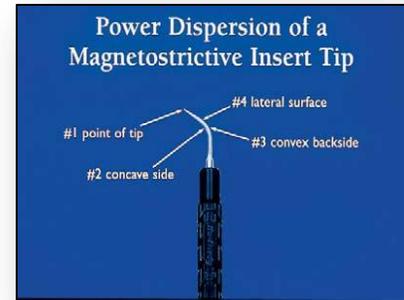


Photo courtesy of Mosby



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Indications and Contraindications

Indications for using an ultrasonic scaler include:

- Positive adaptability to the surface requiring cement removal without pressure
- More timely removal of cement versus hand instrumentation
- Operating field kept clean by use of water mist

Contraindications include:

- Threat of communicable disease transmission due to contaminated aerosols
- Potential for patient concern with cardiac pacemakers; newer models of ultrasonic units contain protective measures to prevent a cardiac incident
- Demineralized areas of the teeth may lose areas of remineralization due to vibration of the ultrasonic
- Tooth sensitivity may occur in areas of exposed dentin
- Using a rougher technique may interfere with the homogeneity of the cement layer and cause increased risk of decalcification and loose bands
- The operator who uses the ultrasonic device too frequently may experience temporary or permanent tendonitis

Due to the fact that many of the patients whose teeth are being orthodontically treated are under the age of 18, it is important to work as sensitively as possible with the ultrasonic against the enamel around the bands, as young teeth and young pulps are susceptible to over-heating and may damage newly erupted teeth as well.

The health history is always considered before utilizing an ultrasonic device. In reviewing the patient's health history, the operator and dentist should consider the following additional contraindications:

- Prosthetic joints
- Overall heart health
- Lowered immune response
- Diabetes
- Hearing aide use

Attaching Ultrasonic Tips

When utilizing the Magnetostrictive-type of ultrasonic device, the tips are constructed with a bundle of rods which slide into the handpiece sleeve or transducer of the unit, such as the one in this illustration. When attaching the tip into the sleeve, you should follow the following steps:

- After following all infection control and OSHA standards for PPE and tray set-up for the procedure, remove the tip from the autoclave bag;
- Make certain that water is on at the cart and at the ultrasonic unit;
- Before inserting the tip bundle into the sleeve, step on the rheostat (foot control) gently to fill the sleeve with water, then insert tip bundle into sleeve and attach.

By filling the sleeve with water at least half-way, the tip will be ready to function immediately upon activation. The rods in the bundle will overheat waiting for the sleeve to fill with water and could damage the bundle or overheat the tooth waiting for the water spray. This way, the sleeve is filled with water and the handpiece will emit a “halo” mist of water.

When utilizing the Piezoelectric-type of ultrasonic device, the tips are attached to a handpiece by simply screwing the tip onto or into the end of the handpiece. The handpiece is attached to the transducer unit, and the small tip is screwed into the working end of the handpiece, such as the one in this illustration.



Photos courtesy of
Biosonic

Definitions/Terms

Transducer: A substance or device, such as a piezoelectric crystal, microphone, or photoelectric cell, which converts input energy of one form into output energy of another.

Halo: the appearance of a water halo provides the optimum cooling spray and will not create an uncontrollable amount of water into the area or the patient’s mouth.

HVE: High-volume evacuator; this suction device provides the most effective suction power to handle the mist produced by ultrasonic’s; is the best device to minimize the spread of contaminated particles.

The Seated Operator and Patient

Before beginning the procedure, the patient should be placed into the supine position, as shown in this illustration. The nose, knees and toes of the patient should be parallel with the floor. A semi-supine position, with the patient's head elevated, will cause fatigue and will not allow the operator to utilize direct vision during the procedure.



Photos courtesy of
A-dec

The operator may not have an assistant to handle moisture control.

During the ultrasonic procedure, the use of a saliva ejector and the HVE (high-volume evacuator) is necessary to maintain the patient's comfort as well as help reduce the amount of bacterial spray from the handpiece.

The Banded and Bracketed Patient

Corrective orthodontics requires the use of bands or brackets to be placed onto the middle-third of the tooth, on the facial/buccal surface, in order to hold the archwires into place. The archwire creates the forces by which the teeth are moved into another position, or stabilizes a tooth or teeth for non-movement.

The cementation of bands or direct bonding of brackets is NOT an allowable duty for any level of dental assistant at this time. However, the removal of cement is allowable for a Registered Dental Assistant. Once the dentist has cemented the bands into place, the cement is allowed to harden. After the cement has reached its final stage, a scaler or hand instrument may be used to remove cement excess from around the band.

The caution: whether using a hand instrument or an ultrasonic scaler, the assistant must be cautious of the margins of the band to eliminate the possibility of loosen the band.

Tip Movement and Operator Technique

To minimize trauma and reduce the possibility of damaging or loosening a band or bracket, the following technique is used with ultrasonic scaling devices:

- Hold the tip at a 10° - 30° angle – do not use the tip of the scaling tip at any time.
- By using a flat, wide tip such as a beavertail, there are no sharp edges similar to a chisel tip or a perio tip.

- Utilize a fulcrum at all times to stabilize the hand and the handpiece. This illustration shows the third finger (ring finger) is used to establish a fulcrum. During scaling, a fulcrum should be established in the same quadrant as the area being treated.



Using rapid, light strokes in a back and forth motion, the tip is moved over the cement excess secreted from around the band. Never allow the ultrasonic tip to touch soft tissue, such as the interproximal tissues, the gingival crest, or the sulcus area.

Always use direct vision. Stay positioned in the operator's zone, preferably behind the patient's head during the procedure. To minimize trauma, the operator should always:

- Use proper technique
- Use a lower power setting on the unit
- Use a blunt-ended tip such as a beavertail
- Use a good water halo

Never do the following:

- Use a heavy hand or a heavy amount of pressure
- Use sharp tips
- Stab at to tap the tip against the cement or band
- Increase power which increases heat to save time
- Place tip onto soft tissue

Upon completion of cement removal, it is suggested that the patient brush their teeth and the operator check with floss or a floss aide to make certain that all cement in the interproximal areas has been removed.

The operator should also mouth-mirror and explorer inspection of all areas prior to asking the dentist to check the outcome of the procedure (direct supervision) and prior to dismissing the patient. The area's most likely to be missed are the distobuccal and distolingual areas of the posterior teeth.

PROCEDURE SHEET

Set-up:

1. Disinfection protocols are followed prior to staging the area for treatment
2. All handpiece/sleeve devices have been cleaned and prepared for receipt of a new handpiece tip
3. All protective barriers have been placed in the operatory
4. All PPE has been donned prior to handling sterilized equipment and instruments
5. All instruments and the ultrasonic tip is removed from the autoclave bag/cassette
6. The saliva ejector and the high-volume evacuator (HVE) are assembled for use during the procedure.
7. Fill sleeve with water, if using Magnetostrictive-type ultrasonic device
8. Insert tip securely or screw Piezoelectric tip to handle tightly (may require the use of an instrument wrench)
9. Check water flow; adjust as needed
10. Adjust unit settings as needed



Procedure:

1. Review health history with patient; explain procedure to patient
2. Don PPE
3. Position patient properly into the supine position; place saliva ejector and secure
4. Position self properly in the operators zone
5. Utilize a modified pen grasp to hold the ultrasonic handpiece and begin scaling
6. Utilize a fulcrum adjacent to the area being treated and within the same quadrant if possible
7. Use light strokes back and forth over cement field
8. Keep tip in motion
9. Hold tip at a 10° - 30° angle to the tooth
10. Keep the tip off the band or bracket
11. Keep tip from moving onto soft tissue or subgingivally
12. Use direct vision
13. Control water flow and spray field with HVE
14. Maintain patient comfort by using saliva ejector as needed
15. Remove all visible supragingival cement from around bands and/or brackets
16. Use mirror, explorer and floss to evaluate cement removal
17. Use toothbrush to brush away debris
18. Ask patient to brush teeth
19. Check for loose bands or brackets

Program Conclusion

This Ultrasonic Scaling for Orthodontic Cement Removal Certification course and the materials provided herein are intended to provide the education necessary for the user to develop strong skills as a dental healthcare worker. The producers of this material would like to thank and gratefully acknowledge the California Dental Association for its commitment to developing quality educational materials for use within the profession of dentistry.

Acknowledgements

With great appreciation:

Ms. Joan Greenfield, CDA, RDAEF, MS

J. Productions

Sacramento City College

The faculty and staff of the dental assisting and dental hygiene programs of Sacramento City College

Thomson Learning

Elsevier Saunders (Mosby)

Biosonic

A-dec

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