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REMOVAL OF ORTHODONTIC BANDS AND
CEMENT REMOVAL WITH A HAND
INSTRUMENT

REMOVAL OF ORTHODONTIC BANDS AND CEMENT REMOVAL WITH A HAND INSTRUMENT COURSE OUTLINE, ACTIVITIES AND HOUR BREAKDOWN

1. **Identifying teeth with orthodontic bands**
 - Teeth most likely to have bands
 - Differentiating bands from other orthodontic appliances
 - Components of an orthodontic band and attachments
2. **Removal of orthodontic bands**
 - Instruments used (armamentarium)
 - Technique for removal of bands
3. **Patient safety and comfort during removal of bands**
 - Explain the procedure and patient experience
 - Prevention of swallowing/aspiration
 - Special care for soft and hard tissues
4. **Special circumstances**
 - Crowns, fillings, possibility of fracture or damage
 - Inflamed tissue
 - Patients with limited opening
5. **Identifying residual cement**
 - Types of band cement
 - Differentiating from stain/discoloration
 - Identifying decalcification or white spots and proper action to take
 - Factors influencing amount of residual cement (etched teeth, bands)
 - Likely places to find residual cement (band space, interproximal areas, etc)
6. **Supragingival removal of residual cement with a hand instrument**
 - Instruments used (armamentarium)
 - Technique for removal of residual cement
7. **Patient safety and comfort during removal of cement**
 - Prevention of swallowing/aspiration (use of suction)
 - Special care for soft and hard tissues
 - Patient home care instruction to reduce inflammation and hypertrophy

1. Identifying teeth with orthodontic bands

An orthodontic band is a specific orthodontic appliance made of stainless steel that attaches to the teeth circumferentially like a “ring” around the tooth. It is generally only used on posterior teeth, usually molars. It differs from a bracket that attaches directly to the facial surface of the tooth.

Though this is rudimentary, let’s review how to identify a band utilizing several different means. When viewed from the occlusal aspect, the dark rim of the band can be seen to go all the way around the tooth. Another way to identify a band is by looking at the facial surface. Some bands will have attachments like a headgear tube that will protrude farther from the tooth. When viewing from the facial surface, look mesial and distal to the attachment to see if the metal ends and tooth structure is evident. If enamel can be seen on the mesial and distal aspect, this would indicate that the appliance is a bracket and is bonded only to the facial surface. However, if the metal continues mesially and distally toward the interproximal surface then it is likely to be a band. It may also be helpful to look on the lingual aspect of the tooth. Seeing metal going around the tooth, especially on the lingual aspect of the tooth is a good indicator a band is present. There are sometimes brackets or attachments bonded directly to the enamel on the lingual surface so it is important to use the same criteria as looking from the facial aspect to differentiate between a bracket/attachment and a band.

Bands can have a variety of components and attachments. It usually has a “bracket” portion that is welded to the buccal aspect of the band. There is not one standard shape or configuration of the bracket portion so it should be identified generally and not by specific size or shape. However, the bracket portion generally consists of at least one slot that is located roughly in the middle portion of the band occluso-lingivally. This is the slot where the archwire passes during traditional fixed orthodontic treatment. There may also be one or more auxiliary slots. These buccal slots are multi-purpose but are commonly used for things like headgears, intrusion arches, overlay wires, etc. There may also be vertical slots that allow for attachments to be inserted from the occlusal aspect. These slots may also be convertible. This means that buccal aspect of the archwire slot can be removed creating an open slot.

Bands often have welded lingual attachments. This can be in the form of a “slot” that can be used for a variety of lingual/palatal appliances such as lingual arch, transpalatal arch, W-arch, quadhelix. Or, the lingual welded attachment may be a simple tab of metal called a seating lug. There may also be an appliance directly soldered to the lingual aspect of the band as in the case of a rapid palatal expander or soldered lingual arch.

2. Use of instruments in removal of orthodontic bands

The primary instrument used in the removal of orthodontic bands is the band removing pliers (see figure 1, 2). This instrument is designed to safely remove the band from the tooth with minimal pressure and discomfort to the patient.



Figure 1



Figure 2

One side of the pliers has a soft, padded portion that is designed to go on the occlusal aspect of the tooth. This should not contact the band at any portion since its function is to use the tooth as a leverage point for removing the band. The other side of the pliers has a sharp edge that curves toward the padded portion. This is designed to grab the gingival edge of the band (or an attachment). Once this end has engaged the gingival aspect of the band, by squeezing the pliers gently, the band is lifted occlusally (see figure 3, 4). There is often a popping or cracking sound that occurs when the seal of the cement is broken. Warn the patient that he or she will hear this sound and not to worry. Once the cement seal is broken, the band removing plier can be used to lift the band occlusally. Never try to use the instrument if the plastic pad is missing. You could fracture the tooth. Make sure your inventory includes replacement pads.



Figure 3



Figure 4

This technique should be used at multiple points on the band before the band is lifted off the tooth. Trying to remove the band from a single point is not desirable for many reasons. It usually creates a situation where the band rolls on the tooth. That is, as one portion of the band is lifted occlusally, the opposite side moves gingivally. Usually it pivots around the contact point with the adjacent tooth. This can be very uncomfortable for the patient since it is creating excessive force on the tooth and can push a portion of the band into the gingival tissue. Trying to remove the band from a single point on the

tooth can also result in the band bending or splitting which can make the band more difficult to remove. This is why it is important to break the seal initially and then move the pliers to another portion of the band to gradually move the band occlusally in an even manner.

It is sometimes difficult to engage the gingival aspect of the band. This can be due to the shape of the tooth and band, position of the band, or tissue inflammation that has caused the gingival aspect of the band to be subgingival. In these cases it may be helpful to engage, with the blade of the band remover, one of the attachments on the band. The pliers can be used on both buccal and lingual attachments. It can also be used on soldered and welded connectors such as lingual arches, rapid palatal expanders, transpalatal arches, quadhelices, etc)

Once the cement seal is broken and the band has been moved occlusally from multiple points around the band, it is now time to remove the band from the tooth. This is a critical part of the procedure and must be done with the utmost care and attention. The removal of the band is accomplished initially by using the same motion described above. As the pliers are closed together, the band will break free of the tooth (see figure 5). When this occurs, the pliers must be closed together so the sharp portion and the padded portion are in contact for the first time since the procedure began. The band will then slide over the padded portion of the bracket like a ring (see figure 6). This is a safety feature of the pliers that prevents the band from falling off the tooth into the patient's mouth where it could be swallowed or aspirated (inhaled). These are serious complications that should be avoided at all costs and if either of them occurs, the orthodontist should be notified immediately. It is important to be sure that the two sides of the pliers are contacting each other and the band is secured around the arm of the pliers before any attempt is made to remove the band from the mouth.



Figure 5



Figure 6

3. Patient safety and comfort

The safety of the patient during this procedure is *the primary focus*. Prevention of swallowed or aspirated bands as well as the prevention of damage to the oral hard and soft tissues is the most important part of the entire process.

When a band is removed from a tooth, the tooth is often sensitive. Having undergone orthodontic movement, the tooth can be slightly mobile and sensitive to any pressure. In addition there can be inflammation of the soft tissue, especially if the oral hygiene has not been adequate during active orthodontic treatment. This can lead to additional discomfort and bleeding during the removal of the band. The orthodontic assistant must be sensitive to these issues and to what the patient is feeling in order to make the removal of the band as comfortable as possible.

4. Special circumstances

The removal of orthodontic bands requires special care in cases where the banded teeth have restorations. Particular care must be taken when the banded tooth has been restored with a crown. The margin of the crown (where the crown meets the natural tooth structure) is usually very close to the gingival edge of the band. The assistant must be extremely careful that the band remover engages the gingival portion of the band and not the margin of the crown.

Teeth with fillings can have margins that are close to the gingival edge of the band so the same care must be taken as with crowned teeth to not only engage the gingival edge of the band and not the restoration. In addition, teeth with fillings are often weaker than unrestored teeth and therefore special care must be taken to avoid excessive forces when removing bands as this could fracture the tooth.

As mentioned previously, the removal of orthodontic bands is more challenging when the gingival tissues are inflamed. Inflamed tissue will naturally sit more occlusal than tissue that is healthy. This makes access to the gingival edge of the band for removal more difficult. In addition the assistant must expect that inflamed tissue will tend to bleed when contact is made with the instrument and the band.

Patients with diminished opening related to TMJ derangements or individual anatomical variations limit visibility and access for placement of debanding pliers. Additional care in these circumstances is necessary to position the plier especially when attempting to remove bands on second molars.

In extreme circumstances where the limited opening or the strength of the tooth is in question it may be more effective to section the orthodontic band before attempting to remove it. Orthodontic pliers are available to sever or split the band vertically. As an alternative the orthodontist can use a high speed drive to section the band.

Identifying residual cement

There are many types of band cements used in orthodontics today. The most common type is a mixture of composite resin and glass ionomer. This gives the cement the strength that is desirable for retention of the band as well as fluoride release from the glass ionomer that helps prevent caries around the band.

Cements come in different colors while others are similar to the natural color of tooth enamel. This has esthetic benefits but makes these more difficult to identify during removal. When removing cements it is important to use an instrument to “feel” for residual cement since visual inspection may not be reliable. For cements that are a different color than enamel (i.e. blue) a combination of visual and tactile inspection can be used to identify residual band cement.

It is also useful to use compressed air to help identify residual cement. This dries the surfaces and changes the appearance of the cement in contrast with the enamel. Compressed air should be used on the occlusal, facial, lingual and interproximal surfaces.

A dental explorer can help detect residual cement. The explorer tip should be carefully moved along the surfaces to detect any edges or ridges that could be indicative residual cement.

Be aware that teeth can have areas of discoloration and/or rough surfaces that are not residual cement. Therefore the assistant should be cautious when using visual and tactile means to identify residual cement since anatomical variations can mimic the look and feel of residual cement. Examining the pre-orthodontic records is helpful in determining what discolorations and anatomical variations existed before the band was placed.

There are many factors that influence how much cement is left on a tooth following the removal of a band. When a band is cemented, there is either a bond between the band and the cement or a bond between the cement and the tooth. Whether the cement adheres to the tooth or the band when removed is dependent on the type of cement used and the preparations at the time of cementation. The effectiveness of tooth isolation and degradation of the cement over time can affect how much cement remains on the tooth. Acid etching the enamel will increase the bond strength of some cements to the enamel leading to the necessity of more residual cement removal from the tooth. In contrast bands that are micro-etched have a greater bond between the cement and the band than those not sand blasted prior to cementation. This tends to leave less residual cement on the tooth since most of it remains bonded to the band.

The lingual and interproximal surfaces can be more difficult to see and feel for cement and more apt to have residual cement lodged. Considering access during cementation and debanding inspect these areas. There will be a natural interproximal space when the band is removed. Residual cement can be “hiding” there and if not removed could lead to gum irritation and periodontal problems.

Supragingival removal of residual cement with a hand instrument

Following the removal of an orthodontic band, the residual cement is usually removed with a scaler. There are many types of scalers but the most common one used in orthodontics for the removal of supragingival cement is the curved sickle scaler (see Figure 7). The sickle scaler has two straight cutting edges that join to form the pointed tip of the instrument.



Figure 7



Figure 8

Sickle scalers may be used on the occlusal, buccal, lingual and interproximal surfaces to remove excess cement. During the removal of cement, it is recommended that the patient wear eye protection to prevent eye injury in the event that a piece of cement inadvertently enters the eye during scaling.

A modified pen grasp is used to hold the scaler (see Figure 8). This grasp is very stable because it creates a tripod effect around the handle of the scaler. The modified pen grasp is created by placing the pad of the middle finger on the handle (shank) of the instrument and the index finger is bent at the second joint from the finger tip and is positioned well above the middle finger on the same side of the handle.

A stable intraoral finger rest is needed in order to use this sharp instrument safely. By stabilizing the hand, the finger rest enhances control so that the assistant will be less likely to accidentally slip. The finger rest also acts like a fulcrum. By resting the tip of the ring finger on a stable surface, such as the teeth, the hand can pivot around this point in any direction.

The blade of the scaler is used to detect and dislodge cement. When the blade is applied to the tooth, the angle between the instrument and the tooth should be less than 90 degrees but no less than 45 degrees. They are designed to follow around the surface of the enamel and detect and remove anything that is not tooth enamel (i.e. cement). The cement is engaged and removed with a pull stroke. This creates a peeling motion that is used to dislodge the residual cement from the enamel surface. Most cements will come off the enamel in sheets as opposed to small fragments. This makes debris easy to suction as it breaks free.

Patient safety and comfort during removal of cement

As with the removal of bands, when removing residual cement the comfort and safety of the patient is the *primary focus*. This is particularly true when the gingival tissues are inflamed and/or there is poor access to the teeth. The sickle scaler is not meant to be used subgingivally nor should the assistant place any portion of a scaler subgingivally. If there is cement that extends subgingivally, the orthodontist will be required to remove it.

Occasionally the cement will be sufficiently bonded to the tooth that removal with a scaler or any hand instrument is not possible. Excessive force should never be used with a scaler. If the cement cannot be removed with a scaler and minimal force, the orthodontist may have to remove the residual cement with a handpiece.

When to ask the orthodontist for assistance

When you are not sure if the particle you detect is band cement or enamel
When removal of the band or the cement is so challenging that you think you may fracture the tooth or injure the patient if you proceed.
When the patient asks you not to proceed further.
When you judge that subgingival band cement remains.

Laboratory Session: 1 Hour

During this session, students will practice the removal of orthodontic bands as well as the techniques for removal of cement with a hand instrument on a typodont. Students will work with a partner during the process of these procedures the assisting student will observe each stage of the process for evaluation. The following is an approximate step-by-step description of the procedures that should be followed during the laboratory session.

1. Each student will set up his/her armamentaria for removal of bands and residual cement.
2. Student will be provided with a typodont with banded posterior teeth (cemented) and a bench mount.
3. Instructor will review procedures for removal of bands and excess cement.
4. Instructor will provide ideal examples that will be passed around for viewing.
5. Student will remove the bands from the typodont tooth while partner observes, evaluates and records on worksheet. Student will also evaluate him/herself on the procedure. Instructor evaluates the removal of the bands as well as the cement removal. The bands will be re-cemented for further practice as needed based on instructors evaluation. The entire process will continue to be evaluated on the worksheet by the student, partner/assistant and instructor.

6. Partners switch places, the operator becomes the assistant and the assistant becomes the operator, both student partners have completed at this point four typodont teeth.
7. The worksheets are then evaluated in small groups.

Clinical Session: 2 Hours