

# **CDC 4Y051O**

## **Dental Assistant Journeyman**

### **Volume 2. Clinical Procedures— Part 1**



**Air Force Career Development Academy  
The Air University  
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The second volume of CDC 4Y051O, Clinical Procedures—Part 1 pertains to instruments and clinical procedures performed in several specialty areas of dentistry. The areas include the examination, screening and preliminary diagnosis section, general dentistry, endodontics, oral surgery, periodontics and instrument sharpening.

Unit 1 focuses on the functions and procedures performed in the examination, screening and preliminary diagnosis section; general dentistry; and endodontics. The general dentistry section includes the terminology and classification of cavities, and placement of restorative materials. In endodontics, information is included on the causes and diagnosis of pulp disease, and the clinical steps in pulpectomy, root canal treatment, and apicoectomy procedures.

Unit 2 covers the function and indications of oral surgery and periodontics. Many of the assisting duties, which occur preoperatively, during surgery, and postoperatively, are similar in oral and periodontal surgery. Aspects of an oral surgery examination, informed consent, and pain and anxiety control are included in this unit. Also included in the oral surgery section are the terms of many oral surgery procedures. For some of the more common procedures, the specific treatment sequence is covered. Some common post-surgical complications are included in this section also. The section on periodontics includes the examination, treatment plan, and routine periodontal procedures. Also included are periodontal surgery procedures, oral hygiene instructions after surgery, periodontal maintenance and recall, and maintenance for implant patients.

Finally, unit 3 covers the information related to the basics of periodontal instrument sharpening and sharpening techniques. The unit begins with identifying why it is important to sharpen instruments and how to test for sharpness. It continues with sharpening method, types of sharpening stones, the relevance of instrument design to sharpening techniques, which includes basic preparation stationary flat stone-moving instrument, moving stone-stationary instrument, and other manual techniques.

Both a glossary of terms and a glossary of abbreviation and acronyms to be used in this course are included at the end of this volume.

A student assessment survey sheet is bound in back of this volume. The student is requested to complete the survey and return it to 381 TRS/TRR.

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**NOTE:**

In this volume, the subject matter is divided into self-contained units. A unit menu begins each unit, identifying the lesson headings and numbers. After reading the unit menu page and unit introduction, study the section, answer the self-test questions, and compare your answers with those given at the end of the unit. Then complete the unit review exercises.





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# Unit 1. Examinations, General Dentistry, and Endodontics

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A TYPICAL AIR FORCE (AF) dental clinic has several dental specialties, each providing a specific kind of dental treatment. For example, examinations are usually done in the examination, screening, and preliminary diagnosis section, while teeth are removed in oral surgery. You may be assigned to assist in any one or all of the dental specialties during your career as a dental assistant.

To be an effective assistant, you must know what procedures are done in each of the dental specialties, and be able to perform the proper assisting techniques in the different specialties. Most of the basic clinical procedures were covered in an earlier volume. The various dental specialties have additional requirements, some of which we cover in this unit. This unit will focus on examination, screening, and preliminary diagnosis; restorative dentistry, and endodontics.

## 1–1. Examination, Screening, and Preliminary Diagnosis

A dental examination, which includes the screening and preliminary diagnosis, is one of the basic professional services provided by the AF Dental Service. The time, skill, and effort required to perform and record a dental examination is as important as those for any other dental procedures. In this section, we will consider the function and type of procedures of a dental examination, screening an preliminary diagnosis, as well as assisting duties within those procedures.

### 201. Function and types of procedures

The purpose of this lesson is to provide you with a more complete understanding of the function and the three types of procedures used to assess the oral health status of patients: periodic dental examination, dental sick call, and special examinations.

#### Functions

Dental examinations constitute one of the basic professional services provided by the AF Dental Service. The examination section evaluates the oral health status of patients and provides for the initiation of treatment. The dentist must evaluate the AF IMT 696, Dental Patient Medical History, before beginning the oral examination.

The purpose of the clinical examination is to:

- Determine variations from normal soft tissue and normal hard tissues within the oral cavity.
- Describe and record variations from normal.
- Identify and describe any type of tumorous growth (if present).
- Evaluate the dental and general health needs of the patient.
- Determine a diagnosis.

After completing the clinical examination, the dentist may request dental radiographs of the dentition, including periapical, bite-wing, occlusal, and panoramic radiographs.

Once the diagnosis and treatment needs are identified and recorded, patients are routed to the appropriate treatment section for care. Treatment planning, sequence of care, and coordination of consultations are the responsibility of the dentist providing the primary care for the patient. In some cases, if the prescribed treatment is beyond the capabilities of the clinic, the patient is referred to another facility for treatment.

### **Types of procedures**

There are several different procedures done in the examination section:

- Periodic dental examination of military members.
- Performance of the hypertension screening program.
- Dental sick call.
- Clinical examination of individuals eligible for care, other than active duty Air Force.
- Special examination in support of the medical mission.

#### ***Periodic dental examination***

Probably the most frequent purpose for administering a dental examination is to meet the AF Dental Readiness Assurance Program (AFDRAP) requirement. This program pertains to active duty AF members only, and should consist of at least a type 2 dental examination, a review of dental health records, and hypertension screening.

The dental service produces a computerized list of individuals who require periodic dental examinations. These products are produced according to organization and date of the individual's last examination. Each unit coordinates the scheduling of the dental examinations with the dental service and sends an annotated notification to the individuals to advise them when to report for an examination.

#### ***Dental sick call***

Another important function of an examination section is the examination of sick call patients. The purpose of sick call examinations is to diagnosis patients' urgent dental problems, provide emergency treatment for the relief of pain, and refer nonemergency treatment to the appropriate treatment section. The patient's chief complaint will be the primary focus of this encounter and will be addressed or referred.

The dentist examines the suspected area and diagnoses the patient's condition. The diagnosis may include radiographs, percussion of the tooth, palpation of the affected tissues, and thermal test using applications of hot and cold.

Depending on the diagnosis, the treatment for patients in need of immediate care may consist of a temporary restoration, debridement of a periodontal pocket, opening a root canal, or an extraction. Immediate care is provided to relieve pain, control bleeding, or treat an infection.

Following the initial treatment in sick call, the patient often will require an appointment in the appropriate dental specialty to resolve the condition permanently. For example, if a sick patient is in pain and needs a root canal, the canal is opened to provide initial relief, medications are prescribed if necessary, and the patient is scheduled with endodontics to complete the root canal therapy.

For a sick call patient who does not need immediate attention, the examination section will diagnose the condition and the patient will be scheduled for an appointment with the appropriate dental specialty. For example, a person who lost a restoration and is not in any pain would be scheduled with an appointment in the restorative dentistry section.

Prior to dismissing a patient, a brief examination of the total dentition is made. Additional dental care needed to restore the patient's dental health is noted, and the patient is informed of the needed treatment.

### ***Special examinations***

Dental examinations in conjunction with medical physical examinations may be requested for a number of reasons. These include but are not limited to examinations required for enlistment, commissioning, remote or isolated duty, flying training, enrollment in the AF Academy, and assignment as a food handler. Normally, the type of dental examination required is indicated on the patient's physical examination form.

## **202. Assisting duties**

In this lesson, we will discuss your assisting duties as a dental assistant journeyman. While this lesson is brief, it contains very important information to put into practice. Your behavior is critical in the examination section because this is where a patient is first exposed to the professional treatment area of the dental clinic. The old adage "the first impression is a lasting impression" is what we are emphasizing here. By being cheerful, courteous, prompt, and thorough, you help create the desirable first image of Dental Service on your base.

Make sure that none of your patients are overlooked when their needs are to be coordinated with other dental sections. By following up on the patient, you can prevent such problems. You must accomplish basic clinical procedures such as receiving, seating, and draping the patient; selecting and arranging instruments and medications; and performing infection control.

The basic instrument setup for examination and charting should include a mouth mirror, explorer, cotton forceps, and periodontal probe. Additional items such as saliva ejector or oral evacuator tip, cotton rolls, gauze, dental floss, and articulating paper may be needed. Of course, you'll need the patient's dental health record.

The clinical examination of the patient should include an examination of the extraoral structures of the face and neck, and intraoral soft and hard tissues. The examination of the extraoral structures includes items such as facial symmetry, lymph nodes of the neck, temporomandibular joint, and shape of the jaws. Examination of the intraoral soft tissues includes items such as the labial mucosa, vestibule, buccal mucosa, gingiva, tongue, floor of the mouth, and soft palate. The intraoral hard tissues examined include the hard palate, intraoral portion of the jaw bones, and the teeth. During this process, it may be necessary for you, the assistant, to direct the air syringe to dry the teeth. This gives the dentist a better view of stained, decalcified, decayed areas, and margins of restorations. Carious lesions and impaction of food and debris in the interproximal spaces are noted. Irritants affecting the gingiva, such as an overhang or rough interproximal surface of a restoration and poorly adapted inlay or crown, should be noted also.

When examining the teeth, the dentist uses an explorer and mouth mirror to examine each tooth surface from the incisal or occlusal margin of the crown to the free gingival margin. The natural pits and grooves of each tooth are explored carefully for structural defects, minute breaks in the enamel, and carious lesions or defective restorations, and stains.

When assisting in the examination section, a large portion of your time will consist of performing administrative tasks required to complete forms relating to direct patient care. The dental health record provides a written record of all examination findings and treatment provided to the patient. It becomes an important legal record. During the clinical examination, the dentist identifies pathologic conditions and describes the findings to the assistant. As the assistant, you'll record the findings in the patient's record. The dentist usually has a routine method for verbally dictating the condition of the dentition. Using the universal numbering system, the dentist will generally start with tooth number one and continue to number 16; then down to number 17 and on to tooth number 32. You'll use charting symbols to record the various conditions and restorations the dentist will call out very

quickly. When the initial charting of the patient's record is completed, you'll chart missing teeth, existing restorations, and prosthetic appliances, as well as diseases and abnormalities. You must have a thorough knowledge of the diagnostic nomenclature, charting symbols, authorized abbreviations, types of examinations, and dental classifications, as well as knowing where (which numbered sections and items) to chart the findings on the Standard Form (SF) 603, Health Record—Dental, and SF 603A, Health Record—Dental—Continuation.

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### **Self-Test Questions**

**After you complete these questions, you may check your answers at the end of the unit.**

#### **201. Function and type of procedures**

1. What are the two basic areas of focus within the examination section?
2. What is the purpose of the clinical examination?
3. When may the dentist request dental radiographs of the dentition, including periapical, bite-wing, occlusal and panoramic radiographs?
4. Who is responsible for treatment planning, sequence of care, and coordination of consultations?
5. What happens if the prescribed treatment is beyond the capabilities of the clinic?
6. List the five types of procedures performed in the examination section.
7. What is probably the most frequent reason for administering a dental examination? To whom does it pertain and what does it include?
8. How are periodic dental examinations scheduled?
9. What is the purpose of dental sick call examinations?
10. What happens when sick call patients do not need immediate attention or relief from pain?

11. What are some of the purposes of special examinations?

### **202. Assisting duties**

1. Why is your behavior in the examination section critical?
2. What instruments are needed for examination and charting?
3. What does the examination of the extraoral structures include?
4. What does examination of the intraoral soft tissues include?
5. What does the dentist look for when examining the teeth?
6. What will a large portion of your time consist of when assisting in the examination section?
7. What does the dental health record provide?
8. What does the assistant do as the dentist identifies pathologic conditions and describes the findings?
9. What will you chart when the patient's record is initially charted?
10. What items must you be knowledgeable of to chart a patient's record?

### **1-2. Restorative Dentistry**

Since most patient treatment needs are met in the restorative dentistry section, this is where most of the dental assistants are assigned. Restorative dentistry includes the treatment and restoration of carious teeth with metallic and nonmetallic materials. These materials are usually amalgam, composite resins, and glass ionomer restorations. If the dental assistant is well trained and works closely with the dentist, the patient may receive more treatment in a shorter length of time.

In this section, we will consider the function and procedures associated with restorative dentistry, basic restorative instruments, assisting with general dentistry procedures, and recovering scrap amalgam. Let's begin with function and procedures.

### **203. Function and procedures**

This lesson will provide you with an overview of the function and procedures of the restorative dentistry used when providing treatment to restore a patient's dental condition to a healthy, functional, and esthetically (pleasing to the eye) acceptable level.

#### **Function**

Restorative dentistry fulfills the basic dental needs of most patients, and is an integral part of general dentistry; it is primarily responsible for the restoration of decayed or fractured teeth. Restorative dentistry is essential to maintain the oral health of AF personnel and other uniformed service members to ensure maximum wartime readiness and combat capability.

#### **Procedures**

Restorative dentistry strives to restore decayed or fractured teeth to their original functional ability and esthetic quality of healthy dentition. In general, procedures include:

- Determining the procedure to be done.
- Administering anesthesia.
- Placing a rubber dam.
- Preparing the cavity or cavities to be filled.
- Placing filling material into prepared cavities.
- Carving and finishing restorations.
- Smoothing and polishing restorations.

A treatment plan may be developed to provide a systematic approach to clinical dental care. The first step in developing a treatment plan is to record the findings of a thorough examination, including the condition of the oral and adjacent tissues, diagnostic measures, and consultations required. The treatment plan may also include the following: necessary oral surgery, restoration of carious tooth structure, and preparation of the mouth to receive prosthetic appliances.

As an assistant in restorative dentistry, you'll perform many of the basic clinical procedures discussed earlier, such as:

- Preparing the treatment room.
- Performing proper infection control standards.
- Wearing the appropriate personal protective equipment.
- Selecting and arranging instruments and materials required for the procedure.
- Receiving and preparing the patient.
- Preparing local anesthetic.
- Preparing and assisting with the placement of the rubber dam.
- Irrigating and aspirating throughout the procedure.
- Retracting tissue to maintain a clear field of vision.
- Preparing, passing, and receiving instruments and materials.

If future appointments are needed, make sure that the patient knows how to arrange for them. Dismiss your patients in the same cordial, pleasant manner that you greeted them. When the treatment is



complete, you'll perform infection control procedures required to decontaminate the treatment area and sterilize instruments.

## 204. Basic restorative instruments

Many dental procedures require the use of hand instruments with sharp cutting edges. Because of the many hard-to-reach areas in the human mouth and the various functions required, cutting instruments come in a wide variety of sizes and shapes. The cutting instruments discussed in this section are primarily used in restorative dentistry.

### Hand cutting instruments

Hand cutting instruments allow the dentist to manually remove decayed tooth structure, smooth cavity walls and floors of a preparation, and place any bevels or retention grooves to hold the dental material in the tooth. This cutting instrument group includes chisels, hatchets, hoes, gingival margin trimmers, and excavators.

#### *Spoon excavators*

The spoon excavator is a double-ended instrument with a spoon-, claw-, or disk-shaped blade (fig. 1-1); their tips and sides are designed for cutting action. These instruments are often referred to as spoons because their blades somewhat resemble miniature spoons. Normally, the dentist will use both small spoons, similar to #19, and larger spoons, such as #36 and #37. Spoon excavators are used primarily to remove carious debris from tooth cavities.

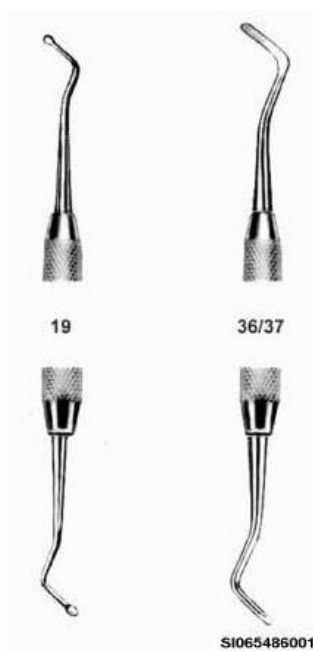


Figure 1-1. Spoon excavators (Courtesy of Hu-Friedy Mfg. Co. LLC).

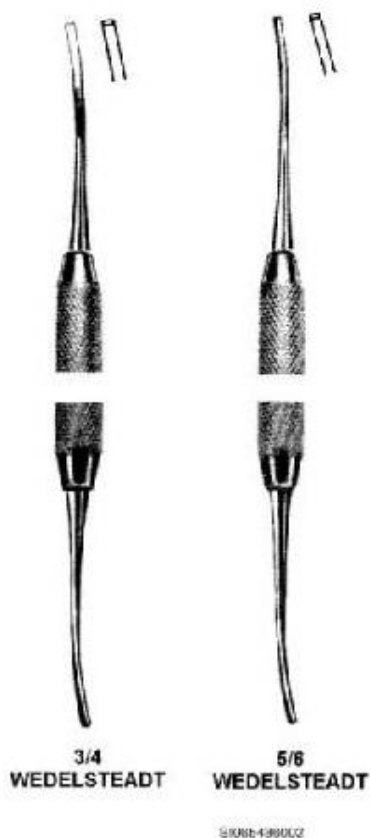
### *Chisels*

Dental chisels are described frequently as miniature wood chisels. They usually have a cutting edge at a right angle to the axis of the blade. Chisels are used to cleave (split) tooth enamel, smooth cavity walls, and sharpen line and point angles. They are designed to be used in a push motion to place pressure on undermined enamel or dentin and fracture the carious material. Each chisel is designed to reach specific areas of the mouth. Be careful in handling chisels because their cutting edges are dulled very easily. Even though dental instruments are made from the finest metals available, a slight blow of the cutting edge against a metal object greatly reduces their cutting ability. Enamel chisels are

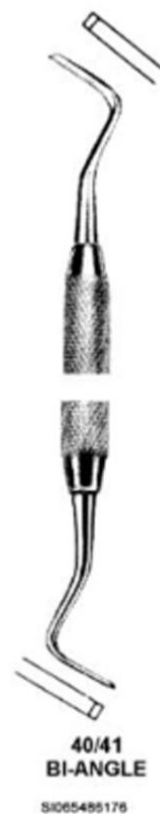
double ended and either straight or curved. Basically, two types of enamel chisels are used in restorative dentistry: the Wedelstaedt and the biangle (fig. 1-2 and 1-3).

### ***Wedelstaedt chisels***

The Wedelstaedt chisels are a double-ended, paired set of chisels. The two cutting edges are beveled in opposite directions. The Wedelstaedts have slightly curved shanks and are used primarily on anterior teeth. Two commonly used Wedelstaedt chisels are the #3/4 and #5/6 (fig. 1-2).



**Figure 1-2. Wedelstaedt chisels**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).



**Figure 1-3. Biangle chisel**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

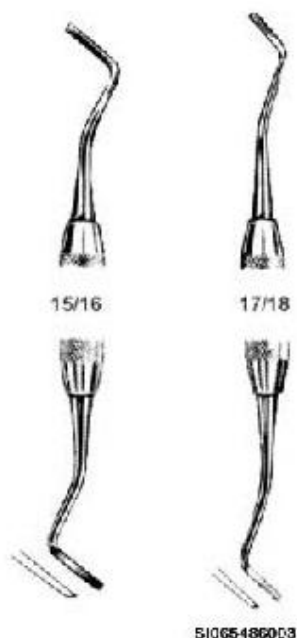
### ***Biangle chisels***

The biangle chisels have two distinct angles: one at the shank, and one at the working end. This design allows access to tooth structures, which would not be possible with straight chisels. A double-ended version of the biangle chisel is the #40/41 (fig. 1-3).

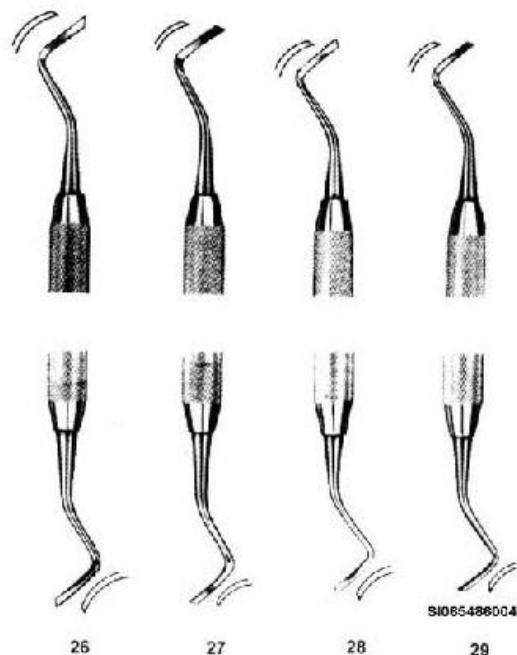
### ***Hatchets***

A dental hatchet resembles a camper's hatchet, except much smaller. Like dental chisels, some have single cutting ends and others have cutting edges on both ends of the handle. Hatchet blades are set at a 45° to 90° angle from the handle and shank. These instruments have different lengths and widths of blades. Hatches are used on the walls of the cavity preparation to cleave enamel and cut dentin in order to establish a sharp cavity outline.

There are two pairs of single bevel hatchets, and they are supplied as two double-ended instruments: the #15/16 and #17/18 (fig. 1-4). The two working ends make a pair. The instruments that form pairs are the same size; however, their cutting edges have opposite bevels to allow access to different areas of the mouth.



**Figure 1-4. Hatchets**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).



**Figure 1-5. Gingival margin trimmers**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### ***Hoes***

As you may have guessed, dental hoes look like a garden hoe in miniature. They are used with a pull motion to smooth and shape the floor of cavity preparations and to accentuate grooves or retention points.

### ***Gingival margin trimmer***

The gingival margin trimmers (GMT) are modified hatchets that have working ends with opposite curvatures and bevels (fig. 1-5). As the name implies, GMTs are used to trim, smooth, and shape the gingival margin floor of a cavity preparation. They are also used to bevel sharp line angles of inlay and amalgam preparations. GMTs are available in double-ended styles and are used in pairs, such as the #26 and #27. This is because the working ends of the even numbered instruments, 26 and 28, are designed for use on the distal surfaces; and the odd numbered, 27 and 29, are used on mesial surfaces.

### **Dental matrices**

If the external walls of a tooth are removed during the course of cavity preparation, they must be restored with restorative material. To do this, the dentist uses a matrix to approximate the original walls and hold the filling material in proper form and position until it has time to harden. These matrices include matrix retainers, metal bands, wedges, matrix strips, and crown forms. A dentist usually prefers certain types of these bands over others. With practice, you should become very proficient in having the preferred band on the appropriate retainer.

### ***Matrix retainers***

Matrix retainers are used to hold the matrices (metal bands or strips) firmly in place around a tooth. Matrix retainers and metal bands are used in combination to form a temporary mold while filling material is being packed into place. The Tofflemire matrix retainer has a retaining screw at one end to hold the matrix band, while on the other end of the retainer is an adjusting screw. When the adjusting screw is turned clockwise, the band loop constricts; when it's turned counterclockwise, the loop loosens.

The Tofflemire retainer is available in three different designs: the universal straight, contra-angle, and contra-angle junior (pedodontic) (fig.1-6). These retainers are practically maintenance free, and can be heat sterilized along with other dental instruments. Your part in maintaining matrix retainers is to check them periodically and replace those with badly worn screw threads.



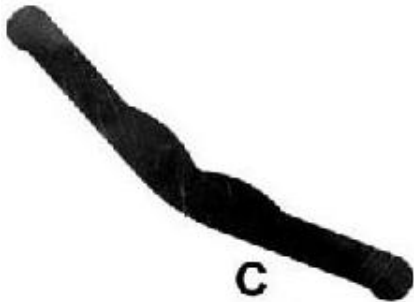
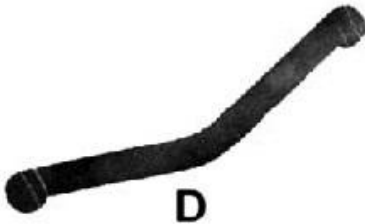
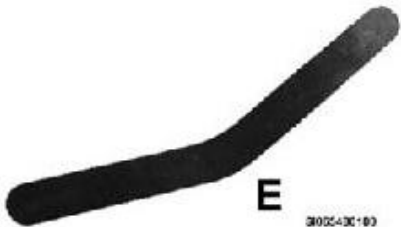
Figure 1-6. Tofflemire matrix retainers.

### *Amalgam matrices*

Amalgam matrices are made of very thin, flexible stainless steel available in either roll form or bands.

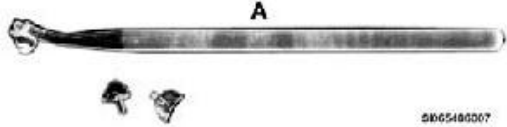

At times, the standard packaged matrix bands do not provide the necessary length, width, or shape for a particular cavity preparation. When this is the case, the dentist can cut the metal matrix strips to form the needed band. Bands used with the Tofflemire retainers completely encircle the tooth. Matrix bands come in assorted sizes and shapes (figures 1-7a through 1-7e).

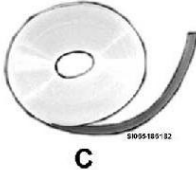
BAND	DESCRIPTION	FIGURE
Precontoured		<p>A</p> <p>Figure 1-7a. Amalgam matrix bands.</p>
Junior (pedodontic) #15 with aprons	Is used when additional length is needed for a preparation extending below the gingiva. This one has extensions known as "aprons."	<p>B</p> <p>Figure 1-7b. Amalgam matrix bands.</p>

BAND	DESCRIPTION	FIGURE
Wide #2 with aprons	Is used when additional length is needed for a preparation extending below the gingiva. This one has extensions known as "aprons."	 <p>Figure 1-7c. Amalgam matrix bands.</p>
Junior (pedodontic) #13	Is used when additional length is needed for a preparation extending below the gingival. A smaller version of #1.	 <p>Figure 1-7d. Amalgam matrix bands.</p>
Universal (straight) #1	The most commonly used band.	 <p>Figure 1-7e. Amalgam matrix bands.</p>

### *Composite matrices*

Composite matrices come in several forms, as presented in the following table and in figures 1-8a through 1-8c.

MATRICES	FIGURE
Clear preformed plastic cervical matrices with placement instrument.	 <p>Figure 1-8a. Composite matrices.</p>
Clear plastic anatomical matrix band.	 <p>Figure 1-8b. Composite matrices.</p>

MATRICES	FIGURE
Celluloid strip (roll).	 <p>Figure 1-8c. Composite matrices.</p>

The plastic roll form, commonly known as celluloid strips, is clear polyethylene in a 45-foot roll. A clear, plastic anatomical matrix band is also available. For composite restorations in cervical areas, clear preformed cervical matrix forms are used. All of the clear plastic matrices are used with light cured resin filling materials.

### ***Matrix crowns***

Matrix crowns are also known as preformed crowns. These preformed crowns (fig. 1-9) are made of either acrylic or corrosion-resistant metal.

These preformed crowns have three uses:

1. Hold temporary or sedative filling materials in place.
2. Hold badly broken or fractured teeth in place.
3. Serve as temporary crowns while the dental laboratory is preparing permanent crowns.

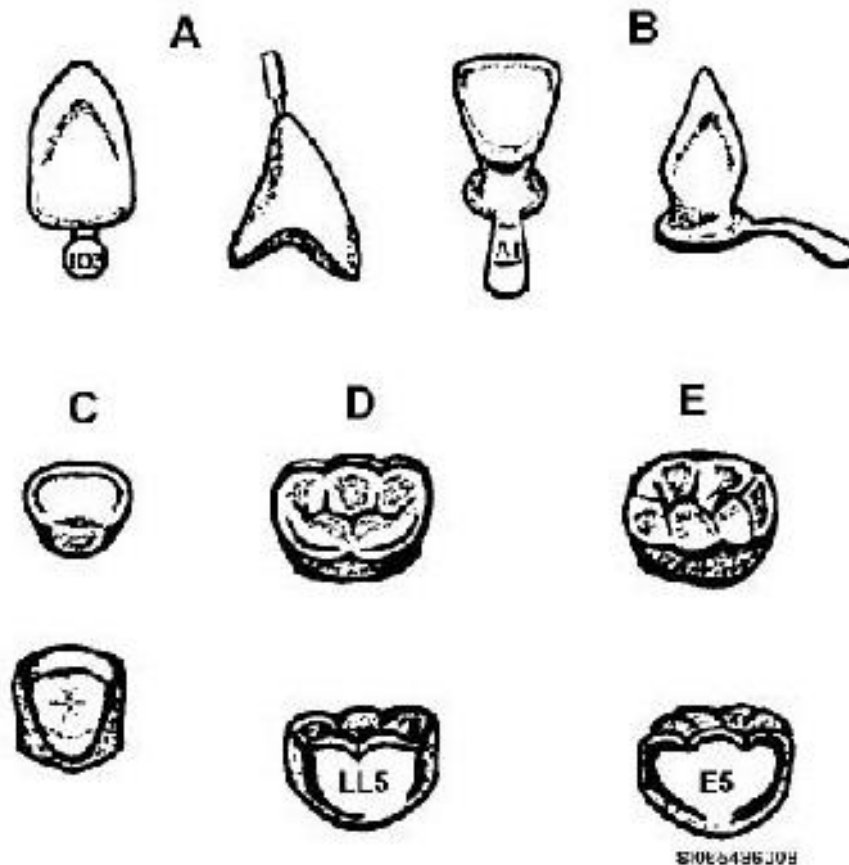


Figure 1-9. Preformed matrix crowns.

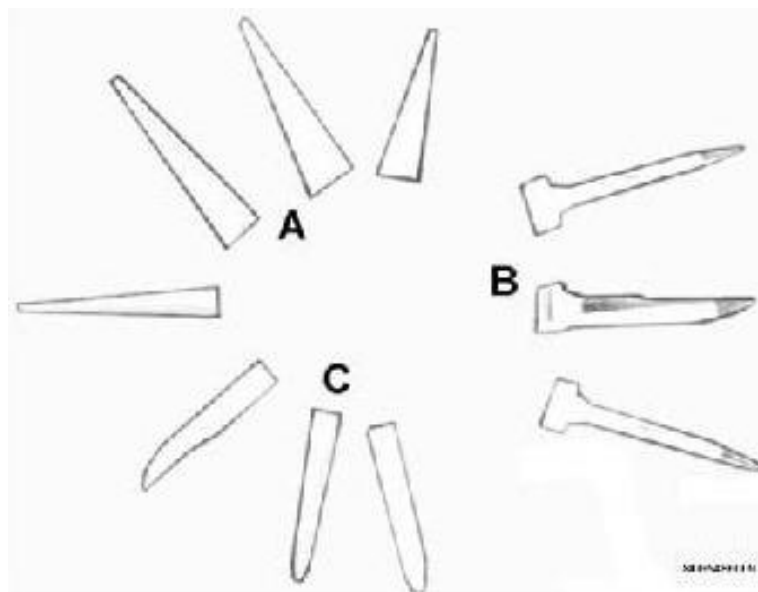
Matrix crowns are often used in prosthodontics and pediatric dentistry. The clear plastic matrix crown forms come in incisor, cuspid, and bicuspid shapes. These crown forms are removed when the restorative material sets. Corrosion-resistant metal crowns come in the incisor, cuspid, bicuspid, and molar shapes. They are made of tin-silver, stainless steel, or aluminum. Because of their poor esthetic quality in anterior regions, they are primarily used on posterior teeth.

### Wedge

Wedges are small, tapering, triangular pieces of wood or clear plastic about ½ inch in length. They are available in various sizes, which may be color coded. They are either plain (straight) or anatomically shaped. The clear, plastic anatomical wedges are designed for use with light-cured materials.

Callout Letter	Crown
<b>A</b>	Anterior acrylic temporary crown.
<b>B</b>	Clear plastic strip crown for pediatric dentistry.
<b>C</b>	Pediatric anterior metal crown.
<b>D</b>	Posterior metal crown (Unitek).
<b>E</b>	Contoured posterior metal crown with more anatomy (Ni-Chro).

Since the general shape of tooth crowns varies, the matrix around the tooth may not always produce a snug fit. This leaves space through which condensed restorative material can push out to create an undesirable overhanging restoration. The dentist uses wedges to force the matrix band or strip tightly against irregular tooth surfaces to prevent these spaces and aid in creating interproximal contact between the restoration and adjacent tooth structure. This snug fit then restricts the firmly condensed restorative material to the confines of the prepared cavity margins and the band itself (fig. 1–10).



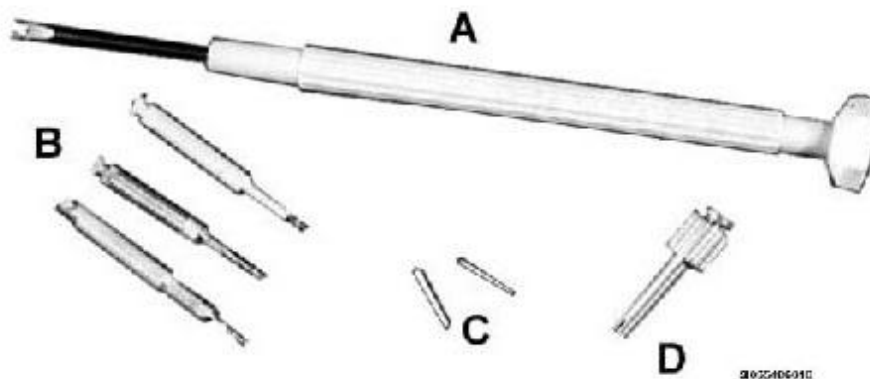
**Figure 1–10. Wedges.**  
 [A: Plain (straight) wooden wedges. B: Clear, plastic anatomical wedges.  
 C: Anatomical, color-coded wooden wedges.]

### Amalgam instruments

While many instruments are used in restoring tooth structure, certain instruments are used specifically to carry, condense, carve, and finish amalgam restorations.

### ***Pin amalgam set***

The pin amalgam instruments are designed as a threaded pin system (e.g., Threaded Mate System—TMS) in which the pin burs (drills), self-threading pins, and pin (hand) wrenches are precision matched (fig. 1-11). It's extremely important to keep the set together since there are a large variety of types and sizes. A pin bender is frequently used to bend or slightly adjust the position of inserted pins.



**Figure 1-11. TMS pin set.**  
[A: Pin bender. B: Pin burs or drills. C: Self-threading pins. D: Pin or hand wrench.]

### ***Pin burs or drills***

The dentist uses the pin burs or drills to make holes in the dentin portion of the tooth to receive pins of appropriate size. The pin burs closely resemble dental burs. The actual parts of these burs vary from .021 to .027 inch in diameter. They are available in short and long shank lengths for use in contra-angle (latch) handpieces.

### ***Pins***

The pins used are very small. Some are less than  $\frac{1}{4}$  inch long and .011 inch in diameter. These pins are available in threaded forms and are screwed into place with the use of a pin wrench. The threads on the pin also help retain the restorative material. Pins come in different lengths and diameters. After pin placement, the dentist may shorten the pin. A pin bender may be used to adjust the pins for better retention. Although pins are generally used in amalgam restorations, they are also used to reinforce other restorative materials.

### ***Carriers***

Amalgam carriers transport the freshly prepared amalgam restorative material to the cavity preparation. These carriers have hollow working ends, called barrels, into which the amalgam is packed for transportation (fig. 1-12). Both single- and double-ended carriers are available with a variety of barrel sizes including mini, regular, large, and jumbo. When the lever (located on top of the carrier) is depressed, the amalgam is ejected into the cavity preparation.

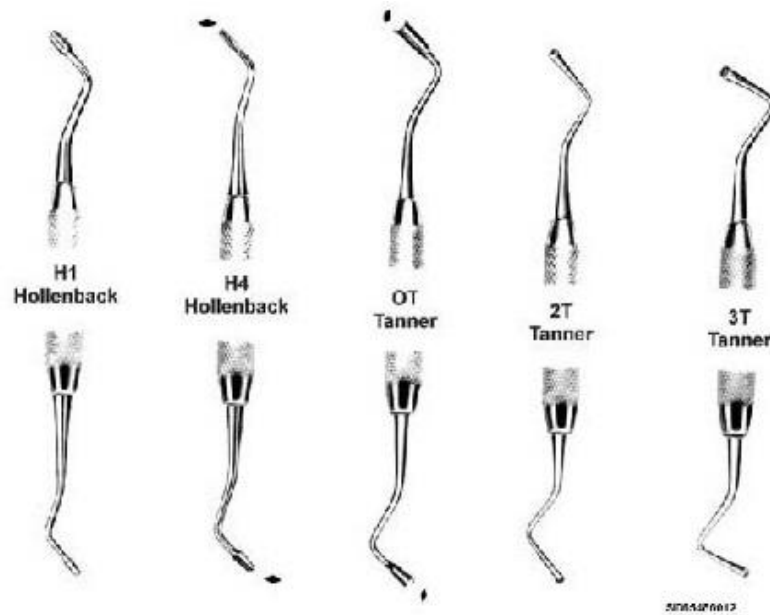




Figure 1-12. Amalgam carriers  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### ***Condensers***

Amalgam condensers, often called pluggers, are instruments used to condense or pack the amalgam filling materials into the cavity preparation. The hammer-like working end is large enough to compress the soft amalgam without sinking into it. Condensers come in single- and double-ended designs. They also have variously shaped and sized working ends, which can be smooth or serrated. Some of the more common types of condensers are shown in figure 1-13.



**Figure 1-13. Amalgam condensers**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

Because of the difficulty experienced in condensing amalgam around pins, special double-ended Markley condensers are available (fig. 1-14). Their function is the same as that of the amalgam condensers; however, the Markley condensers have much narrower working ends.



**Figure 1-14. Amalgam pin condensers**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### **Carvers**

Carvers have sharp cutting edges that are used to shape, form, or cut tooth anatomy into amalgam restoration. As you can see in figures 1-15 through 1-17, these instruments come in an assortment of shapes and sizes in double-ended designs. Many carvers were designed for carving specific tooth surfaces. For example, the Interproximal and #1/2 Hollenback were designed for carving proximal tooth surfaces, whereas the cleoid-discoid #89/92 and Tanner #5 are used on occlusal surfaces.

Carvers shaped similar to the Vignon or Frahm #2/3 are used to quickly carve the basic anatomy on occlusal surfaces. Some carvers are also used to carve wax patterns for crown and inlay fabrication.

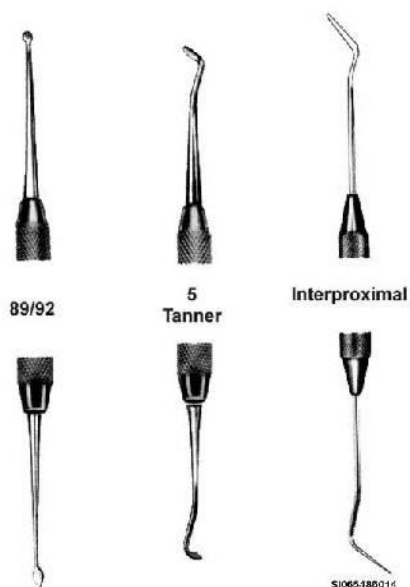


Figure 1-15. Carvers  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

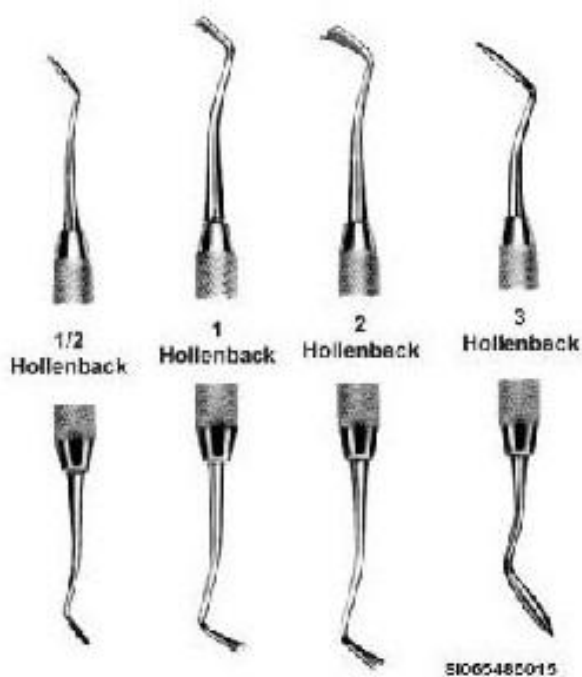


Figure 1-16. Hollenback carvers  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

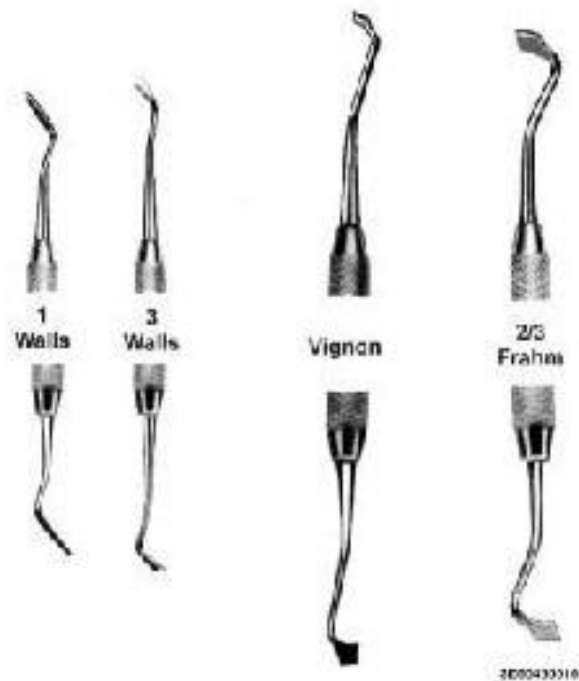


Figure 1-17. Carvers  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### ***Burnishers***

Burnishers are used to burnish or polish hardened metallic surfaces and refine anatomy. A burnisher can be used to remove scratches left on the amalgam surface by the carving instruments. Burnishers have smooth rounded working ends and come in single- and double-ended types. Some of the more commonly used burnishers are shown in figure 1-18.



Figure 1-18. Burnishers  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### Cement, resin, and insulating base instruments

The instruments in this group are used for mixing and handling restorative resin, and for various temporary restorative, insulating, and pulp-capping materials.

#### *Spatulas*

There are three different spatulas available for mixing restorative materials (fig. 1-19). Some of these spatulas can cause discoloration in the material being mixed. The selection of a mixing spatula is not critical *except* when preparing a permanent anterior restoration. Some composite restoration materials discolor easily, so use the spatulas recommended by the manufacturer when working with it. The single-ended #322 and #324 are suitable for mixing materials other than composites. A smaller version of the #324 is the #313 spatula. The #313 is used for mixing small quantities of cement.

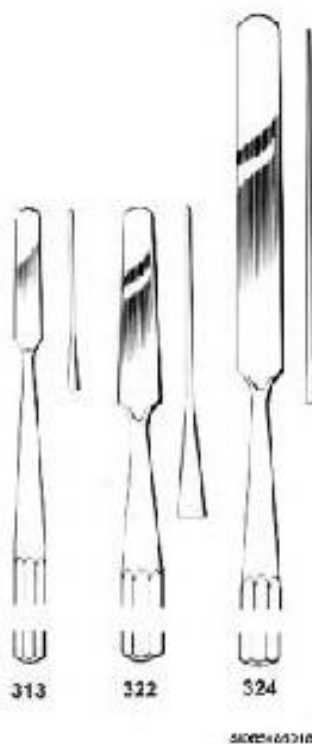
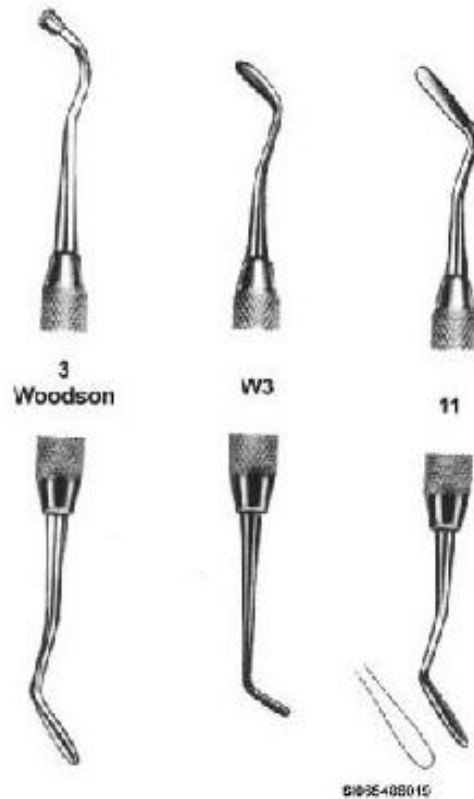


Figure 1-19. Spatulas  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

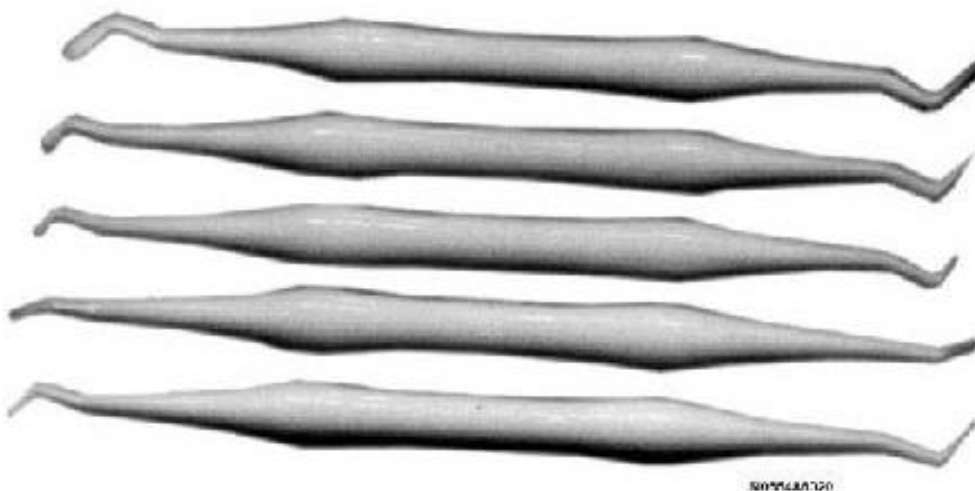
#### *Composite resin instruments*

A variety of double-ended instruments make up this instrument group. They are used to transport and place dental cements, resins, temporaries, and insulating and pulp-capping materials. The working ends on composite resin instruments range from varying small cylinders to assorted angled, paddle-like shapes. Figure 1-20 shows the Woodson #3, #W3, and #11 (also known as Stellite), which are some of the commonly used instruments in this category.



**Figure 1-20. Composite and cement instruments**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

Other types of composite resin instruments are made of plastic. They either come included in the kit of resin material from the manufacturer or, in some cases, can be ordered as a set as shown in figure 1-21. There are several advantages to using plastic instruments. Plastic won't discolor or contaminate the composite restoration, and the material does not cling to the instrument. The instruments in the set shown can be heat sterilized and used on composites and cements.



**Figure 1-21. Plastic composite instrument set.**

Another instrument frequently used with etching and bonding procedures associated with composite resins is a disposable brush with a reusable handle. An example of this type is shown in figure 1-22.



Figure 1-22. Disposable brush and handle.

### *Insulating base instruments*

These instruments, better known as dycal or calcium hydroxide instruments, are used to mix, carry, and place insulating bases. They are available as a single-ended instrument, (fig. 1-23), or as a double-ended instrument (fig. 1-24).



Figure 1-23. Single-ended dycal instrument.



Figure 1-24. Double-ended calcium hydroxide instrument  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### **Instrument tray setup**

Figure 1-25 shows a typical selection and arrangement of instruments for a routine restorative procedure.

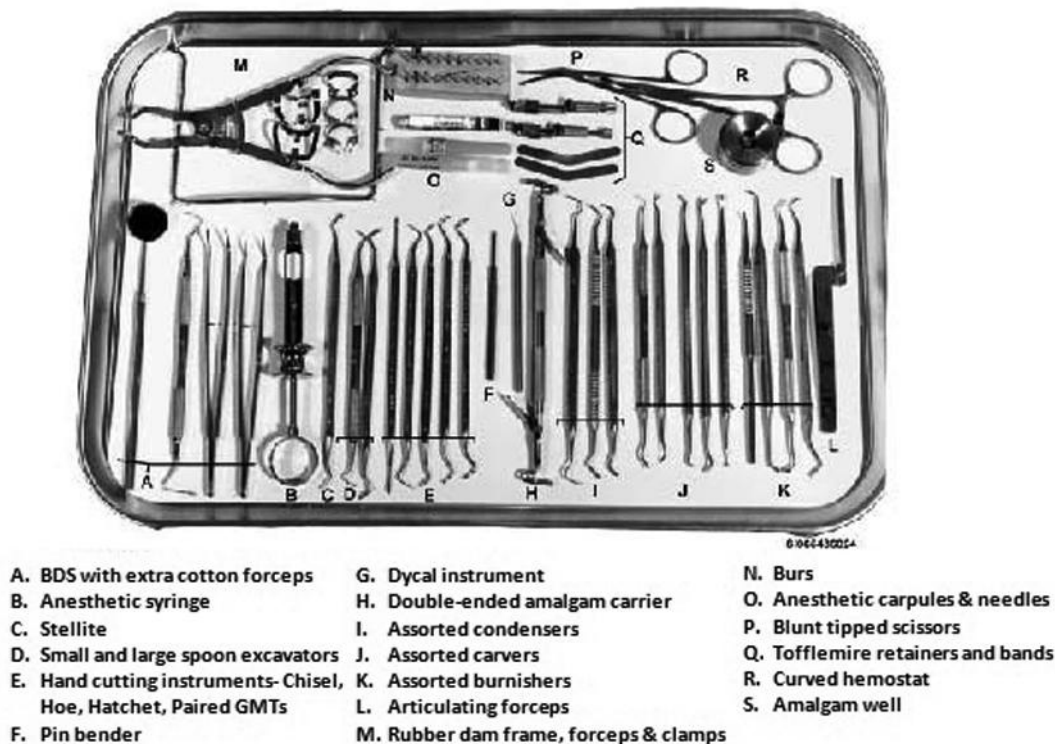


Figure 1-25. Typical restorative instrument tray setup.

## 205. Assist with general dentistry procedures

In order for the necessary treatment procedures to proceed smoothly and without delay, you need to understand some basic terminology and classification of cavities. In this lesson, we will discuss cavity preparation, types and classification of cavities, steps in cavity preparation, and the placement of restorative materials.

### Cavity preparation

A cavity preparation is a mechanical procedure that removes caries or existing restorative materials and a limited amount of healthy tooth structure in order to receive and retain restorative materials.

### Types of cavities

Cavities can occur on one or more of the tooth surfaces, and be of various sizes, ranging from very small to those that include all five surfaces.

Cavity Type	Description
Simple	Occurs on one surface of the tooth.
Compound	Two surfaces of the tooth are involved in the cavity.
Complex	Three or more surfaces are involved in the cavity.

Compound and complex cavities may include one or both of the proximal surfaces as well as portions of the facial and lingual surfaces. When caries attack the proximal surface of posterior teeth, the cavity preparation often includes preparation of the occlusal surface.

### Classification of cavities

Cavities are classified according to the location where the carious lesion begins, including pits and fissures, as well as smooth surfaces.



### ***Pits and fissures cavities***

Caries frequently have their beginnings deep in the developmental pits and fissures areas of the tooth. These areas are deeper than the surrounding tooth substance and are nearly impossible to clean thoroughly, creating ideal conditions for bacterial plaque formation. Locations of pit and fissure caries include:

- Lingual pits of maxillary incisors.
- Lingual groove and pit of maxillary molars.
- Occlusal surfaces of posterior teeth.
- Facial groove and pit of mandibular molars.
- Pits occurring in areas due to irregularities in the formation of enamel.

### ***Smooth surface cavities***

Smooth surface cavities can be found on all teeth on the proximal surfaces, and gingival one-third of the facial and lingual surfaces.

### **Steps in cavity preparation**

After the dentist decides which tooth or teeth to restore, the anesthesia is administered (if required), and the rubber dam is put in place. Arrange items in sequential order of the procedure. If you are well prepared, the steps in cavity preparation should proceed smoothly without delay and the patient will be more at ease and confident.

The dentist will work first to completely remove decay, and then shape the remaining structure to accept and retain the restorative material.

Watch closely during the procedure and be ready to irrigate and aspirate as needed, as well as pass the instruments and materials to the doctor when needed. The initial cavity preparation generally is done using the high-speed hand piece and a variety of rotary instruments.

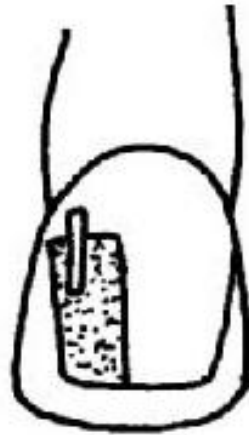
### ***Cavity design and removal of caries***

The dentist will use various types of cavity preparation procedures to design a cavity preparation to retain the restorative material. The design of the cavity preparation for either a tooth with initial caries or replacement restoration is based on the location of the caries, the amount and extent of the caries, the amount of lost tooth structure, and the restorative material to be used.

When cusps or most of the tooth crown must be removed, retention pins are placed in selected areas of the remaining dentin to provide retention of the restorative material. The pins are held in place by twisting the threaded pin into a slightly smaller hole made by a pin bur or drill (fig. 1-26). The pin acts like a tiny screw and holds itself in place. The upper portion of the pin extends into the cavity preparation where the restorative material can be placed around it and thus retained (fig. 1-27 and 1-28).

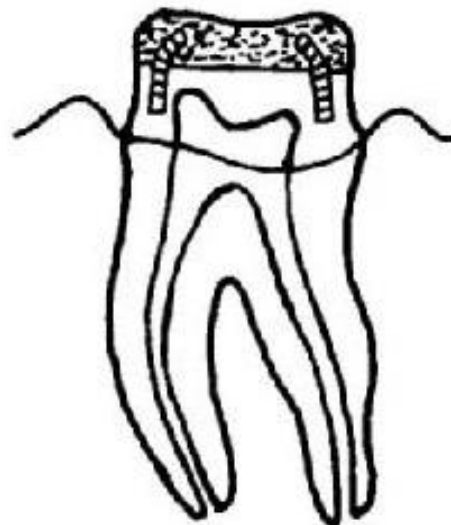


Figure 1-26. Occlusal view of retention pin hole placement.



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Figure 1-27. Retention pin placement in an anterior tooth.



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Figure 1-28. Retention pin placement in a posterior tooth.

Carious dentin not removed during the design of the cavity preparation can be removed by using either round burs or spoon excavators.

***Finishing the enamel walls and margins***

The last cutting step in the preparation of the cavity is finishing the enamel walls. This is a process of angling, beveling, and smoothing the walls of the cavity preparation to achieve the best marginal seal possible between the restorative material and tooth structure. The dentist may use burs, diamond

stones, or hand-cutting instruments (chisels, hoes, hatchets, and gingival margin trimmers) to complete the walls by removing loose or unsupported enamel to create the strongest possible enamel wall.

### ***Cleansing the cavity***

The final step in cavity preparation is cleansing the cavity. This includes the removal of accumulated debris, drying the cavity, and final inspection prior to placing restorative materials. All debris must be removed from the cavity, especially on the margins, because deposits left on them subsequently dissolve, resulting in a leak that invites recurrent caries.

Irrigating the cavity preparation with warm water usually removes all debris. Stubborn particles of debris can be removed with a small cotton pellet dampened with water or hydrogen peroxide. Following irrigation and aspiration to remove the debris, dry the cavity with pressurized air from the 3-way syringe or dry cotton pellets.

### **Placement of restorative materials**

After the cavity preparation is completed, your attention as the assistant is critical. You must rapidly anticipate each step in the procedure in order to have the necessary materials ready at the proper time.

You must prepare and pass restorative materials, mix them at the right time, and follow manufacturer's instructions. More instruments are needed to place the restoration than to prepare the tooth; therefore, more instrument transfers are necessary and occur more rapidly than in cavity preparation. Once the restorative materials have been placed in the cavity, the dentist then begins to finish the restoration.

### ***Cavity liners and bases***

Many dentists use some type of cavity liner or base in almost all cavity preparations. They are used primarily to protect and aid the pulp in recovering from irritation resulting from cavity preparation. Liners and bases are placed when the cavity preparation is completed, just prior to insertion of the restorative material.

Calcium hydroxide is used as a base and pulp capping material because it protects and is compatible with the pulp. It is also compatible with all restorative materials, including self-cured and light-cured composite resins. Calcium hydroxide is placed on the dentin walls and pulp floor, but must not touch the enamel margins of the preparation. Glass ionomers are used as a protective base prior to the placement of a composite resin restoration.

Most bases are applied best when you, the assistant, wipe the instrument clean between each small application. Hold a gauze sponge in the transfer zone and quickly wipe the end of the instrument as the dentist moves toward the base mix. If the dentist inadvertently gets the base on the enamel walls of the cavity preparation, pass an instrument for removal of the material. Cavity varnish is a liner used by some dentists and is placed in cavity preparations after bases are placed. Cavity varnishes are used to seal the dentinal tubules to help prevent microleakage.

Copalite cavity varnish has an organic solvent of ether or chloroform that quickly evaporates, leaving the resin as a thin film over the preparation. This varnish should be slightly thicker than water. If it becomes slightly more thickened, thin it slightly with solvent. If the liquid becomes very thick, discard it.

Copalite varnish is not used with composites since the varnish retards the set of composites and interferes with the bonding of composites. When applying the varnish, dip a small cotton pellet held by cotton forceps into the varnish just enough to wet the pellet. Apply the cavity varnish to the pulpal area, walls of the cavity preparation, and onto the edge of the margins of the preparation. Remove any excess varnish from the enamel with a fresh cotton pellet. Place a second application of cavity varnish over the first to thoroughly coat the surfaces of the dentin and fill any voids from bubbles created

when the first application dries. After the second application of varnish dries, the tooth is restored with a material such as amalgam.

### ***Amalgam restorations***

Amalgam is used as a restorative material on the surfaces of both permanent and primary posterior teeth. Amalgam also is esthetically acceptable for distal restorations of the cuspid when the restoration is not readily visible. Amalgam can also be used to prepare a sound base for a tooth prior to the preparation of a full artificial crown. This is commonly referred to as an amalgam buildup. When multiple surfaces of the tooth are removed during the cavity preparation, a matrix is used to approximate the original surface and hold the restorative material in proper form and position until it sets. The type of matrices used depends on the type of restorative material placed. Amalgam matrices are made of very thin, flexible stainless steel. They are available in either roll form or bands. The matrix band, retainer, and wedge are used in combination to form a temporary mold while filling material is being packed into place. You'll need to have the right type of matrix available and assembled, ready for use during the procedure. The most commonly used retainer is the Tofflemire (fig. 1-29). The matrix is assembled and placed before the amalgam is mixed.

To assemble the matrix, follow these steps:

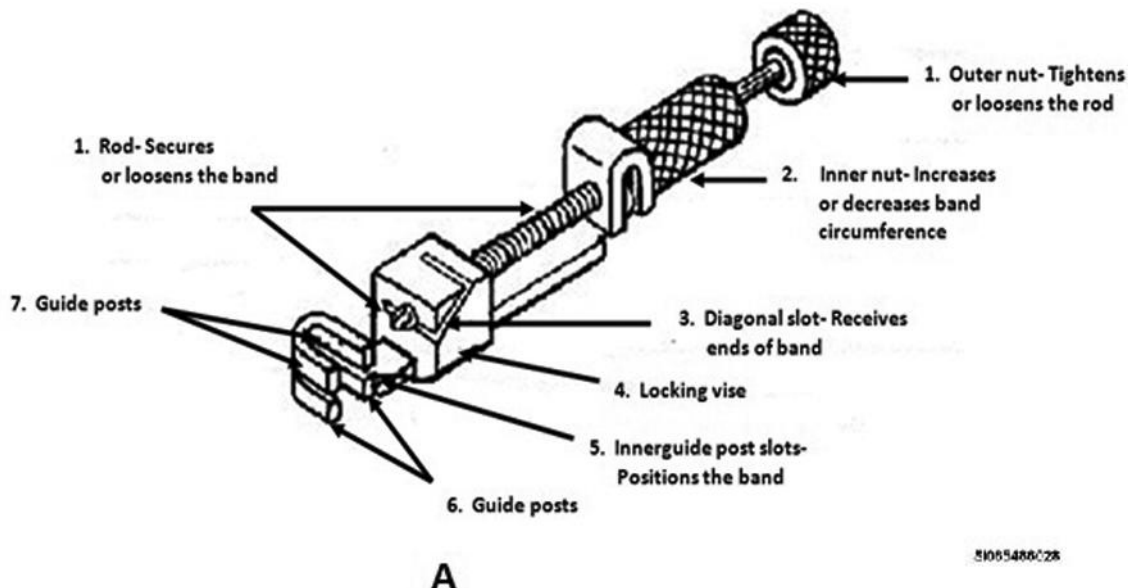


Figure 1-29. Components of the Tofflemire retainer.

- Hold the retainer in one hand with the slots in the guide posts and locking vise facing upward.
- Turn the large inner nut counterclockwise to position the locking vise close to the guide posts.
- Turn the small outer nut counterclockwise until the rod is not visible in the locking vise slot.
- In your other hand, grasp the band with the ends placed evenly together.
- Place the edge of the band with the larger circumference (occlusal edge) into the diagonal slot at the vise end of the retainer.
- With the band placed in this manner, the larger circumference is toward the occlusal surface and the smaller circumference toward the gingiva (fig. 1-30).

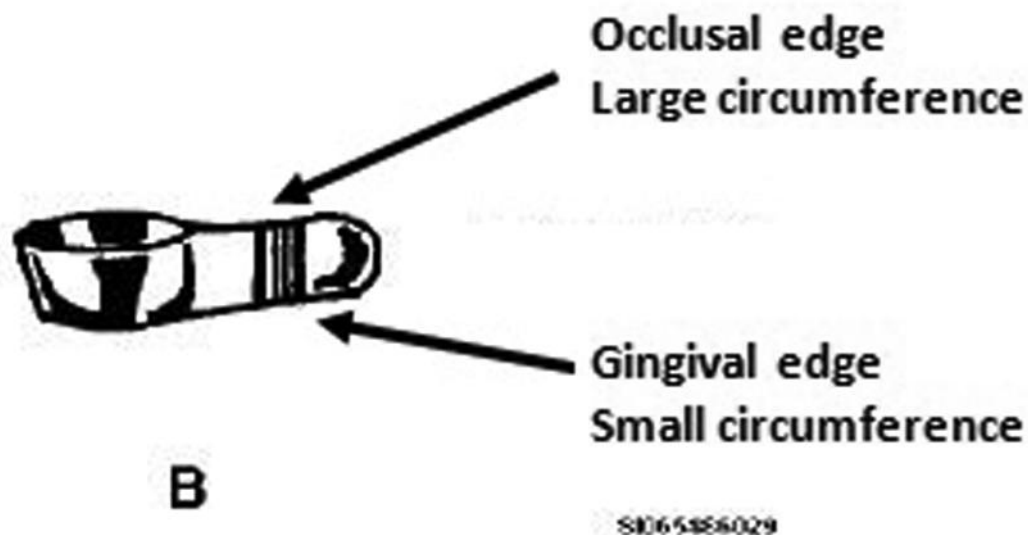


Figure 1-30. Large and small circumferences of the band.

- Continue to ease the band through the inner guide post slot.
- Position the band through the left guide posts for teeth on the mandibular right or maxillary left quadrants (fig. 1-31).



Figure 1-31. Positioning the band to the right or left for the appropriate quadrants.

- For teeth in the mandibular left or maxillary right quadrants, position the band through the right guide posts.
- Turn the outer nut clockwise until the rod tip presses firmly against the band in the lock vise to secure the band.
- Turn the inner nut clockwise to decrease the band size or counterclockwise to increase the size.

After the Tofflemire matrix is assembled, it is ready for positioning on the prepared tooth. The following procedure can be accomplished by either the dentist or assistant.

- Use the handle end of the mouth mirror to open the loop of the band (the band can be flattened or bent during placement in the retainer, and will not slide easily onto the tooth preparation).
- Adjust the size (diameter) of the loop by turning the inner knob.
- Gently place the matrix band into the interproximal space on either side of the tooth, over the prepared tooth, with the small circumference of the band positioned toward the gingiva and the retainer parallel to facial surface of the tooth.
- The handle of the retainer extends out of the oral cavity at the corner of the lips.
- Hold the band securely in place by finger pressure over the occlusal surface.
- Turn the inner knob clockwise to tighten the band snugly around the tooth.
- Use the explorer to ensure that no gingival tissue or dam material has become trapped between the band and the cavity preparation.
- Select the wedge and place in the forcep so that the flat, wider side is towards the gingiva.
- Insert the wedge into the lingual embrasure next to the preparation and the band. (This ensures the matrix band is tightly adapted to the gingival contour of the tooth and preparation when mesial or distal tooth surfaces are involved, and also prevents overhangs.)
- Check the contact to ensure the seal at the gingival margin is closed.
- Burnish to contour the band at the contact area.

While the provider makes any final adjustments to the matrix, you'll need to ensure the precapsulated amalgam is placed securely in the amalgamator and ready to triturate. Wait for a signal from the provider to begin mixing the amalgam. When the amalgamator stops, remove the amalgam capsule from the amalgamator, open the capsule, and empty the mixed amalgam into the amalgam well. Use caution with the amalgam mix because any moisture contamination will cause the finished restoration to expand. Load the amalgam into the amalgam carrier.

Some providers permit the assistant to dispense the amalgam into the cavity preparation as they condense the amalgam into the preparation. Other providers may prefer to have you pass the loaded amalgam carrier and dispense the amalgam themselves. In either case, you must pass the amalgam condenser to the provider.

The provider uses the amalgam condenser to pack the amalgam firmly into all areas of the prepared cavity. During the condensing procedure, the provider indicates when a change in condensers is needed. As you gain experience, you'll know when a change is needed by observing the stage of completion. The exchange of amalgam carrier and condensers continues until the cavity preparation is slightly overfilled. When the condenser is used for the last time, have the explorer ready to pass to the provider to slightly contour the marginal ridge and remove excess amalgam prior to removal of the matrix and retainer.

After the amalgam has been packed, the matrix and wedge must be removed to finish carving the anatomy of the tooth. You will need to have the cotton forceps or a hemostat ready to remove the wedge, retainer, and matrix band. Follow these steps to remove the matrix:

- Gently manipulate the point of an explorer around the inside occlusal edge of the band. This contours the marginal ridge of the restoration and removes the excess amalgam around the matrix band.
- Remove the wedge with hemostats or cotton forceps.
- With thumb or finger over the occlusal surface of the restoration and matrix band, the outer and inner nuts are turned counterclockwise to loosen and remove the retainer from the band.

- Grasp the loose end of the band with the hemostat or cotton forceps and gently rock back and forth until the band comes out of the interproximal space.
- Remove the band from the other interproximal space in the same manner.

Next, have the appropriate amalgam carvers ready to pass to the provider. The provider uses an interproximal carver to smooth the gingival margin of the amalgam restoration at the interproximal area. The provider uses another carver, such as the discoid-cleoid, to carve the primary grooves on the occlusal surface and remove excess amalgam. You may need to have another carver ready to pass to the provider to carve the facial and lingual margins of the amalgam if applicable. In addition to passing and receiving a variety of carvers to the dentist, you'll need to hold the high volume evacuator tip in your other hand to aspirate the shavings from the carving procedure at various times.

When carving of the amalgam restoration is complete, the rubber dam is removed, the patient's mouth is irrigated and aspirated, and the occlusion of the new restoration checked for any needed adjustment.

Have the articulating paper ready for use by placing it into a hemostat or articulating paper holder. Pass this to the provider to check the occlusion of the restoration. The articulating paper is placed on the teeth of the opposing quadrant and the patient instructed to gently close his or her teeth together. If the patient closes his or her teeth together too suddenly or with too much pressure, the new amalgam restoration will fracture if it is too high. Have an amalgam carver ready to pass to the dentist to reduce any high spots on the amalgam restorations. The restoration is checked with the articulating paper and carved until the proper occlusion is obtained. Have a burnisher, such as a ball or ovoid, ready to pass to the dentist to burnish the amalgam restoration. When the restoration is completed, irrigate and aspirate the oral cavity using the water syringe and high volume evacuator to remove amalgam shavings resulting from the occlusal adjustment. Prior to dismissal, ensure the patient is given and understands the postoperative instructions.

### ***Composite resin restorations***

The restoration of tooth surfaces that are easily visible normally is done with tooth-colored restorative materials for an esthetic appearance. Some brands offer several color selections, whereas others are supplied in a universal shade. The shade must always be selected before the teeth are allowed to dry because dehydration results in lighter than normal tooth shades. Conventional or modified types of preparations are used when tooth-colored materials are to be used. Conventional preparations are approximately 1 millimeter (mm) deep, and the cavity walls follow the direction of the enamel rods. The restorative material is retained in the preparation by mechanical retention. Modified preparations are much more conservative in tooth structure removal and rely mostly on acid-etch enamel for retention of the restorative material.

Composite matrices come in several forms. For mesial and distal restorations, a plastic strip or anatomical matrix band is placed before the material is mixed. The anatomical matrix band is assembled, placed, and removed similar to the metal bands and retainer used in amalgam restorations.

To use a plastic strip matrix, cut a 3-inch strip from a 45-foot roll. Gently work the strip into the interproximal area to the surface being restored. Plastic or wooden wedges can be used with these matrices when needed. To remove the plastic strip matrix, first remove any wedges. Then, gently manipulate the strip toward the incisal edge, using a rocking motion to free it from the interproximal space.

For composite restorations in cervical areas, clear or metal preformed cervical matrix forms are used.

There is no assembly of these matrices. They are also placed after the restorative material is mixed and placed into the preparation.

Acid-etching the enamel portion of cavity preparations (with a 35 to 50 percent solution of phosphoric acid) results in improved retention for resin restorations. A celluloid matrix may be placed

prior to the acid-etching procedure to protect the adjacent teeth. The phosphoric acid is applied to the enamel surface of the cavity preparation and allowed to be in contact with the enamel for approximately 20 seconds. Then the area is rinsed thoroughly with water and dried according to manufacture's instructions. The etched enamel surface, when dried, appears chalky white because of a slight dissolving of the surface to create microscopic undercuts. After etching the tooth, a bonding agent is applied.

When enamel and dentin are etched during the same acid application, it is commonly referred to as the *–all etch technique.* It is best to apply the acid to the enamel first for 10 seconds, then to the dentin for 10 seconds. Etching dentin for 20 seconds or more opens the tubules too wide and removes minerals to too great a depth. Overetched dentin can result in a weaker bond and posttreatment sensitivity. The acid is removed by rinsing for at least 10 seconds. The excess water is removed by *gentle* drying with air; however, but the dentin is left *moist* so that it glistens. In addition, the dentin surface must be left moist to keep the collagen fibrils fluffed up. If the dentin is dried, the fibrils will collapse and block adequate penetration by the dentin bonding resins, resulting in a weaker bond that will fracture easily.

The acid etchant comes in a liquid or gel. Often, coloring agents are added so you can see where the etchant is on the tooth. Liquid etchants are applied with a brush, small cotton pellet, or small sponge. Gels are applied by brush or dispensed from a syringe through a fine needle. After etching the tooth, a bonding agent is applied.

The dentist may need an instrument to pack the composite resin material into the cavity preparation and avoid formation of air bubbles. When the composite resin material is applied to the etched and bonded surface, the resin flows into the surface voids or undercuts and irregularities. If using a light cured system of composite resin, the light source is positioned near the restoration and exposed according to the manufacturer's instructions. The dentist, assistant, and patient must wear protective glasses or use protective shields during the light exposure.

Once the resin material cures, a mechanical bond forms. This type of surface union between the restorative material and the enamel improves the retention qualities and provides a smoother cavity margin, improving the esthetics of the restoration. In addition, less marginal leakage is likely to occur due to the improved union of the enamel and restoration.

To finish the restoration, the matrix is removed and any rough areas are smoothed with composite type finishing burs. If the restoration involves proximal surfaces, abrasive strips are used to smooth these surfaces. If applicable, the gingival margin of the restoration is checked to remove any excess composite material. The surface of the restoration is smoothed further with fine and extra-fine discs of silicon carbide and zirconium silicate. These smooth surfaces prevent retention of food debris or plaque. After completion of the restoration, the rubber dam is removed and the oral cavity irrigated and aspirated.

### ***Glass ionomer restorations***

Usually, the gingival areas on the facial aspect of the maxillary anterior teeth are restored with one of the tooth-colored restorative materials for an esthetic appearance. Restorations located on the gingival third of the tooth mainly are necessary because the tooth structure is carious or because it has been worn away or abraded by incorrect brushing habits. Since glass ionomer cements bond directly with enamel, dentin, and cementum, they are used for such restorations where minimal preparation of the tooth is desired, or where the fluoride release from the cement is desired to resist recurrence of caries. During placement of the glass ionomer cement restoration, saliva must be avoided in the cavity preparation because it will cause the restoration to fail.

## **206. Recovering scrap amalgam**

Once treatment is complete for an amalgam restoration, it is important to understand the process of recovering the scrap amalgam, which may be from a previous restoration that had been removed



and/or a new amalgam restoration that has been placed. Scrap amalgam should be recovered daily or weekly, depending upon local clinic guidelines.

### **Personal protective equipment**

Dental scrap amalgam is a hazardous material and must only be handled when wearing personal protective equipment (PPE). At a minimum, you should have eye protection, mask, and gloves when handling amalgam.

### **Designated containers**

The scrap amalgam should be collected in two designated plastic containers. Ensure that the containers have lids that close tightly. One container should be labeled CONTACT AMALGAM. This is the amalgam that has been in contact with the oral cavity. The other container should be labeled NON-CONTACT AMALGAM. This is amalgam that has not been in the oral cavity.

### **Recovery process**

The process for recovery is as follows:

- Don appropriate PPE.
- Place empty amalgam capsules in separate (non-contact) amalgam container.
- Place unused amalgam from the amalgam well into a sealed and labeled (non-contact) amalgam storage container.
- Flush lines with approximately 100 cubic centimeters (cc) (4 to 5 ounces) of water to rinse the cleaning solutions from the scrap amalgam.
- Collect scrap amalgam from the high volume evacuation trap and place in container labeled (contact) amalgam storage container without any fluid.
- Inspect the evacuation trap to ensure there are no remaining amalgam particles.

### **Disinfect scrap amalgam**

Prior to turning in scrap amalgam, it is required to be disinfected. Empty the contents of the container labeled CONTACT onto a paper towel. Disinfect the contents and allow to completely dry. Transfer to a sealed and labeled (contact) amalgam storage container. If the amalgam trap is no longer in good condition (serviceable) then disinfect it, and dispose of it in a "non-contact" sealed container. Place new amalgam trap in its place. Extracted teeth containing amalgam restorations need to be disinfected with non-chlorine disinfectant, dried, and stored in a (contact) sealed container for turn in.

### **Turning in amalgam containers**

Turn in contact/non-contact amalgam containers when they are full (or per local guidance) to dental logistics for proper disposal to Defense Reutilization and Marketing Office (DRMO). Dental logistics will complete the Department of Defense (DD) Form 1348-6, Single Line Item Requisition System Document, DOD (Manual-Long Form), or other required forms.

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## **Self-Test Questions**

**After you complete these questions, you may check your answers at the end of the unit.**

### **203. Function and procedures**

1. What is the basic function of restorative dentistry?
2. Why is restorative dentistry essential to AF personnel and other uniformed service members?

3. What procedures are included in restorative dentistry to restore decayed or fractured teeth to their original function and esthetic quality?
4. What may be developed to provide a systematic approach to clinical dental care?

#### **204. Basic restorative instruments**

1. Describe the design and use of spoon excavators.
2. Explain the uses of chisels and the type of motion used with them.
3. Name the two types of enamel chisels used in restorative dentistry and explain the difference between them.
4. What are the uses of hatchets?
5. What are the uses of gingival margin trimmers and why are they used in pairs?
6. What is the purpose of a matrix retainer?
7. Explain the difference between the retaining screw and the adjusting screw on a matrix retainer.
8. What are three types of the Tofflemire retainer?
9. What are amalgam matrices made of and in what shapes are they available?
10. List four sizes of matrix bands and give a description of each.
11. Name the various types of composite matrices and briefly describe their use.

12. What are preformed crowns made of, and what are their three uses?
13. What kinds of wedges are available?
14. Briefly explain why wedges are used.
15. What items of the pin amalgam set are important to keep together as a set? Why?
16. Briefly describe the use and sizes of pin burs.
17. How are pins placed into the prepared cavity?
18. What are the uses and sizes of amalgam carriers?
19. What are the uses of amalgam condensers?
20. What condensers are used to condense around pins?
21. How are carvers used?
22. Match the description in column A with the term and classification in column B. Column B items are used only once.
- | Column A                                   | Column B                  |
|--|---------------------------|
| ___(1) Quick anatomy on occlusal surfaces. | a. Interproximal.         |
| ___(2) Proximal surfaces.                  | b. Cleoid-discoid #89/92. |
| ___(3) Occlusal surfaces.                  | c. Vignon.                |
|  | d. Tanner #5.             |
|  | e. #1/2 Hollenback.       |
|  | f. Frahm #2/3.            |
23. What are the uses of burnishers?

24. How does the #313 spatula differ from the #324 spatula?
25. How are composite resin instruments used? Name some of these instruments.
26. What are the advantages to using plastic composite resin instruments?
27. What instrument is frequently used with etching and bonding procedures associated with composite resins?
28. What are the uses of insulating base instruments?

**205. Assist with general dentistry procedures**

1. Match the description in column A with the term or classification in column B. Column B items are used only once.

## Column A

- \_\_\_(1) Cavities involving two surfaces of the tooth.
- \_\_\_(2) Mechanical procedure removing caries or existing restorative materials.
- \_\_\_(3) Caries beginning deep in developmental areas of the tooth.
- \_\_\_(4) Cavities involving one surface of the tooth.
- \_\_\_(5) Caries found on gingival one-third of the facial and lingual surfaces or proximal surfaces.
- \_\_\_(6) Cavities involving three or more surfaces.

## Column B

- a. Cavity preparation.
- b. Simple.
- c. Compound.
- d. Complex.
- e. Pit and fissure.
- f. Smooth surface.

2. Name the locations of pit and fissure caries.
3. What design is the cavity preparation based on?
4. When cusps or most of the tooth crown must be removed, what is placed in selected areas of the remaining dentin to provide retention?
5. What is used to remove carious dentin not removed during the design of the cavity preparation?

6. What is included in the process of finishing the enamel walls and margins?
7. What is the final step in the cavity preparation? What does it include?
8. What happens if deposits of debris are left on the margins of the cavity preparation?
9. As the assistant, why is your attention critical during the placement of restorative materials?
10. What are the primary uses of cavity liners and bases?
11. What are the uses of calcium hydroxide?
12. Describe how bases are best applied.
13. What should you have ready if the base gets on the enamel walls of the cavity preparation?
14. What is the purpose of cavity varnish that some dentists use?
15. What should you do if cavity varnish becomes slightly thickened? When should it be discarded?
16. Briefly describe how to apply cavity varnish.
17. On what teeth surfaces is amalgam used as a restorative material?
18. When multiple surfaces of a tooth are removed, what is required to approximate the original surface and hold the restorative material in the proper form and position until it sets?
19. When during the procedure are amalgam matrices assembled and placed?

20. What are the steps in assembling the Tofflemire retainer with a matrix?
21. Which item on the Tofflemire is used to decrease or increase the size of the band?
22. What is used to adapt the band to the gingival contour of the tooth and preparation when mesial or distal tooth surfaces are involved? Why?
23. When do you begin to mix the amalgam?
24. What instrument must you have ready to transfer once amalgam is placed into the preparation?
25. What instrument is necessary to remove the wedge, retainer, and matrix band?
26. What do you use to remove the shavings from the carving procedure?
27. What must be done when carving of the amalgam restoration is complete?
28. What instrument should you have ready to pass to the dentist if the restoration has any high spots?
29. What instrument should you have ready to pass to the dentist when the proper occlusion is achieved?
30. What should you do when an amalgam restoration is completed?
31. What types of composite matrices are required for mesial and distal restorations?
32. For composite restorations in cervical areas, which composite matrices are placed after the restorative material is mixed and placed into the preparation?

33. How long is the phosphoric acid in contact with the enamel surface of the cavity preparation?
34. What is applied after etching the tooth?
35. If using a light-cured system of composite resin, where is the light source positioned and for how long?
36. When using the light-cured system, who must wear protective glasses during the light exposure?

#### **206. Recovering scrap amalgam**

1. How often should scrap amalgam be recovered?
2. At minimum, what personal protective equipment (PPE) is required to be worn when collecting scrap amalgam?
3. Explain the difference between a non-contact container and a contact container.

### **1-3. Endodontics**

Before major advances in the treatment of diseases of the dental pulp and periapical tissues were made, many teeth were extracted needlessly. Endodontics is the dental specialty primarily concerned with these diseases. In some dental clinics, an endodontist is assigned exclusively to this specialty. Often, some of the restorative dentists spend part of their time seeing patients who require endodontic treatment, also known as root canal therapy. In this section, we will discuss the function of endodontics and basic endodontic instruments, as well as assisting with endodontic procedures.

#### **207. Function and basic endodontic instruments**

In this lesson, we will discuss the function of endodontics and of the basic endodontic instruments used in the prevention, diagnosis, and treatment of the dental pulp and tissues surrounding the root of the tooth. Having a good understanding of these areas will better prepare you to work beside the endodontist to meet the patient's needs.

##### **Function**

The primary purpose of endodontics is the treatment of diseases of the pulp and periapical tissues. The goal of this treatment is to retain the natural teeth rather than extract them. Often, the endodontic patient's initial appointment is of an urgent nature because of the associated pain or infection. Understanding the causes of pulp disease and how a diagnosis is reached will increase your ability to be an effective endodontic assistant.

### Endodontic rotary instruments

Latch-type endodontic rotary instruments are primarily used in the coronal third of the canal for enlarging the orifice, preparing post space, and flaring the canal. The most common are the Gates-Glidden drill and Peeso reamer (fig. 1-32 and 1-33). Both are sized in increasing diameters from number 1 through 6. The number of rings on the shank indicates the size of the instrument. The use of excessive force with the Gates-Glidden or Peeso could either perforate the canal or fracture the instrument. The Gates-Glidden is designed to break high on the shaft if excessive resistance is encountered, allowing easy removal of the fragment. Several long shanked, latch-type round burs are also available for use in endodontic procedures (fig. 1-34). Another rotary instrument used in endodontics to place root canal cement apically is the Lentulo paste carrier (fig. 1-35).

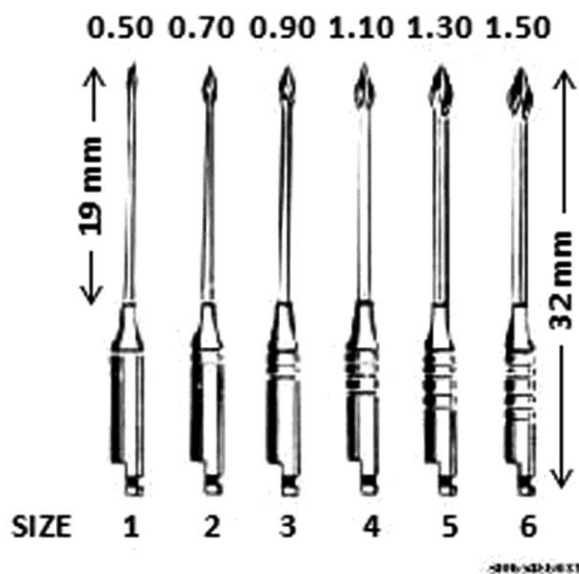


Figure 1-32. Gates Glidden drills.  
(Reprinted with permission of Integra LifeSciences Corporation).

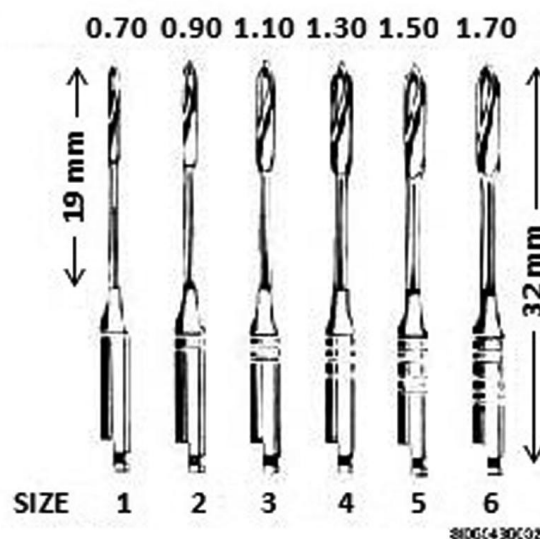


Figure 1-33. Peeso reamers.  
(Reprinted with permission of Integra LifeSciences Corporation).

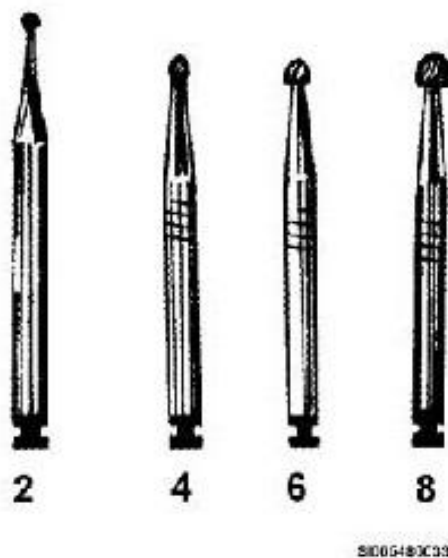


Figure 1-34. Long shanked latch burs.





Figure 1-35. Lentulo paste carrier.  
(Reprinted with permission of Integra LifeSciences Corporation).

### Endodontic explorers

Endodontic explorers (fig. 1-36) have long, narrow working ends. These explorers are angled from their shank in such a way that they provide easy access to the pulp canal. They are used to locate canal openings and explore the pulp chambers and canals.



Figure 1-36. Endodontic explorer (Courtesy of Hu-Friedy Mfg. Co. LLC).

### Endodontic cotton forceps

The forcep instruments (fig. 1-37) resemble the cotton forceps in the basic diagnostic setup (BDS). The major difference is that the endodontic cotton forceps are grooved to allow easy grasping and manipulation of paper points and gutta percha. They are also available in locking or nonlocking design.

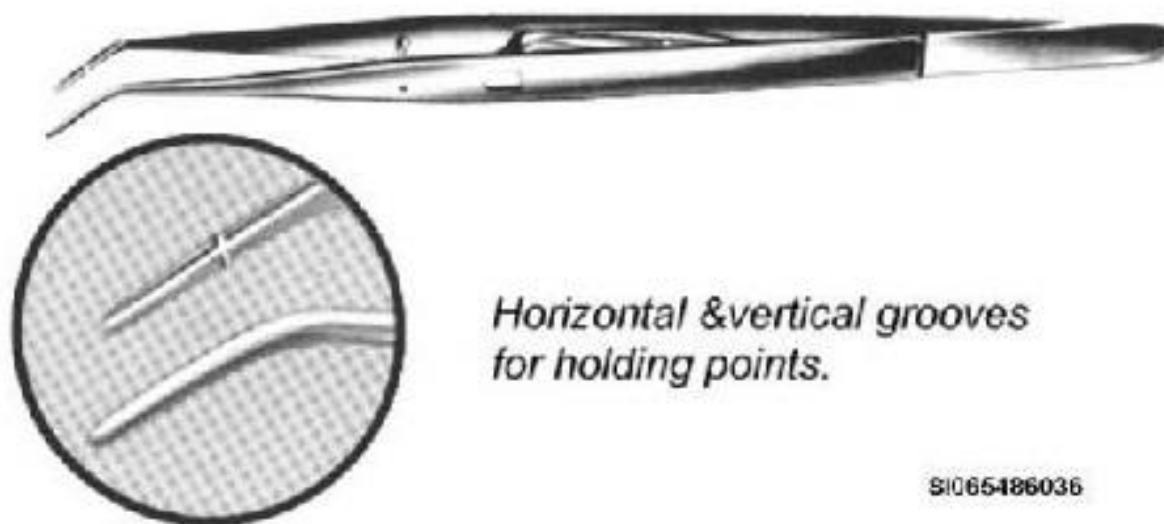


Figure 1-37. Endodontic cotton forcep (Courtesy of Hu-Friedy Mfg. Co. LLC).

### Endodontic excavators

These instruments are long, double-ended spoon excavators designed for endodontic treatment. They allow the removal of coronal pulp tissue, caries, or cotton pellets that are found deep in the tooth's crown.

### Broaches

A root canal broach is usually one of the first instruments used in the pulp canal during endodontic treatment. Before a broach is used, however, the dentist uses a bur to get into the pulp chamber. Broaches are thin, flexible, usually tapered and pointed, smooth or with a series of sharply pointed barbed projections curving backward and obliquely (fig. 1-38). The identification symbol of barbed broaches is an eight-pointed star formed by the barbs.

Smooth broaches can be used as explorers to get the feel of the canal. A barbed broach is used primarily for the removal of intact pulp tissue from large canals. Because these instruments are fragile and prone to breakage, exercise great care in their use. There are several sizes: coarse, medium, fine, and x-fine through xxxx-fine. The usual procedure is to start with the smallest broach, and discard each broach after it has been used.

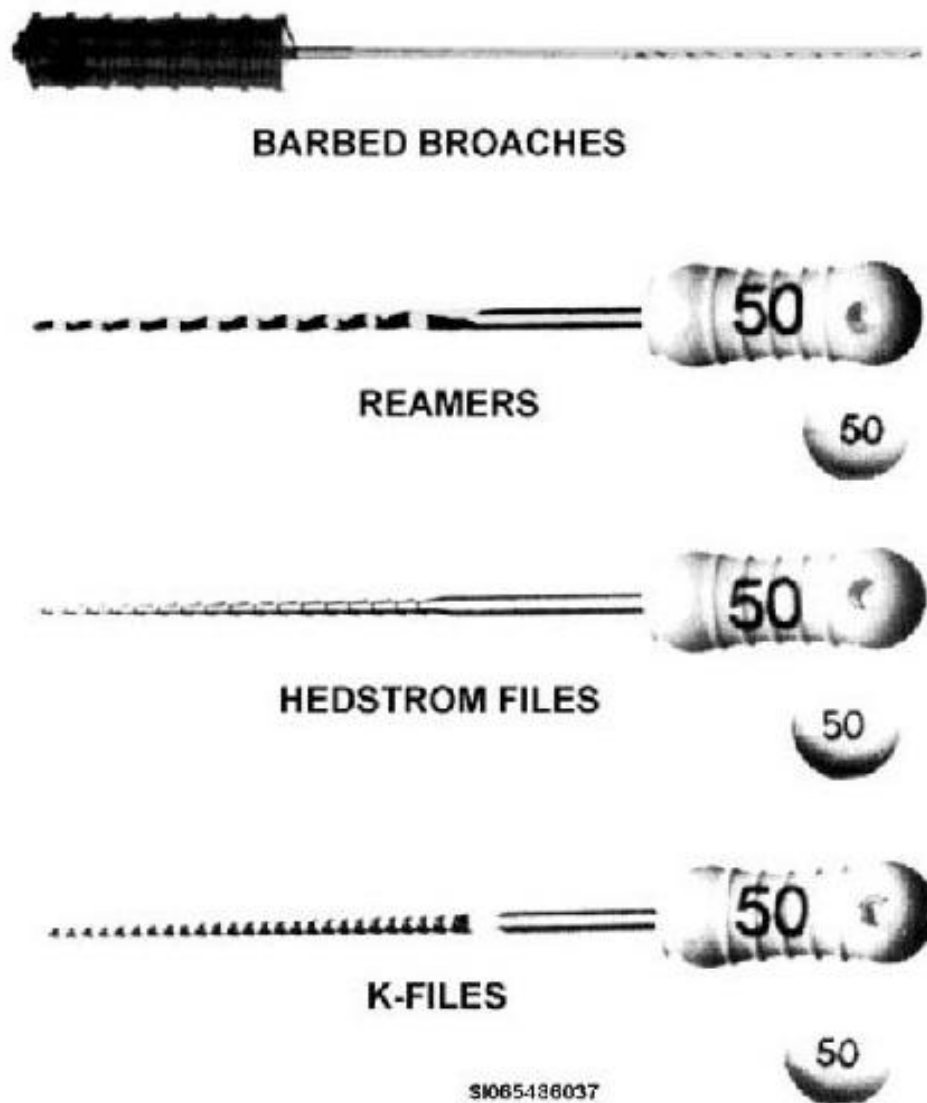


Figure 1-38. Endodontic broaches, reamers, and files.  
(Reprinted with permission of Integra LifeSciences Corporation).

## Reamers

Root canal reamers are used to enlarge the pulp canal after broaches have been used. Reamers are used with a reaming action (rotary cutting). Reamers are usually tapered and pointed, with spiral cutting edges, sometimes serrated. Since the cutting edges of reamers are farther apart than those found on files, reamers are more flexible than files. This same distance between the cutting edges causes reamers to cut slower than files. Reamers are also used to remove old, softened gutta percha fillings, or as a paste carrier to place cement near the apex.

As figure 1-39 shows, reamers are available in many sizes beginning with size 10 and continuing in intervals of 5 to size 60. Beginning with size 60, they are also available in intervals of 10 through size 140. The dentist may use several reamers in one operation, usually beginning with a relatively small size, then the next larger size each time, until the canal has been reamed to the desired diameter.



Figure 1-39. Various sizes of endodontic reamers.

## Files

Normally, root canal files are used after the broaches and reamers. The root canal files look much like those of the reamers; however, the file threads or cutting edges are much finer and closer together (refer again to figure 1-38). Files come in two different types: the K-type (Kerr) file with narrow spirals and the H-type (Hedstrom) file, which has blades cut similar in design to buttress-threaded screws (refer again to figure 1-38). The designation H-type or K-type is a generic classification based on the manufacturing process and does not apply to any single design or line of instruments. Numerical size designations and color coding are the same for both file types. Sizes begin with size 8, continuing through size 140. Files come in different lengths ranging from 19 to 31 mm.

There are major differences between the H-type and K-type files in terms of physical properties, such as flexibility, resistance to fracture in rotation, and method of manufacture.

### *K-type*

K-type files are tapered and pointed, with tight spiral cutting edges arranged so that cutting occurs on either a pushing or pulling stroke. They are used to enlarge the root canal by a rotary cutting or filing abrasive action. K-type root canal instruments are, size for size, stiffer and stronger than comparable types of instruments.

***H-type***

H-type files are tapered and pointed, with spiral cutting edges arranged so that cutting occurs principally on the pulling stroke. These files are used to enlarge the root canal by either a cutting or an abrasive action. The series of intersecting cones forming the file become successively larger from the tip toward the handle. The sharp blades of the H-type files cut more quickly than reamers or K-files. The H-type file is frequently used for flaring of the canal from the apical region to the occlusal or incisal opening.

**Endodontic condensers**

There are two types of endodontic condensers. The first type is referred to as a plugger or vertical condenser, while the second type is called a spreader.

***Plugger or vertical condenser***

The working end of the plugger or vertical condenser is contra-angled, and cylinder shaped with a flat tip designed to condense root canal filling materials vertically into prepared root canals. The double-ended instruments are numbered 5 through 7 and 9 through 11. The two single-ended pluggers (fig. 1-40), #10 and #11, have serrations at 5 mm intervals to evaluate penetration depth.

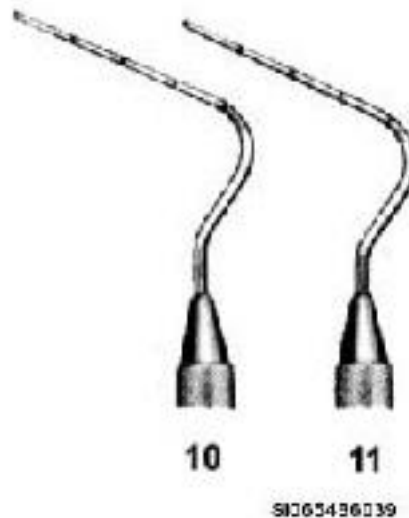


Figure 1-40. Root canal pluggers or vertical condensers.  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

***Spreader***

The endodontic spreader has a contra-angled working end that tapers to a point (compared to the flat tip of a plugger). This instrument is single-ended. The #D-11 and #3 (fig. 1-41) are two of the more commonly used spreaders. Spreaders are designed to condense root canal filling materials horizontally against the wall of the prepared root canal. This horizontal technique is called lateral condensation.

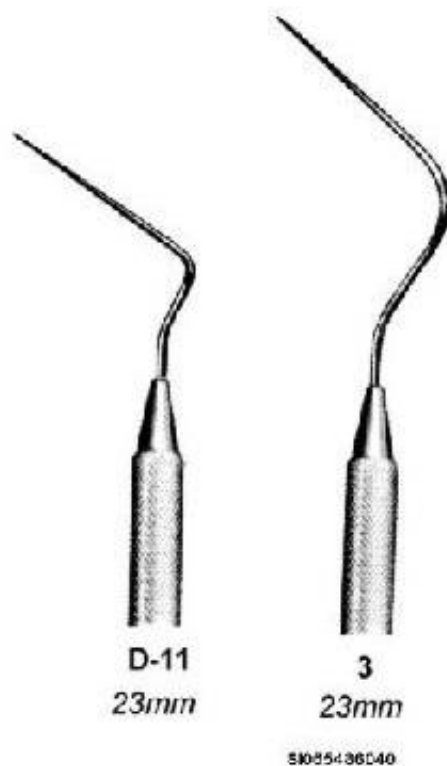


Figure 1-41. Root canal spreaders  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### Endodontic measuring gauges

Precise measurements of the length of a root canal are vital to the success of root canal therapy. The dentist uses a measuring gauge to measure the working length of the files, reamers, and broaches. An instrument stop of rubber is placed on the file to mark the canal length in millimeters. There are two styles of measuring gauges commonly used. The one shown in figure 1-42 is the finger or thumb ruler style. Another type, called a stop gauge, is shown in figure 1-43. With this style, a silicone-rubber stop is placed in the center slot of the gauge. The instrument is then inserted through the stop until the required length is reached on the ruler. Electronic measuring devices are becoming popular to aid in determining the working length.



Figure 1-42. Finger or thumb ruler.

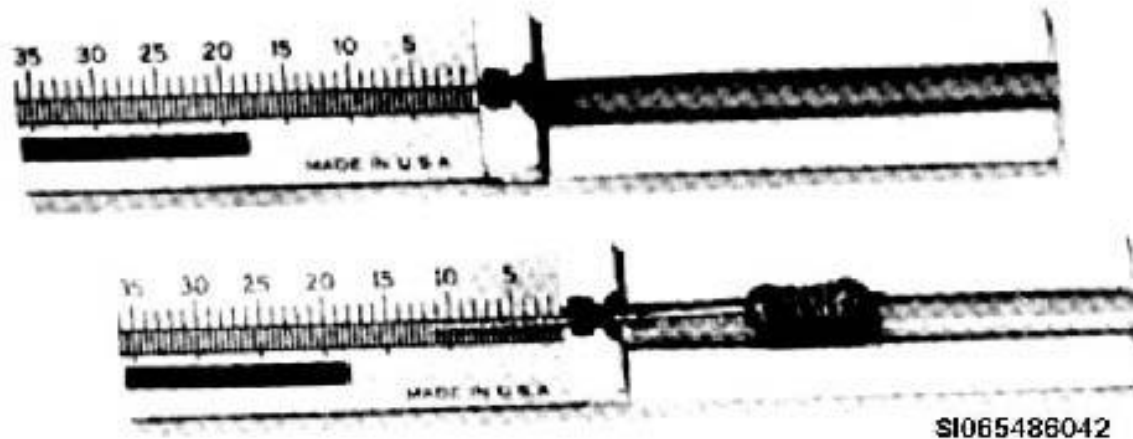


Figure 1-43. Stop gauge.  
(Reprinted with permission of Integra LifeSciences Corporation).

## 208. Assist with endodontic procedures

The cause of pulpal nerve damage occurs from either physical irritation or trauma. Clinical tests are performed by the dentist to diagnosis the patient's situation correctly. In this lesson, we will discuss the causes and diagnosis procedures in order to better prepare you to assist in endodontic procedures.

### Causes

The dental pulp can be injured in several ways. Some injured pulp can be treated and returned to normal. Other injured pulpal tissue may undergo necrosis (dies) after the slightest injury. Some of the most common causes of injury to the pulp include:

- Traumatic blows to the teeth.
- Pulp exposure.
- Chemical irritation.
- Thermal irritation.

### *Traumatic blow*

Traumatic blows to the teeth can result from situations such as common household accidents, auto collisions, or athletic injuries. A sharp blow to one or more teeth can result in fracture of the crown or root, or even the evulsion (forcefully knocked out of the socket) of the complete tooth, causing trauma to the pulp.

### *Pulp exposure*

Pulp exposures are caused by either extensive dental caries or mechanical exposure of the pulp. Carious exposure of the dental pulp occurs when the invasion of caries into the dentin progresses at a rapid rate and overcomes the defensive response of the pulp to produce secondary dentin as a defense barrier against the progressive decay. Mechanical pulp exposures usually are a result of dental procedures that inadvertently invade the pulp. Poor cavity preparation methods and improper pin placement procedures are two common causes of mechanical exposure.

### *Chemical irritation*

Chemical irritation can cause pulp injury or pulp death after placement of certain chemical substances commonly used in restorative procedures. Another cause of chemical irritation is a faulty restoration that allows oral fluids and beverages to leak between the restoration and dentin.

***Thermal irritation***

Thermal irritation can cause patients to experience discomfort and cause pulp injury. This happens when people inhale cold air through their mouths and when metallic restorative materials are placed too close to the pulp.

***Diagnosis***

The diagnosis of pulp and periapical conditions must precede the treatment. Endodontic diagnosis is a result of the skillful use and interpretation of several methods. Some of the more common methods are covered below.

***Dental history***

The patient's dental history is a valuable aid to the dentist. It provides communication between the dentist and patient, and allows the dentist to trace the history of the complaint through signs and symptoms described by the patient. Often, patients reveal valuable information regarding previous injuries to teeth, even though they may have occurred many years earlier.

***Clinical examination***

A clinical examination of the oral cavity provides clues to the nature of the patient's problem by what the dentist can see and feel in the patient's mouth. Clinical signs such as discoloration of teeth, crown fracture, gross caries, swelling, abnormal soft tissue, and draining abscess can be identified during a clinical examination.

***Radiographs***

Radiographs of the teeth and bone are one of the most valuable diagnostic tools the dentist has to evaluate structures that cannot be seen by clinical examination (e.g., the pulp and periapical tissues). The presence of bone loss in the periapical area in response to a necrotic pulp can be detected on a radiograph as a dark area surrounding the apex of the root. The presence of this dark area, or radiolucency, on a dental radiograph is an important feature used to diagnose pulp and periapical disease. Periapical cysts, granulomas, and abscesses appear as radiolucencies on a radiograph.

Radiographs can also reveal possible causes of pulpal injury before bone resorption occurs. Root fracture, deep caries, and previous pulp exposures are some examples of possible causes of pulpal injury detected on radiographs.

An accurate radiograph can reveal root length, abnormal root curvature, and abnormal calcification, which is helpful information in determining whether the tooth can be treated endodontically. A radiograph, properly exposed and processed, can last forever and provide a permanent record of the condition of the patient that can be used for future reference. Comparison of the initial radiographs with postoperative radiographs is a valuable index to determine the success or failure of treatment.

***Thermal sensitivity test***

Thermal sensitivity tests that expose a tooth to extremes in temperature provide an accurate method of identifying the problem tooth, as well as determining the status of its pulp. Cold tests can be done easily by placing a cylinder or stick of ice on the tooth. First, the suspected tooth is isolated and dried; then the ice stick, held in a gauze square, is applied to the cervical area of the tooth. If the tooth responds readily to the cold stimulus and discomfort persists when the cold is removed, hyperemia usually is present.

Heat tests consist of isolating the suspected tooth and applying a thin film of lubricant at the cervical area. A piece of gutta-percha or stick of impression compound is heated in a Bunsen burner while held by a hand instrument. The heated material is applied to the cervical area of the tooth where the lubricant was applied to keep it from sticking to the tooth. If the tooth reacts with a painful response that lingers a few moments after the heat is removed, pulpitis may be present. If the patient experiences no response to heat or cold, the pulp is possibly necrotic.

***Electric pulp test***

An electric pulp test is used primarily to determine whether the pulp is vital or necrotic (nonvital). Electric current is used to stimulate nerve fibers in the pulp through the dentin layer. General information about the status of the pulp is obtained by comparing the response of a suspected tooth with that of a normal tooth (control tooth) of the same type on the opposite side of the mouth. A numerical scale indicates the amount of current delivered to a tooth; higher numbers on the scale indicate that more current is delivered to the tooth. As the current is increased gradually, the patient is instructed to raise a hand whenever a sensation is first detected within the tooth. Generally, the sensation is described as a slight tingling or warm feeling. The number at which a response occurs is recorded and compared with the test results of the control tooth. A tooth with a necrotic pulp will not respond to even the most intense electrical stimulation. A vital pulp will respond to the electric pulp test.

***Percussion***

Percussion is the gentle tapping on the crown of the tooth with the end of a mirror handle to determine the presence of tenderness. If a patient has an acute inflammation at the apex of the root, percussion squeezes the already inflamed area and pain results. An abnormal, dull sound signifies destruction of the periodontal membrane, alveolar bone, or both. Several normal, opposing, and adjacent teeth should be checked for comparison.

***Palpation***

Palpation is the application of the fingers with light pressure to areas of the mouth in order to detect normal or abnormal tissue. Swelling, pain, and degree of rigidity of tissue are determined by palpation. When using palpation in the diagnosis of periapical disease, the fingers are pressed gently against the soft tissue overlying the bone and apices of the teeth to compare the abnormal and normal tissue.

***Mobility test***

The mobility test is used by movement of the tooth or teeth between two fingers or between a finger and handle of an instrument. Abnormal mobility of a tooth signifies temporary or permanent loss of supporting alveolar bone, or trauma. Mobility of the tooth tends to increase if an infection or injury is long-standing and has affected the supporting periodontium tissues.

***Selective anesthesia***

Selective anesthesia can be of assistance if the patient cannot accurately determine which teeth are the source of discomfort. If other diagnostic tests have narrowed the choice down to two teeth, one tooth can be anesthetized to determine if the pain disappears. If the pain does not disappear until the second tooth is anesthetized, the second tooth is the probable source. Selective anesthesia is most effective when the choice is between a maxillary and mandibular tooth.

***Transillumination***

Transillumination uses fiber optic lighting to allow an intense, concentrated light to pass through the tooth from the lingual to the facial aspect. This is done most effectively on anterior teeth due to their structure and location in the arch. The light reflects through the enamel and dentin, permitting the detection of translucency that varies from that of other teeth in the arch, or a fracture of the tooth. Necrotic pulps cause the outline of the pulp chamber to appear darker than the surrounding tooth structure. Normal teeth show no color difference between the tooth structure and pulp chamber.

***Types of procedures***

There are several types of endodontic procedures. The more common procedures include pulp capping, pulpotomy, pulpectomy, and root canal therapy. Occasionally, other procedures such as incise and drain, apicoectomy, periapical curettage, retrograde filling, root amputation, and bleaching the teeth are indicated.



### ***Pulp capping***

In an attempt to protect the pulp against additional injury and stimulate pulp regeneration, an application of a protective dressing, such as calcium hydroxide, is placed over an exposed or nearly exposed vital pulp. This treatment is referred to as pulp capping. When the pulp is exposed mechanically during tooth preparation, placing a pulp cap directly over the exposed pulp is referred to as a *direct pulp cap*. If deep caries are present and a danger of exposing the pulp exists if all caries are removed, placing a pulp cap over a thin layer of remaining dentin is termed an *indirect pulp cap*. If pulp capping is not effective, the tooth is treated with additional endodontic therapy or extracted.

### ***Pulpotomy and pulpectomy***

A *pulpotomy* is the surgical removal of the coronal part (pulp chamber) of an exposed vital pulp. The pulp is retained in the root canals, and the exposed ends are covered with applications of materials such as calcium hydroxide or zinc oxide and eugenol to preserve its vitality and function.

The most common endodontic procedure is the *pulpectomy*, which is the removal of the entire pulp (chamber and canal). After removal of the pulp, root canal therapy is performed.

### ***Root canal therapy***

This treatment consists of the internal debridement, cleaning, shaping, and permanent filling of the root canal system. During the therapy, medications and temporary filling material are placed. The therapy will vary slightly due to the type of tooth and number of canals in the tooth.

### ***Apicoectomy and periapical curettage***

An *apicoectomy* is the surgical removal of the apical portion of the tooth through a surgical opening made in the overlying bone and gingival tissues. An apicoectomy usually is performed in conjunction with periapical curettage after endodontics and other treatment failed to control the infection.

*Periapical curettage* is the surgical exposure of the apical portion of the tooth through an opening made in the overlying bone and gingival tissues. Treatment is limited to curettage of the area to remove all infected material. Conditions that indicate the need for an apicoectomy include:

- Persistent, local infection following endodontic treatment.
- Canal filling materials or medications extruded into the periapical tissue.
- A broken instrument lodged in the canal preventing complete filling.
- Obstruction caused by a hypercalcified root canal.
- Extreme curvatures of the canal preventing access to the apex of the root.
- Accessory root canals unfilled or debrided.

The apicoectomy procedure usually is limited to anterior teeth and some bicuspid teeth because of the anatomical limitations that prevent access to most posterior teeth.

### ***Retrograde filling***

This is a method of sealing the apical end of the root canal by placing a restoration in the root apex. This is done in conjunction with the apicoectomy. Zinc-free silver alloy or super ortho-ethoxy benzoic acid (EBA) cement is used as the filling material because they are not as adversely affected by moisture.

### ***Root amputations***

Occasionally, a multirrooted tooth requiring endodontic treatment will have a root that is impossible to obtain an adequate apical seal. When the other roots of the teeth are treatable, rather than extracting the entire tooth, the untreatable root is amputated and removed. The opening to which the amputated root was attached is sealed with amalgam similar to that of an apicoectomy procedure. The retained section of the tooth is treated endodontically prior to the amputation.

***Bleaching of discolored teeth***

Chemical agents are used to remove discolorations from the crowns of vital or nonvital teeth. Nonvital teeth may discolor because of pulpal hemorrhage into the dentinal tubules after traumatic injury of the teeth, or from the use of medications that cause staining when used in endodontic therapy. In such cases, the appearance of the discolored teeth can be improved dramatically by bleaching the teeth.

***Incise and drain***

An acute periapical abscess indicates a need for incision and drainage to eliminate the infection prior to endodontic treatment. Incision and drainage can be effective when the swelling and infection are localized in the alveolus and a fistula has formed a clearly defined point on the surface of the mucosa. Although the periapical abscess usually is accompanied by severe pain, it's not advisable to inject a local anesthetic solution into the infected area when draining the abscess because of the danger of spreading the infection. Even if local anesthesia is used, it may not be effective because of changes in the pH of the tissues in the presence of the infection. The patient must be informed to expect momentary discomfort when the area is lanced, but the pain is immediately and significantly reduced after the incision is made and the exudate is expressed. If indicated, a drain is placed to provide long-term drainage and prevent the opening from closing prematurely until the infected area drains. Antibiotics are prescribed. Once the infection is controlled and the swelling and tenderness subside, the tooth is treated endodontically.

***Steps in pulpectomy and root canal treatment***

As in all efficient assisting, you'll need to anticipate the dentist's needs. In endodontics, your duties will consist of such tasks as performing infection control procedures, preparing for the treatment, aiding in the placement of the rubber dam, irrigating and aspirating to flush the area, mixing materials, and passing instruments and materials. You'll need to have knowledge of the treatment procedure and sequence to effectively anticipate the dentist's needs and to schedule appointments.

***Appointment scheduling***

Root canal therapy can take one or more appointments based on the number of canals and severity of infection. Before the canal can be filled, the infection must be cleared completely. Filling the canal while infective organisms are still present will result in a recurrence of the abscess. If the patient is suffering from an acute periapical abscess, then he or she will experience severe pain. The pain is due to pressure created by the formation of pus and gases in the pulp canal. The pressure and, therefore, the pain are relieved during the first step of the endodontic therapy when the pulp canal is opened. Once the pulp canal is opened, broaches are used to remove intact pulp tissue from the canal. The canals are then irrigated and debrided with files and reamers. The canals are dried—small cotton pellets are placed in the pulp chamber, and a temporary restoration placed.

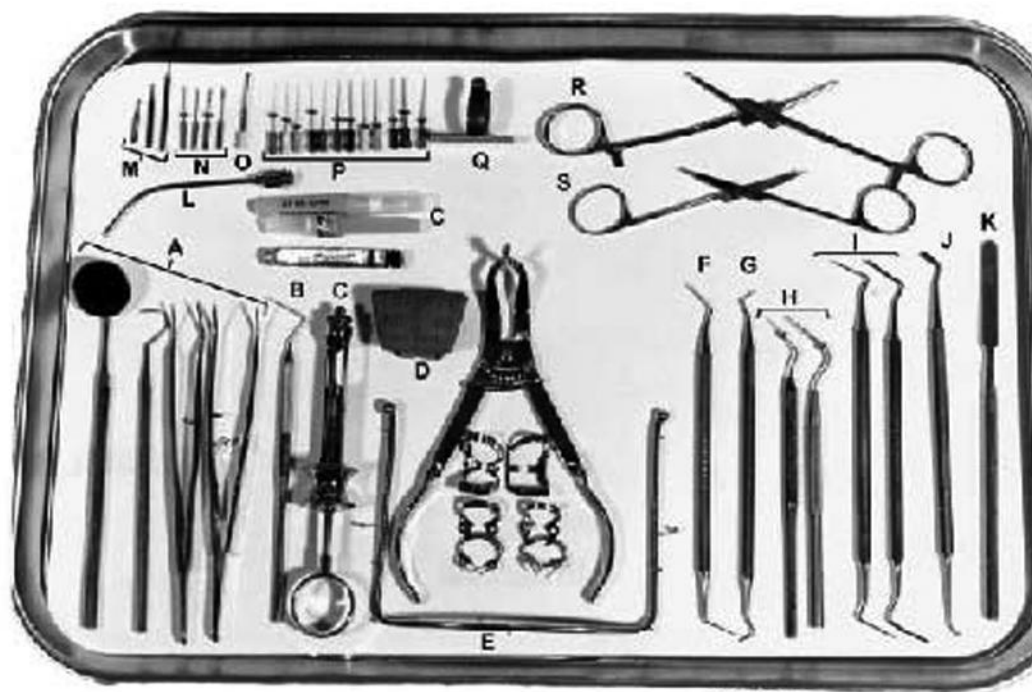
During subsequent appointments, if necessary, the temporary restoration is removed, the canals irrigated, and root canal reamers and files are used to enlarge, shape, and smooth the pulp canal. When all instrumentation is complete and the infection controlled, gutta-percha is cemented into the canals and a temporary restoration placed.

At the final appointment, the temporary restoration is removed and a permanent restoration of amalgam or composite is placed to restore the crown of the tooth. At this time, the tooth is evaluated for possible prosthodontic treatment to replace the restoration with an artificial crown.

During all appointments, a rubber dam is used to isolate the tooth and prevent contamination of the root canal. Radiographs are taken during the appointments to ensure the proper reaming and filing of the canal. The following text details each of the steps in endodontic treatment.

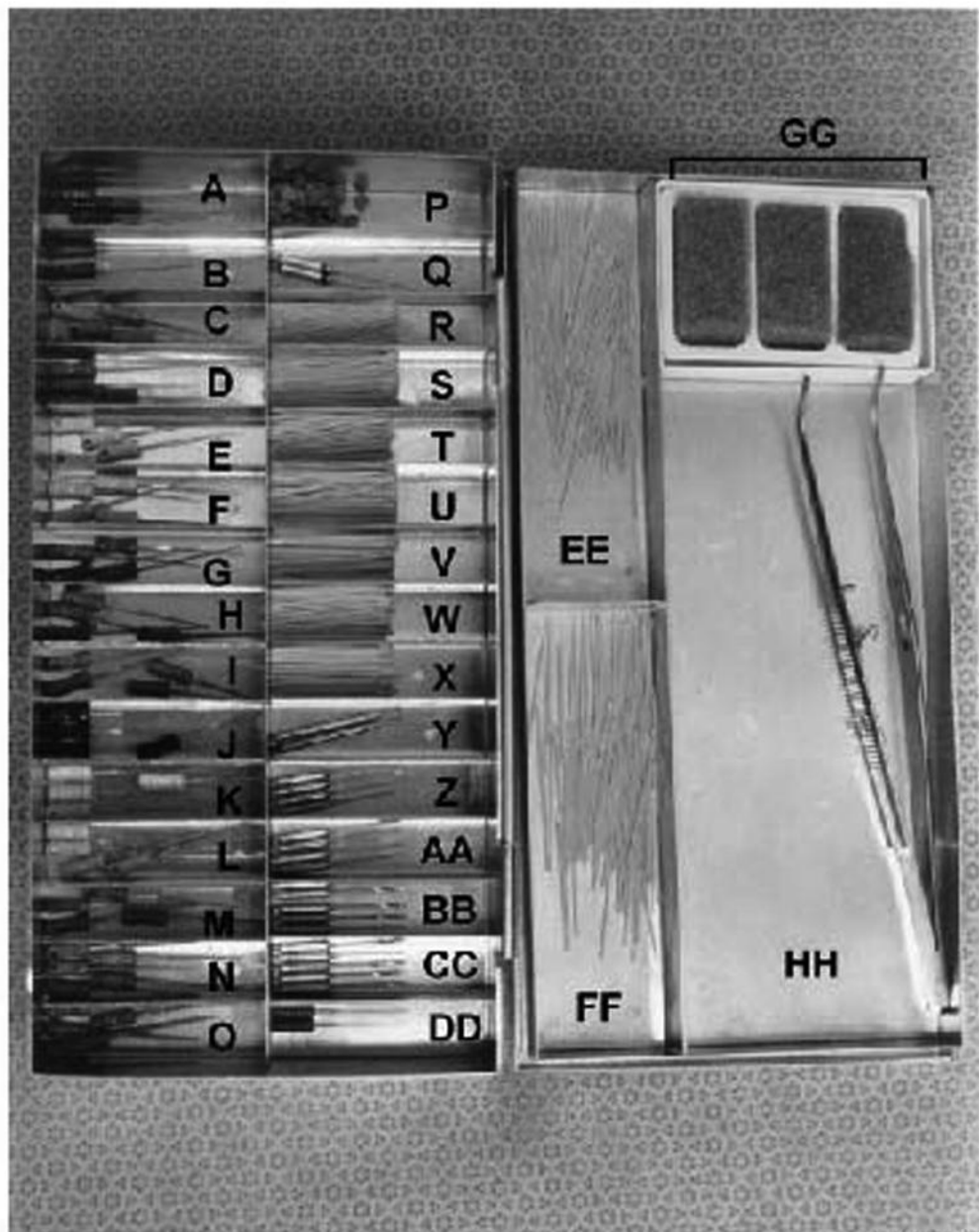
### *Instruments and accessories*

Endodontic instruments and accessories are prepared in sterile packs or kits. A basic instrument setup can be established for endodontic procedures. The standardized setup can be used during each phase of treatment and supplemented with items needed for a specific phase of treatment. Figure 1-44 shows a typical endodontic setup. Generally, small endodontic instruments are placed in a metal compartmentalized box that can be sterilized and maintained in an orderly fashion. Figure 1-45 identifies such an example and lists the contents. A variety of accessory items, such as filling materials, irrigation solutions, cements, and medications used in the endodontic treatment, must be readily available during the procedure.



- |  |                                |                  |
|--|--------------------------------|------------------|
| A. BDS with extra cotton forceps         | F. Endodontic explorer         | M. Burs          |
| B. Periodontal probe                     | G. Spoon excavator             | N. Peeso reamers |
| C. Anesthetic syringe, carpule and needs | H. Canal spreaders             | O. Broach        |
| D. Mouth prop                            | I. Canal condensers (Pluggers) | P. Files         |
| E. Rubber dam frame, forceps and clamps  | J. Woodson #2                  | Q. Endo ruler    |
|  | K. Spatula                     | R. Hemostat      |
|  | L. Suction tip                 | S. Iris scissors |

Figure 1-44. Typical endodontic instrument tray setup.



- |                    |                     |                                 |
|--------------------|---------------------|---------------------------------|
| A. Medium broaches | M. #55 Files        | Y. #2 Round burs                |
| B. Coarse broaches | N. #66 Files        | Z. #2 Gates drills              |
| C. #8 Files        | O. #70 Files        | AA. #1 Pessio reamers           |
| D. #10 Files       | P. Silicone stops   | BB. #2 Pessio reamers           |
| E. #15 Files       | Q. Lentulo spirals  | CC. #3 Pessio reamers           |
| F. #20 Files       | R. #35 Gutta percha | DD. X-Fine broach               |
| G. #25 Files       | S. #40 Gutta percha | EE. #25 Gutta percha            |
| H. #30 Files       | T. #45 Gutta percha | FF. #30 Gutta percha            |
| I. #35 Files       | U. #50 Gutta percha | GG. #30 Gutta percha            |
| J. #40 Files       | V. #55 Gutta percha | HH. Endodontic dressing forceps |
| K. #45 Files       | W. #60 Gutta percha |                                 |
| L. #50 Files       | X. #70 Gutta percha |                                 |

Figure 1-45. Typical endodontic box kit with supplies.

***Anesthesia and pain control***

A local anesthetic is administered by the dentist prior to endodontic therapy if the tooth possesses a vital pulp. If the tooth is hypersensitive, it could require injection of additional anesthetic solution directly into the pulp. When a tooth is nonvital, the use of local anesthetic solution may not be indicated. At subsequent visits, after the pulp has been removed, local anesthesia may not be necessary. The patient is given a prescription for medication to control any anticipated postoperative discomfort or infection.

***Isolation***

Endodontic therapy involving the removal of the pulp and sealing the empty canal requires debridement and irrigation of the pulp chamber and canals as part of the procedure. These steps of the procedure are necessary to ensure against future infection by eliminating bacteria before the canal is sealed. An absolutely dry field, free from bacteria-laden saliva, is required to achieve such sanitation of a root canal. This dry field is maintained best with rubber dam isolation. The rubber dam is usually prepared to expose only the tooth to be treated endodontically, thereby providing isolation of the tooth with the rubber dam.

***Opening the pulp chamber and canals***

After the tooth is isolated, the dentist makes an opening through the crown of the tooth to gain access to the pulp chamber and canal. The opening is made through the lingual surface on anterior teeth and through the occlusal surface on posterior teeth. Friction-grip and latch-type burs or diamond stones are used to create the endodontic opening. Sizes vary according to the preference of the dentist and the size of the chamber and canals of the tooth.

***Removing the pulp***

After the endodontic opening is made, the root canals are located and the pulp removed. Anterior teeth usually have one root canal, whereas posterior teeth could have up to three or more canals of different sizes. Anatomical variations exist among patients; therefore, additional canals or a tooth with no canals could be found. A thin, straight explorer can be used as a probe to locate canal openings within the pulp chamber. The larger pulp canals are easy to locate, whereas smaller canals are sometimes difficult to locate.

Once the canals are located, the pulp tissue is removed. If the pulp tissue is still intact, the thin, flexible, barbed broach is used to remove it. Broaches are considered disposable and should be discarded after one use because they are subject to fracture after repeated sterilization. If the pulp tissue has disintegrated, it's simply removed when the canal is cleaned and filed.

***Irrigation***

After the root canals are accessed and the pulp tissue removed, the root canals are cleaned with an irrigating solution. Irrigation and evacuation are essential parts of endodontic treatment because they assist in the removal of pulpal remnants and tissue fluid. The irrigation solution also serves as a lubricant in the instrumentation and enlargement of the canal walls.

The most frequently used solution for irrigation of the root canal is sodium hypochlorite or common household bleach. This solution is a solvent for necrotic tissue and an effective disinfectant to destroy bacteria in the canal, and acts as a bleaching agent. Sodium hypochlorite is used full strength or diluted with one to two parts of water.

Another irrigation solution, sometimes used alternately with sodium hypochlorite, is three percent hydrogen peroxide. The peroxide bubbles out debris and partially disinfects the canal. Because of its tendency to cause irritation by bubbling out of the apex into the surrounding tissues, hydrogen peroxide should never be left in the canals. Hydrogen peroxide must be neutralized by irrigation with generous amounts of sodium hypochlorite, or inflammation of the periodontal ligaments and tissues

surrounding the apex of the root could result from the continued release of oxygen bubbles. For this reason, some dentists use only sodium hypochlorite for canal irrigation.

A sterile, disposable, plastic Luer lock-type syringe (5 to 10 cc sizes) with a disposable, blunt 20- to 23-gauge needle is the common instrument used to inject the irrigating solution into the canals. The needle is bent at an angle to provide access to the canal. If both sodium hypochlorite and hydrogen peroxide are used, they are applied alternately using a separate syringe for each. The sodium hypochlorite must always be the last solution used. The irrigating solution is injected slowly and gently into the canal to prevent the solution from being forced into the periapical tissue. A small root canal file, or reamer, can then be placed into the canal and rubbed against the pulp canal walls to produce a scrubbing effect to loosen debris and bacteria. The solution is removed with a suction tip on the oral evacuator. Any remaining solution is absorbed by placing sterile cotton pellets and paper points into the canal. There are numerous times during endodontic treatment in which you'll be required to provide thorough irrigation of the pulp chamber and canals. The following are the most common times:

- Prior to the use of intracanal instruments once the root canal is accessed and the pulp tissue removed.
- Prior to instrumentation of a previously opened pulp cavity to remove food particles and saliva.
- At intervals during instrumentation.
- At the completion of canal instrumentation, prior to placement of medication.

### ***Canal debridement and filing***

Canal debridement is the progressive elimination of organic and inorganic debris within the root canal by mechanical instrument. As part of the debridement process, the canals are enlarged and shaped with endodontic files and reamers. Filing shapes the walls of the root canal so they are smooth with specific size and shape.

The filing procedure begins by first establishing the approximate or estimated length of the root canal. Accurately determining the length of the tooth is vital to successful endodontic treatment. Failure to determine an accurate length could lead to apical perforation and overfilling, with increased postoperative pain or incomplete instrumentation and underfilling.

The estimated length is determined from an accurate, preoperative periapical radiograph of the tooth being treated. Multirrooted teeth can require radiographs from various horizontal angulations to determine the exact number and alignment of each root. The length of the tooth is measured using either a millimeter endodontic ruler or a file held near the radiograph from a reference point on the crown portion of the tooth to the apex. Good reference points are the incisal edges of anterior teeth and cusps on posterior teeth. Files are measured on a millimeter rule and marked accordingly with the placement of rubber stops. The estimated working length is recorded in the patient's record for future reference and modification. If necessary, a more accurate length is established as the filing process continues. The working length is verified by exposing and measuring a periapical radiograph with a reamer or file in the canal.

Once the tooth length is established, you'll use an endodontic gauge to adjust the position of the rubber stops on the appropriate sizes of reamers and files the dentist selects. It's important that the rubber stop be placed at a right angle to the long axis of the instrument and not an oblique angle. When the file is inserted into the root canal, the rubber stop touches the reference point on the crown when the tip of the file is at the apex of the root. With the stops in place, arrange the reamers and files in order of their use. As the filing progresses, the file sizes are increased to enlarge the size of the canal. When teeth with more than one canal are filed, it's essential that each canal be filed to a predetermined length. Each canal can be filed to different diameters as well as different lengths.

During the filing, the root canal is irrigated with solution to keep the dentin shavings from the canal walls from clogging the cutting edges of the file. After the filing is complete, the canal is thoroughly flushed simultaneously with irrigating solution and suction. The canal is dried with paper points held in locking forceps and inserted into the canal to absorb the solution. This is repeated with several paper points until the paper points are completely dry when withdrawn.

### **Medications**

After the root canal is dried with paper points, medications are occasionally placed in the canal between appointments to aid in the control of microbial activity within the tooth. A calcium hydroxide paste is placed in the canals or a small cotton pellet moistened with medication and blotted dry with a cotton roll or gauze is used over the canal opening. A larger, dry cotton pellet is then placed in the pulp chamber. A temporary filling is placed over the larger cotton pellet to prevent contaminating the root canal with saliva and food debris between appointments. Zinc oxide and eugenol, or Cavit (ready-made cement), are used for this purpose.

### ***Root canal filling***

If a medicated cotton pellet or temporary filling materials have been placed, these items must be removed and the canals irrigated and dried with paper points before proceeding to fill the root canal. Gutta-percha points or cones, available in various sizes, are the most common filling material for a prepared root canal.

An appropriate sized gutta-percha point is selected and placed into the canal to a depth where the point seems snug when gently tugged. This gutta-percha point is referred to as the trial point or master cone. A radiograph, with the trial point in place, is exposed to verify the proper length. Often, this radiograph is referred to as a trial point radiograph. If adjustments are needed to achieve the proper length of the trial point, additional trial point radiographs are exposed to verify the proper length. A properly fitted trial point also allows space between the point and the walls of the prepared canal. Before the trial point is removed, a slight mark is placed on the point at the line where it is even with the opening of the tooth by squeezing the cotton forceps on the gutta-percha. The trial point or master cone is now ready for cementing.

While the cement is prepared, the master cone is removed and a paper point placed in the canal to absorb any moisture that may have accumulated. The consistency of the cement should be creamy but quite heavy. The dentist may choose to dip a lentulo spiral or reamer into the cement mix, insert it approximately halfway into the canal, and rotate it to distribute the cement onto the dry walls of the canal. With the master cone placed into the cotton pliers at a right angle, the apical third of the cone is coated with cement, and the cone inserted into the canal and seated to the mark made on the cone.

For the space between the cemented master cone and the walls of either the root canal or the pulp chamber, additional gutta-percha points of smaller diameter are placed alongside the master cone. Filling the canal with additional gutta-percha points is done by inserting an endodontic spreader beside the master cone and applying lateral pressure to condense the cone against the walls of the canal. As the spreader is removed from the canal, a smaller, additional gutta-percha point is inserted in the space. The process of lateral condensation and addition of gutta-percha points continues until the canal is filled completely.

The excess length of gutta-percha points is removed with a heated instrument. An endodontic plugger, also known as a vertical condenser, is used to condense the still warm gutta-percha vertically toward the apex of the tooth. More gutta-percha can be added, if needed, and the process of vertical condensation continued until the canal is filled completely.

When a tooth has more than one root canal, each canal is filed individually and each requires a properly fitted gutta-percha point sealed in it. A perfect sealing of the apical foramen in the roots of teeth is essential to eliminate irritation of periapical tissue. Any excess gutta-percha and cement are removed from the pulp chamber, and the chamber is then sealed with a temporary restoration.

Amalgam or composite materials are placed to fill the canal opening and restore the tooth permanently. Teeth successfully treated endodontically are also restored permanently with prosthodontic treatment, such as onlays and artificial crowns. Usually, follow-up appointments are scheduled periodically for radiographs of the restored tooth. The dentist uses the posttreatment radiograph as an aid to determine the elimination of infection and progress of bone regeneration.

### Steps in apicoectomy and associated procedures

The apicoectomy requires teamwork between the dentist and assistant. Along with the apicoectomy, the dentist usually performs periapical curettage and may place a retrograde filling. After the patient has been draped and anesthetized, the dentist makes a surgical incision. You provide retraction of the mucoperiosteal flap with the periosteal elevator. This reveals the cortical bone of the alveolus covering the apex of the tooth. The dentist then uses a hand piece and surgical bur, or chisel, to remove the cortical plate covering the apex of the tooth. Once the root is exposed, the dentist uses the bur to remove the apex (fig. 1-46). You'll irrigate with saline solution and aspirate as needed. Then the dentist uses a curette to curettage the surrounding periapical tissue, thus removing infectious material from around the root tip. Figure 1-47 shows the curettage procedure. If access to the root canal is obstructed from the occlusal or lingual aspect, debridement and filling can be done from the apex.

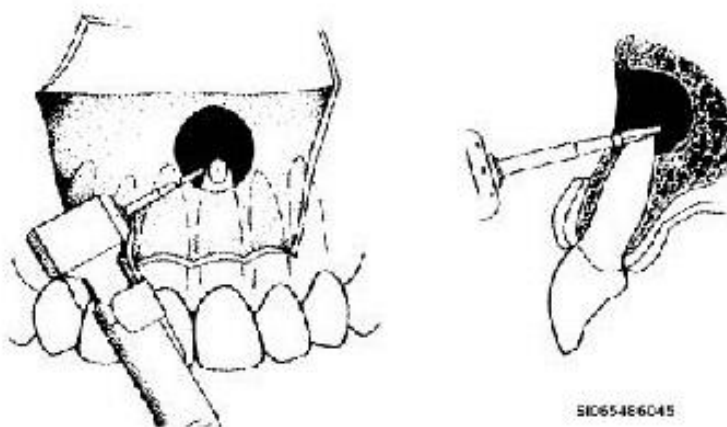


Figure 1-46. Initial preparation of the apex for an apicoectomy procedure.

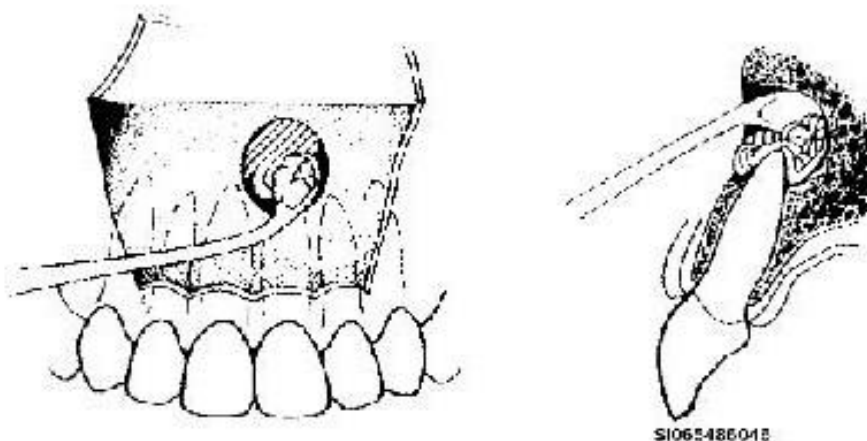


Figure 1-47. Apical curettage.



If indicated, a retrograde filling is accomplished to seal the apical end of the root canal by placing a restoration in the root apex. The dentist uses a high-speed hand piece and bur to prepare the apex for the filling. Figure 1-48 shows the retrograde preparation. When the preparation is complete, the surgical site is irrigated carefully with saline solution and aspirated until it is dried thoroughly. A gauze square (or other selected material) is placed to catch amalgam scraps during placement and condensation of the amalgam. Zinc-free amalgam alloy or super EBA cement is mixed and placed into the recessed preparation of the root apex (fig. 1-49). The amalgam is condensed and smoothed even with the tip of the amputated root surface. The gauze square is carefully removed to avoid dropping amalgam scraps or cement into the incision. The site may be irrigated and aspirated again.

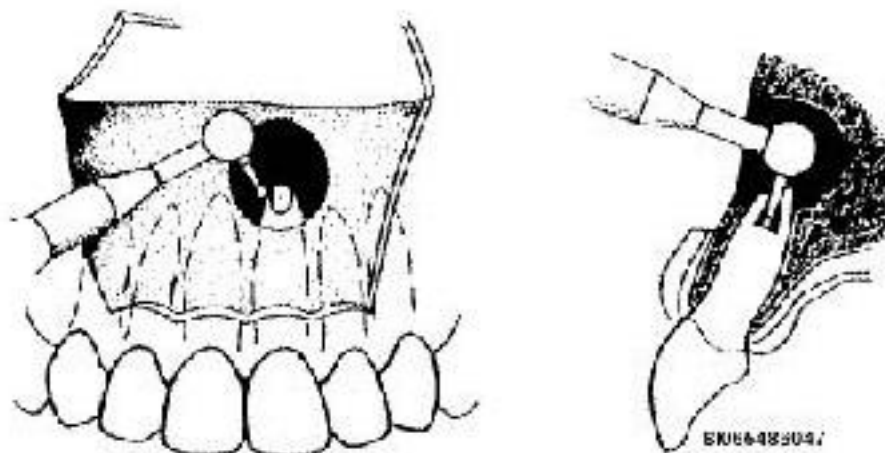


Figure 1-48. Retrograde filling preparation.

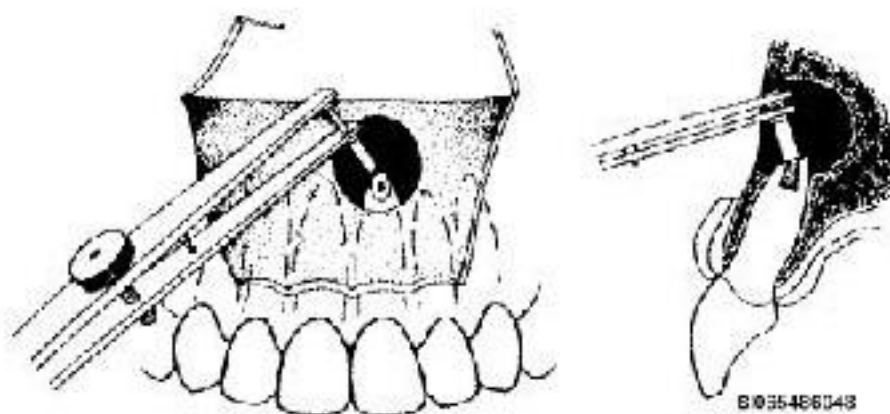


Figure 1-49. Placement of retrograde filling material.

A radiograph is exposed to determine the absence of any filling particles in the tissue at the surgical site. When it is determined that the filling is satisfactory and all particles of the filling material are removed, sutures are placed to close the incision. The surgical portion of the apicoectomy is done quickly. The longer the patient is subjected to a surgical procedure, the more likely it is that there will be swelling and discomfort. Follow-up appointments usually are scheduled periodically for radiographs of the restored tooth.

## Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

### 207. Function and basic endodontic instruments

1. What is the primary purpose of endodontics?
2. What is the primary use of latch-type endodontic rotary instruments?
3. Name the most common types of latch-type endodontic rotary instruments. What does the number of rings on the shank indicate?
4. How are endodontic explorers used?
5. What is the major difference between endodontic cotton forceps and those used in the basic diagnostic setup?
6. What are the uses of endodontic excavators?
7. Describe the design of endodontic broaches.
8. What is the identification symbol of barbed broaches?
9. How are smooth broaches used?
10. What is the primary use of the barbed broach?
11. What sizes of broaches are available?
12. How are root canal reamers used? What types of action are used with reamers?

13. How do reamers compare to root canal files?
14. Explain how reamers are sized.
15. What sizes and lengths of files are available?
16. List and explain the design and uses of each of the two types of files.
17. Explain the design and use of the two types of endodontic condensers.
18. What is used on the file to mark the canal length in millimeters?
19. What is used to determine the working length of files, reamers, and broaches? What are the two types of these instruments?

**208. Assist with endodontic procedures**

1. Match the description of the causes of pulp disease in column A with the term in column B. Column B items are used only once.

Column A

- \_\_\_(1) Common household accidents and athletic injuries.
- \_\_\_(2) Extensive dental caries.
- \_\_\_(3) Leakage of oral fluids and beverages between the restoration and dentin.
- \_\_\_(4) Metallic restorative materials placed too close to the pulp.

Column B

- a. Thermal irritation.
- b. Pulp exposures.
- c. Traumatic blows.
- d. Chemical irritation.

2. How can a patient's dental history be a valuable aid to the dentist when diagnosing pulp disease?
3. What important feature is used to diagnose pulp and periapical disease on a dental radiograph?
4. What type of pulp diseases appear on a dental radiograph?

5. What helpful information can an accurate radiograph reveal in determining whether a tooth can be treated endodontically?
6. What information can thermal sensitivity tests provide?
7. What is indicated if a tooth responds readily to the cold stimulus and discomfort persists when the cold is removed?
8. What conditions are indicated by the varying results of the heat test?
9. Briefly explain the various results of the electric pulp test.
10. What is the response to percussion if a patient has an acute inflammation at the apex of the root?
11. What can be determined by palpation?
12. What can increased mobility indicate?
13. What test can be used when other diagnostic tests have narrowed the choice down to two teeth?
14. Why is a protective dressing, such as calcium hydroxide, placed over an exposed or nearly exposed vital pulp?
15. What procedure describes the surgical removal of the coronal part of an exposed vital pulp?
16. What endodontic procedure is the most common and consists of the removal of the entire pulp?
17. What does root canal therapy treatment consist of?

18. What procedure is usually performed in conjunction with periapical curettage?
19. What conditions could indicate the need for an apicoectomy?
20. What procedure is performed to seal the apical end of the root canal by placing a restoration in the root apex?
21. Why is a local anesthetic not advised when performing an incise and drain procedure?
22. Briefly describe what takes place during the first appointment for root canal therapy.
23. What takes place during subsequent appointments?
24. How are endodontic instruments and accessories prepared?
25. When is a local anesthetic administered in root canal therapy?
26. What is used to maintain an absolutely dry field, free from bacteria-laden saliva, thereby isolating the tooth during a root canal?
27. What instrument can be used as a probe to locate canal openings?
28. What is used to remove the pulp tissue if it is still intact?
29. Why are irrigation and evacuation essential parts of endodontic treatment?
30. What solution is used most often to irrigate the root canal?

31. What is the common method used to inject irrigating solution into canals?
32. How is irrigating solution removed from the canals?
33. List the most common times during endodontic treatment in which you'll be required to irrigate the pulp chamber and canals.
34. How are files prepared with the estimated working length?
35. At what angle is the rubber stop placed on the instrument?
36. What should you be prepared with after the filing is complete?
37. Briefly explain how medications are prepared and placed into the canal.
38. How is the master cone cemented into the canal?
39. Explain how the space between the cemented master cone and the walls of the root canal or pulp chamber is filled.
40. What is used to condense warm gutta-percha vertically toward the apex of the tooth?
41. What procedures can be done in conjunction with an apicoectomy?
42. What does the dentist use to remove the cortical plate covering the apex of the tooth?
43. What is used to remove infectious material from around the root tip?

44. What is used to catch amalgam scraps during placement and condensation of amalgam?

45. Why is it important to complete the surgical portion of an apicoectomy quickly?

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## Answers to Self-Test Questions

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### 201

1. Evaluating the oral health status of patients and providing for the initiation of treatment.
2. To determine variations from normal soft and hard tissues within the oral cavity; describe and record variations from normal; identify and describe any type of tumorous growth (if present); evaluate the dental and general health needs of the patient; and determine a diagnosis.
3. After completing the clinical examination.
4. The dentist providing primary care for the patient.
5. The patient is referred to another treatment facility for treatment.
6. Periodic dental examination of military members; performance of the hypertension screening program; dental sick call; clinical examination of individuals eligible for care, other than active duty Air Force; and special examination in support of the medical mission.
7. To meet the AF Dental Readiness Assurance Program requirement. It pertains to active duty AF members only, and includes a type 2 dental examination, review of the dental health record, and hypertension screening.
8. Each unit coordinates the scheduling of the dental examinations with the dental service, and sends annotated notification to the individuals to advise them when to report for the examination.
9. To diagnose patients' urgent dental problems, provide emergency treatment for the relief of pain, and refer nonemergency treatment to the appropriate treatment section.
10. The examination section diagnoses the condition and schedules the patient for an appointment with the appropriate dental specialty.
11. Examinations required for enlistment, commissioning, remote or isolated duty, flying training, enrollment in the AF Academy, and assignment as a food handler.

### 202

1. This is where a patient is first exposed to the professional treatment area of the dental clinic.
2. Mouth mirror, explorer, cotton forceps, and periodontal probe.
3. Facial symmetry, lymph nodes of the neck, the temporomandibular joint, and shape of the jaws.
4. Items such as the labial mucosa, vestibule, buccal mucosa, gingiva, tongue, floor of the mouth, and soft palate.
5. Structural defects, minute breaks in the enamel, carious lesions or defective restorations, and stains.
6. Administrative tasks required to complete forms relating to direct patient care.
7. A written record of all examination findings and treatment provided to the patient.
8. Records the findings in the patient's record.
9. Missing teeth, existing restorations, and prosthetic appliances, as well as diseases and abnormalities.
10. Diagnostic nomenclature, charting symbols, authorized abbreviations, types of examinations, and dental classifications, as well as where (which numbered sections and items) to chart the findings on the SF 603/603A.

### 203

1. It provides treatment to restore a patient's dental condition to a healthy, functional, and esthetically (pleasing to the eye) acceptable level.

2. It maintains their oral health to ensure maximum wartime readiness and combat capability.
3. Determining the procedure to be done, administering anesthesia, placing a rubber dam, preparing the cavity or cavities to be filled, placing filling material into prepared cavities, carving and finishing restorations, and smoothing and polishing restorations
4. A treatment plan.

## 204

1. Double-ended instrument with spoon-, claw-, or disk-shaped blade, with tips and sides designed for cutting action. They are used to remove carious debris from tooth cavities.
2. Used to cleave (split) tooth enamel, smooth cavity walls, and sharpen line and point angles. Designed to be used in a push motion to place pressure on undermined enamel or dentin, and to fracture the carious material.
3. Wedelstaedt and biangle. Wedelstaedt chisels are a double-ended, paired set of chisels with two cutting edges beveled in opposite directions and slightly curved shanks designed for use on anterior teeth. Biangle chisels have two distinct angles: one at the shank, and one at the working end which allows access to tooth structures that would not be possible with straight chisels.
4. They are used on the walls of the cavity preparation to cleave enamel and cut dentin so that there will be a sharp cavity outline.
5. To trim, smooth, and shape the gingival margin floor of a cavity preparation, bevel sharp line angles of inlay and amalgam preparation. Because the working ends of the even numbered instruments, 26 and 28, are designed for use on the distal surfaces; and the odd numbered, 27 and 29, are used on mesial surfaces.
6. To hold the matrices (metal bands or strips) firmly in place around a tooth to form a temporary mold while filling material is being packed into place.
7. The retaining screw holds the matrix band; the adjusting screw, when turned clockwise, constricts the band loop, and when turned counterclockwise, loosens the loop.
8. Universal straight, contra-angle, and contra-angle junior (pedodontic).
9. Very thin, flexible stainless steel available in either roll form or bands.
10. #1, universal or straight; #13, junior smaller pedodontic version of the #1; #2, Wide and #15, junior (pedodontic), which both have extensions known as aprons, are used when additional length is needed for a preparation extending below the gingiva.
11. Clear polyethylene plastic roll form referred to as celluloid strips; clear plastic anatomical matrix band; celluloid strip or roll. The clear preformed cervical matrix forms are used for composite restorations in cervical areas; all clear plastic matrices can be used with light cured resin filling materials.
12. Either acrylic or corrosion-resistant metal. They are used to hold temporary or sedative filling materials in place, hold badly broken or fractured teeth in place, or serve as temporary crowns while the dental laboratory is preparing permanent crowns.
13. They are available in wood or clear plastic, in various sizes that may be color coded, and either plain (straight) or anatomically shaped.
14. They are used to force the matrix band or strip tightly against irregular tooth surfaces to prevent spaces that cause undesirable overhanging restorations.
15. Pin burs (drills), self-threading pins, and pin (hand) wrenches. They are designed as a thread mate system (TMS), which are precision matched and available in a large variety of types and sizes.
16. Used in the contra-angle (latch) hand piece to make holes in the dentin portion of the tooth to receive pins of appropriate size. Sizes vary from .021 to .027 inch in diameter in short and long shank lengths.
17. They are screwed into place with the use of a pin wrench and can be adjusted with a pin bender, or they can be shortened.
18. They are used to transport the freshly prepared amalgam restorative material to the cavity preparation. There's a variety of barrel sizes, including mini, regular, large, and jumbo.
19. Condense or pack the amalgam filling materials into the cavity preparation.
20. Markley.
21. The sharp cutting edges are used to shape, form, or cut tooth anatomy into amalgam restoration.
22. (1) c, f.



- (2) b, d.
- (3) a, e.
- 23. Burnish or polish hardened metallic surfaces and refine anatomy, and remove scratches left on the amalgam surface by the carving instruments.
- 24. It's a smaller version used for mixing small quantities of cement.
- 25. To transport and place dental cements, resins, temporaries, and insulating and pulp-capping materials. Common types: Woodson #3, #W3, and #11 (also known as Stellite).
- 26. Plastic won't discolor or contaminate the composite restoration, and the material won't cling to the instrument.
- 27. A disposable brush with a reusable handle.
- 28. Mix, carry, and place insulating bases.

## 205

- 1. (1) c.
- (2) a.
- (3) e.
- (4) b.
- (5) f.
- (6) d.
- 2. Lingual pits of maxillary incisors, lingual groove and pit of maxillary molars, occlusal surfaces of posterior teeth, facial groove and pit of mandibular molars, and pits occurring in areas due to irregularities in the formation of enamel.
- 3. The location of the caries, the amount and extent of the caries, the amount of lost tooth structure, and the restorative material to be used.
- 4. Retention pins.
- 5. Either round burs or spoon excavators.
- 6. Angling, beveling, and smoothing the walls of the cavity preparation to achieve the best marginal seal possible between the restorative material and tooth structure.
- 7. Cleansing the cavity; this consists of removing accumulated debris, drying the cavity, and a final inspection prior to placing restorative materials.
- 8. The deposits will dissolve, resulting in a leak that invites recurrent caries.
- 9. Because you must rapidly anticipate each step in the procedure in order to have the necessary materials ready at the appropriate time.
- 10. Protect and aid the pulp in recovering from irritation resulting from cavity preparation.
- 11. A base and pulp capping material.
- 12. The assistant holds a gauze sponge in the transfer zone and quickly wipes the end of the instrument as the dentist moves toward the base mix.
- 13. An instrument for removal of the material.
- 14. It is a liner used seal the dentinal tubules to help prevent microleakage.
- 15. Thin it slightly with solvent; discard it if it becomes very thick.
- 16. Dip a small cotton pellet held by cotton forceps into the varnish just enough to wet the pellet. Apply the cavity varnish to the pulpal area, walls of the cavity preparation, and onto the edge of the margins of the preparation. Remove any excess varnish from the enamel with a fresh cotton pellet. Place a second application of cavity varnish over the first to thoroughly coat the surfaces of the dentin and fill any voids from bubbles created when the first application dries.
- 17. Both permanent and primary posterior teeth; however, it is also esthetically acceptable for distal restorations of the cuspid when the restoration is not readily visible.
- 18. A matrix.
- 19. Before the amalgam is mixed.

20. Turn the large inner nut counterclockwise to position the locking vise close to the guide posts. Turn the small outer nut counterclockwise until the rod is not visible in the locking vise slot.
21. The inner nut.
22. A wedge. Select the wedge and place in the forcep so that the flat, wider side is towards the gingiva. Insert the wedge into the lingual embrasure next to the preparation and the band. This ensures the matrix band is tightly adapted to the tooth and prevents overhangs.
23. When the dentist signals.
24. An amalgam condenser.
25. Cotton forceps or a hemostat.
26. High-volume evacuator tip.
27. The rubber dam is removed, the patient's mouth is irrigated and aspirated, and the occlusion of the new restoration checked for any needed adjustment.
28. An amalgam carver.
29. A burnisher.
30. Irrigate and aspirate the oral cavity using the water syringe and high-volume evacuator to remove amalgam shavings resulting from the occlusal adjustment. Ensure the patient is given and understands the post-operative instructions.
31. A plastic strip or anatomical matrix band.
32. Clear or metal preformed cervical matrix forms.
33. Twenty seconds.
34. A bonding agent.
35. Near the restoration, according to the manufacturer's instructions.
36. The dentist, assistant, and patient.

**206**

1. Daily or weekly, depending upon local clinic guidelines.
2. Eye protection, mask, and gloves.
3. The amalgam that has been in contact with the oral cavity should be labeled CONTACT AMALGAM. The amalgam that has NOT been in contact with the oral cavity should be labeled NON-CONTACT AMALGAM.

**207**

1. Treatment of diseases of the pulp and periapical tissues.
2. Within the coronal third of the canal for enlarging the orifice, preparing post space, and flaring the canal.
3. Gates-Glidden drill and Peeso reamer. The number indicates the size of the instrument.
4. They provide easy access to the pulp canal in order to locate canal openings and explore the pulp chambers and canals.
5. Endodontic cotton forceps are grooved to allow easy grasping and manipulation of paper points and gutta percha, and are available in locking or nonlocking design.
6. They allow the removal of coronal pulp tissue, caries, or cotton pellets that are deep in the tooth's crown.
7. Thin, flexible, usually tapered and pointed, smooth or with a series of sharply pointed barbed projections curving backward and obliquely.
8. An eight-pointed star formed by the barbs.
9. As explorers to get the feel of the canal.
10. Removal of intact pulp tissue from large canals.
11. Coarse, medium, fine, and x-fine through xxxx-fine.
12. To enlarge the pulp canal after the use of broaches; remove old, softened gutta-percha fillings, or as a paste carrier to place cement near the apex. Used with a reaming action (rotary cutting).
13. Cutting edges of reamers are farther apart than those found on files so that reamers are more flexible than files; distance between the cutting edges causes reamers to cut slower than files.

14. Sizes begin with size 10 and continue in intervals of 5 to size 60. Beginning with size 60, they are available in intervals of 10 through size 140.
15. Sizes begin with size 8, continuing through size 140. Files come in different lengths ranging from 19 mm to 31 mm.
16. (1) K-type files are tapered and pointed, with tight spiral cutting edges arranged so that cutting occurs on either a pushing or pulling stroke. K-type files are used to enlarge the root canal by a rotary cutting or abrasive action.  
(2) H-type files are tapered and pointed, with spiral cutting edges arranged so that cutting occurs principally on the pulling stroke. A series of intersecting cones forming the file become successively larger from the tip toward the handle. Sharp blades of the H-type files cut more quickly than reamers or K-files. They are used to enlarge the root canal by either a cutting or an abrasive action; frequently used for flaring of the canal from the apical region to the occlusal or incisal opening.
17. (1) In pluggers or vertical condensers, the working end is contra-angled, and cylinder shaped with flat tips. Double-ended instruments are numbered #5-7 and #9-11; single-ended pluggers have serrations at 5 mm intervals to evaluate penetration depth. They are used to condense root canal filling materials vertically into prepared root canals.  
(2) Endodontic spreaders have contra-angled working ends that taper to a point (compared to the flat tip of a plugger). #D-11 and 3 are common single-ended spreaders. They are used to condense root canal filling materials horizontally against the wall of the prepared root canal (lateral condensation).
18. An instrument stop of rubber.
19. A measuring gauge; finger or thumb ruler style, and stop gauge.

## 208

1. (1) c.  
(2) b.  
(3) d.  
(4) a.
2. It provides communication between the dentist and patient, and allows the dentist to trace the history of the complaint through signs and symptoms described by the patient.
3. The presence of a dark area or radiolucency.
4. Periapical cysts, granulomas, and abscesses appear as radiolucencies.
5. Root length, abnormal root curvature, and abnormal calcification.
6. Accuracy in identifying the problem tooth, as well as determining the status of its pulp.
7. Hyperemia.
8. A painful response lingers a few moments after the heat is removed, pulpitis. No response to heat or cold indicates a necrotic pulp.
9. A tooth with a necrotic pulp will not respond to even the most intense electrical stimulation. A vital pulp will respond to the electric pulp test.
10. Pain.
11. Swelling, pain, and degree of rigidity of tissue.
12. Long-standing infection or injury affecting the supporting periodontium tissues.
13. Selective anesthesia.
14. In an attempt to protect the pulp against additional injury and stimulate pulp regeneration.
15. Pulpotomy.
16. Pulpectomy.
17. Internal debridement, cleaning, shaping, and permanent filling of a canal.
18. Apicoectomy.
19. Persistent, local infection following endodontic treatment; canal filling materials or medications extruded into the periapical tissue; a broken instrument lodged in the canal preventing complete filling; obstruction

caused by a hypercalcified root canal; extreme curvatures of the canal preventing access to the apex of the root; and accessory root canals unfilled or debrided.

20. Retrograde filling.
21. Because of the danger of spreading the infection; in addition, changes in the pH of the tissues in the presence of the infection may make the anesthetic ineffective.
22. The pulp canal is opened to relieve pressure and pain, intact pulp tissue is removed from the pulp with broaches, and canals are irrigated, debrided with files and reamers, and dried. Small cotton pellets may be placed into the pulp chamber and a temporary restoration placed.
23. The temporary restoration is removed, the canals irrigated, and root canal reamers and files are used to enlarge, shape, and smooth the pulp canal. Gutta-percha is cemented into the canals when all instrumentation is complete and infection controlled, and a temporary restoration is placed.
24. In sterile packs or kits.
25. When the tooth possesses a vital pulp.
26. A rubber dam prepared to expose only the tooth to be treated endodontically.
27. A thin, straight explorer.
28. Barbed broaches.
29. They assist in the removal of pulpal remnants and tissue fluid, and the irrigation solution also serves as a lubricant in the instrumentation and enlargement of the canal walls.
30. Sodium hypochlorite or common household bleach.
31. A sterile disposable, plastic Luer lock-type syringe (5 to 10 cc sizes) with a disposable, blunt 20- to 23 gauge needle. The needle may be bent at an angle to provide access to the canal.
32. By using a suction tip on the oral evacuator, and placing sterile cotton pellets and paper points into the canals.
33. Prior to the use of intracanal instruments once the root canal is accessed and the pulp tissue removed; prior to instrumentation of a previously opened pulp cavity to remove food particles and saliva; at intervals during instrumentation; at the completion of canal instrumentation, prior to placement of medication.
34. Measure files on a millimeter rule and mark with rubber stops.
35. At a right angle to the long axis of the instrument.
36. Irrigating solution and suction, followed with paper points held in locking forceps to dry the canal.
37. A calcium hydroxide paste is placed in the canals or a small cotton pellet moistened with medication and blotted dry with a cotton roll or gauze is used over the canal opening. A larger, dry cotton pellet is then placed in the pulp chamber. A temporary filling is placed over the larger cotton pellet to prevent contaminating the root canal with saliva and food debris between appointments.
38. The dentist may choose to dip a lentulo spiral or reamer into the cement mix, insert it approximately halfway into the canal, and rotate it to distribute the cement onto the dry walls of the canal. With the master cone placed into the cotton pliers at a right angle, the apical third of the cone is coated with cement, and the cone inserted into the canal and seated to the mark made on the cone.
39. Additional gutta-percha points of smaller diameter are placed alongside the master cone by inserting an endodontic spreader beside the master cone and applying lateral pressure to condense the cone against the walls of the canal. As the spreader is removed from the canal, a smaller, additional gutta-percha point is inserted in the space.
40. An endodontic plugger, also known as a vertical condenser.
41. Periapical curettage and a retrograde filling.

- 42. A handpiece and surgical bur, or chisel.
- 43. Curette.
- 44. A gauze square.
- 45. The longer the patient is subjected to a surgical procedure, the more likely it is that there will be swelling and discomfort.

**Complete the unit review exercises before going to the next unit.**

## Unit Review Exercises

**Note to Student:** Consider all choices carefully, select the *best* answer to each question, and *circle* the corresponding letter. When you have completed all unit review exercises, transfer your answers to the Field-Scoring Answer Sheet.

**Do not return your answer sheet to the Air Force Career Development Academy (AFCDA).**

1. (201) Which of the following is *not* a purpose of the clinical examination?
  - a. Describe and record variations from normal.
  - b. Evaluate the dental and general health needs of the patient.
  - c. Provide comprehensive dental care to meet the patient's needs.
  - d. Determine variations from normal on the soft and hard tissues within the oral cavity.
2. (201) What is the purpose of dental sick call?
  - a. Relieve overbooking of periodic dental examinations.
  - b. Resolve patients' urgent dental problems so that they can return to duty.
  - c. Provide a convenient time period for active duty members on swing shifts.
  - d. Diagnose patients' urgent dental problems and refer non-emergency treatment to the appropriate treatment section.
3. (202) What should be included in the clinical examination of the patient is *best* described by an examination of the
  - a. labial mucosa, vestibule, buccal mucosa, gingiva, tongue, floor of the mouth and soft palate.
  - b. extraoral structures of the face and neck, and intraoral soft and hard tissues.
  - c. facial symmetry, lymph nodes of the neck, and temporomandibular joint.
  - d. hard palate, and teeth.
4. (202) When you assist in the examination section, a large portion of your time consists of
  - a. screening records and assisting in emergency procedures.
  - b. exposing radiographs and maintaining a steady patient flow.
  - c. performing administrative tasks required to complete forms relating to direct patient care.
  - d. performing hypertension screening, exposing radiographs, and assisting in emergency procedures.
5. (203) What is the *first* step in developing a treatment plan?
  - a. Take an X-ray.
  - b. Clean the teeth.
  - c. Restore the teeth.
  - d. Record examination findings.
6. (204) Spoon excavators are used primarily to
  - a. carve wax inlay patterns.
  - b. carve amalgam restorations.
  - c. smooth the floor of a cavity preparation.
  - d. remove carious debris from tooth cavities.

7. (204) Devices used to hold metal bands firmly around a tooth, thereby forming a temporary mold for filling materials, are called
  - a. wedges.
  - b. templates.
  - c. band formers.
  - d. matrix retainers.
8. (204) Which amalgam matrix bands have aprons?
  - a. #1 and #13.
  - b. #2 and #13.
  - c. #2 and #15.
  - d. #13 and #15.
9. (204) What size is the Universal or straight amalgam matrix band?
  - a. #1.
  - b. #2.
  - c. #12.
  - d. #15.
10. (204) Which of the following is *not* a use of matrix crowns?
  - a. Hold temporary or sedative filling materials in place.
  - b. Hold badly broken or fractured teeth in place.
  - c. Used as a permanent restoration.
  - d. Serve as temporary crowns.
11. (204) What does the dentist use to force a matrix band or a strip tightly against irregular tooth surfaces to eliminate space that could result in an overhanging restoration?
  - a. Wedge.
  - b. Cotton roll.
  - c. Crown former.
  - d. Matrix retainer.
12. (204) What device is used to make a hole in the dentin portion of a tooth to receive pins of appropriate size?
  - a. Pin drill.
  - b. Taper fissure bur.
  - c. Gates Glidden drill.
  - d. Round excavating bur.
13. (204) The instruments used to pack amalgam into the cavity preparation are called
  - a. amalgam carriers.
  - b. condensers.
  - c. burnishers.
  - d. spatulas.
14. (204) Which instrument is used to shape, form, or cut tooth anatomy into amalgam restoration?
  - a. Condenser.
  - b. Burnisher.
  - c. Excavator.
  - d. Carver.

15. (204) Which instrument is designed for carving proximal surfaces?
- a. Tanner #5.
  - b. Frahm #2/3.
  - c. #1/2 Hollenback.
  - d. Cleoid-discoid #89/92.
16. (205) Which cavity involves two surfaces of the tooth?
- a. Simple.
  - b. Smooth.
  - c. Complex.
  - d. Compound.
17. (205) When tooth cusps or *most* of the tooth crown must be removed, how is retention obtained?
- a. Box shaped preparation.
  - b. Threaded pins.
  - c. Undercuts.
  - d. Grooves.
18. (205) What is the final step in cavity preparation?
- a. Removing remaining caries.
  - b. Finishing enamel walls.
  - c. Cleansing the cavity.
  - d. Taking an X-ray.
19. (205) Which dental procedure step requires the use of more instruments, causing instrument transfers to occur more rapidly?
- a. Cavity design.
  - b. Removal of remaining caries.
  - c. Placement of the restorative materials.
  - d. Finishing the enamel walls and margins.
20. (205) During the procedure, when are amalgam matrices assembled and placed?
- a. After the amalgam is mixed.
  - b. Before the amalgam is mixed.
  - c. Any time during the procedure.
  - d. Assembled before the amalgam is mixed and placed after the amalgam is mixed.
21. (205) The assembled Tofflemire and matrix band is positioned over the tooth with the
- a. small circumference of the band positioned toward the gingiva and the retainer parallel to the facial surface of the tooth.
  - b. large circumference of the band positioned toward the gingiva and the retainer parallel to the facial surface of the tooth.
  - c. small circumference of the band positioned away from the gingiva and the retainer parallel to the lingual surface of the tooth.
  - d. large circumference of the band positioned away from the gingiva and the retainer parallel to the lingual surface of the tooth.



22. (205) The dentist checks the occlusion of the new restoration using
- a. articulating paper placed on the teeth of the opposing quadrant, the patient is instructed to gently close the teeth together.
  - b. articulating paper placed on the teeth of the opposing quadrant, the patient is instructed to firmly close the teeth together.
  - c. disclosing wax placed on the teeth of the opposing quadrant, the patient is instructed to gently close the teeth together.
  - d. disclosing wax placed on the new restoration, the patient is instructed to firmly close the teeth together.
23. (205) Which matrices are placed, in cervical areas, after the restorative material is mixed and placed into the preparation?
- a. Tofflemire retainers and bands.
  - b. Anatomical matrix bands.
  - c. Cervical matrix forms.
  - d. Celluloid strips.
24. (206) The personal protective equipment (PPE) that should be worn when handling scrap amalgam include mask, gloves,
- a. scrubs, eye protection, and face shield.
  - b. eye protection and scrubs.
  - c. scrubs, and face shield.
  - d. and eye protection.
25. (206) How must extracted teeth containing amalgam restorations be disposed of?
- a. Throw in trash.
  - b. Disinfect and give to patient.
  - c. Disinfect using chlorine disinfectant, dry, and store in a sealed container for turn in.
  - d. Disinfect using non-chlorine disinfectant, dry, and store in a sealed container for turn in.
26. (207) What dental specialty is concerned with the treatment of diseases of the dental pulp and periapical tissue?
- a. Endodontics.
  - b. Periodontics.
  - c. Orthodontics.
  - d. Prosthodontics.
27. (207) Which rotary instruments are used primarily in the coronal third of the canal for enlarging the orifice, preparing post space, and flaring the canal?
- a. Gates-Glidden drill and Peeso reamer.
  - b. Straight fissure burs.
  - c. Inverted cone burs.
  - d. Diamond burs.
28. (207) The endodontic instrument used for the removal of intact pulp tissue from large canals is a root canal
- a. file.
  - b. reamer.
  - c. barbed broach.
  - d. smooth broach.

29. (207) Which one of the following does *not* describe a root canal reamer?
- a. Acts as a paste carrier to place cement near the apex.
  - b. Removes old, softened gutta percha fillings.
  - c. Identified by an eight-pointed star symbol.
  - d. Enlarges the pulp canal.
30. (207) Which of the following statements is *true* regarding K-type files?
- a. Have tight spiral cutting edges arranged for cutting on a pull stroke only.
  - b. Used to enlarge the root canal by rotary cutting or abrasive action.
  - c. Cut more quickly than reamers or H-type files.
  - d. Identification symbol is a circle.
31. (207) Which endodontic instrument is formed by a series of intersecting cones that become successively larger from the tip toward the handle?
- a. Broach.
  - b. Reamer.
  - c. K-type file.
  - d. H-type file.
32. (208) Which can cause trauma to the pulp as a result of common household accidents, auto collisions, or athletic injuries?
- a. Chemical irritation.
  - b. Thermal irritation.
  - c. Traumatic blows.
  - d. Pulp exposure.
33. (208) Which is caused by leakage of oral fluids and beverages between a faulty restoration and dentin?
- a. Chemical irritation.
  - b. Thermal irritation.
  - c. Traumatic blows.
  - d. Pulp exposure.
34. (208) Which procedure involves placing a protective dressing over an exposed pulp?
- a. Pulpotomy.
  - b. Pulpectomy.
  - c. Direct pulp cap.
  - d. Indirect pulp cap.
35. (208) Which procedure is the removal of the pulp chamber and canal?
- a. Pulpotomy.
  - b. Pulpectomy.
  - c. Pulp capping.
  - d. Apicoectomy.
36. (208) During endodontic therapy, what is used to isolate the tooth and maintain a dry field?
- a. Air and water syringe.
  - b. High volume suction.
  - c. Saliva ejector.
  - d. Rubber dam.

37. (208) What is the solution used *most often* to irrigate the root canal?
- a. Sterile saline.
  - b. Calcium hydroxide.
  - c. Hydrogen peroxide.
  - d. Sodium hypochlorite.
38. (208) How is the estimated working length of the root canal verified?
- a. Measuring from reference points on the incisal edges of anterior teeth and cusps on posterior teeth.
  - b. Exposing and measuring a periapical radiograph with a reamer or file in the canal.
  - c. Measuring an accurate, preoperative periapical radiograph.
  - d. Marking files with rubber stops.
39. (208) How is the space between the cemented master cone and root canal or pulp chamber filled?
- a. Additional gutta-percha points are placed and vertically condensed until the space is filled completely.
  - b. Additional gutta-percha points are placed and laterally condensed until the space is filled completely.
  - c. A second master cone is placed and vertically condensed until the space is filled completely.
  - d. Paper points are placed and laterally condensed until the space is filled completely.
40. (208) What material is placed in the recessed preparation of the root apex?
- a. Zinc free amalgam alloy or super ortho-ethoxy benzoic acid (EBA) cement.
  - b. Zinc free amalgam alloy or Zinc Phosphate cement.
  - c. Composite resins or super EBA cement.
  - d. Calcium Hydroxide or resin cement.

## Student Notes

## Unit 2. Oral Surgery and Periodontics

<b>2–1. Identifying Surgical and Periodontal Instruments.....</b>	<b>2–1</b>
209. Oral surgery instruments.....	2–1
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**M**ANY OF THE responsibilities you will be tasked with in oral surgery and periodontics are similar because surgery is performed in both of these specialties. For example, the instruments and your preoperative responsibilities and duties during surgery are the same in both specialties. The requirement for informed consent is similar to providing information regarding pain and anxiety control. Procedures such as suture placement and removal, and postsurgical instructions are also similar. Even some of the postsurgical complications, such as swelling and prolonged bleeding, are the same. Therefore, your knowledge of specific procedures performed in each of these specialties is essential. Both the dentist and patient will benefit from your understanding of the procedures, since it will enable you to assist efficiently and reduce the appointment time. In both of these specialties, management of the appointment book or schedule is often delegated to the assistant, also.

### 2–1. Identifying Surgical and Periodontal Instruments

Since many of the same surgical instruments are used in both oral surgery and periodontic procedures, this section will discuss both areas. While all surgical instruments are made of high-grade steel, either stainless or chrome-plated, each instrument also has a particular purpose, so handle them with extreme care. Keep the instruments with cutting edges sharp to prevent slippage. Lubricate hinged instruments with milk bath and sterilize them in the wide-open position to keep them in good operating condition and prevent rust. Most surgical procedures require several different instruments.

Periodontal instruments are used to treat the structures surrounding the teeth. It is not uncommon to perform periodontal surgery as part of the treatment plan for a periodontal patient. Therefore, as a periodontal assistant there are many surgical instruments you will use. The periodontal instrument group includes probes, scalers, curettes, files, hoes, and knives.

#### 209. Oral surgery instruments

No matter what kind of dental surgery is being performed, some instruments will certainly be required. The purpose of this lesson is to discuss the instruments used during oral surgery. Among these are the surgical rotary instruments, surgical suction, forceps, elevators, retractors, scalpels, suture needles and materials, and surgical scissors. A few other instruments, such as mouth props, mouth gags, and a surgical mallet, will also be included with the miscellaneous surgical instruments.

### Surgical rotary instruments

Surgical rotary instruments (burs) are similar in shape to other basic bur designs. They are larger in size and usually have longer shanks to provide accessibility in surgical procedures. Surgical burs are used to cut bone or section teeth. There are long, shank friction grip burs (fig. 2-1) and long, straight shanked burs, such as the round #4, #5, or #6, and the #701, #702, #703, for use in a low-speed, straight handpiece. Special J-notch burs that eliminate outward migration are used in the Stryker surgical handpiece (fig. 2-2).

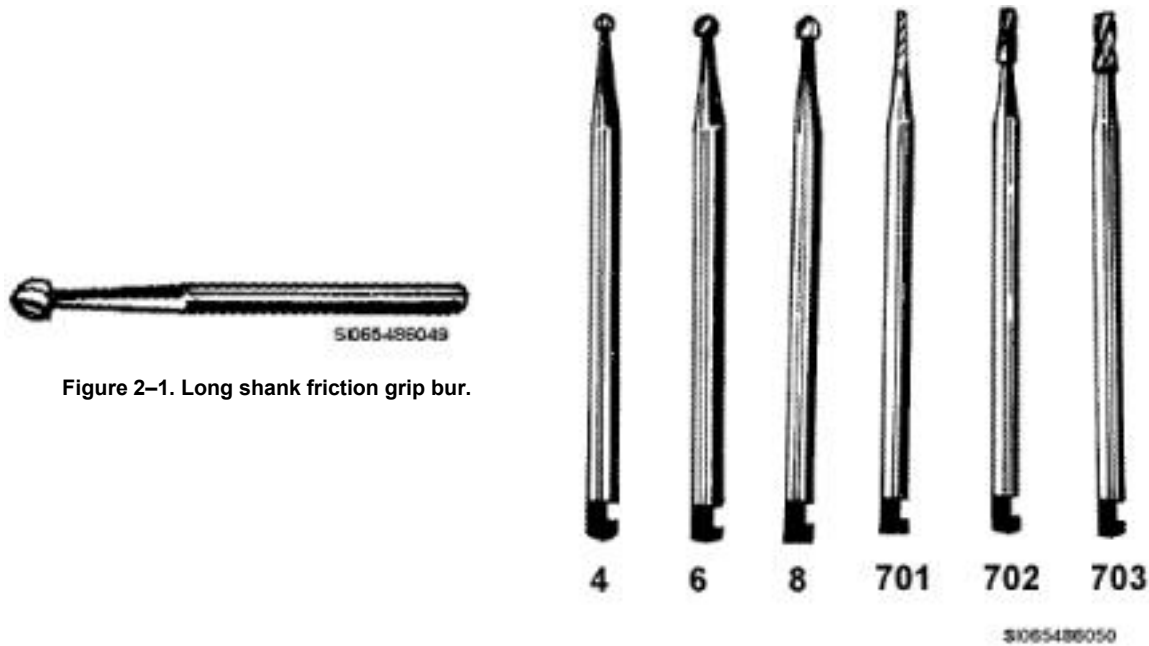


Figure 2-2. J-notched surgical burs.

### Surgical suction apparatus

The surgical suction apparatus is composed of the hose, handle, and tips. The hose used to connect the handle to suction is sterile tubing and available in various lengths. The handle has a bulbous portion on one end and a chuck on the other end. The bulbous portion is slipped into one end of the hose, and the chuck end holds the tips. There are several tips available, ranging from the #1 to #4. The smaller #2 tip is suitable for use in a tooth socket. When these parts are properly joined and the loose end of the tubing is connected to the suction, they function as a single suction unit (fig. 2-3).

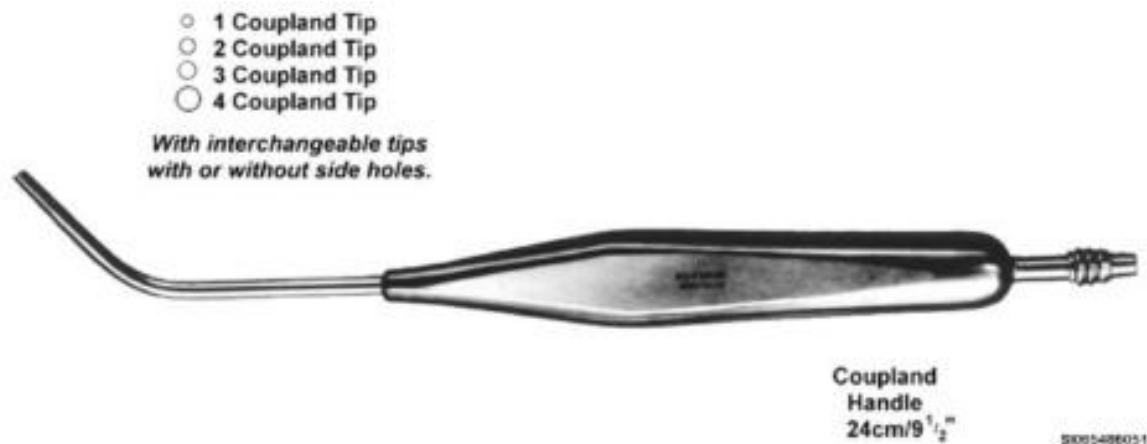


Figure 2-3. Surgical suction handle and tip  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

## Retractors

There are different kinds of retractors, but the purpose is the same for each—to hold back objects in the oral cavity.

### *Tissue retractors*

In dental surgery, tissue retractors hold tissue flaps away from the treatment site to provide better visibility. Some retractors have fork-like prongs (fig. 2-4) to permit handling the tissue without causing excessive damage.

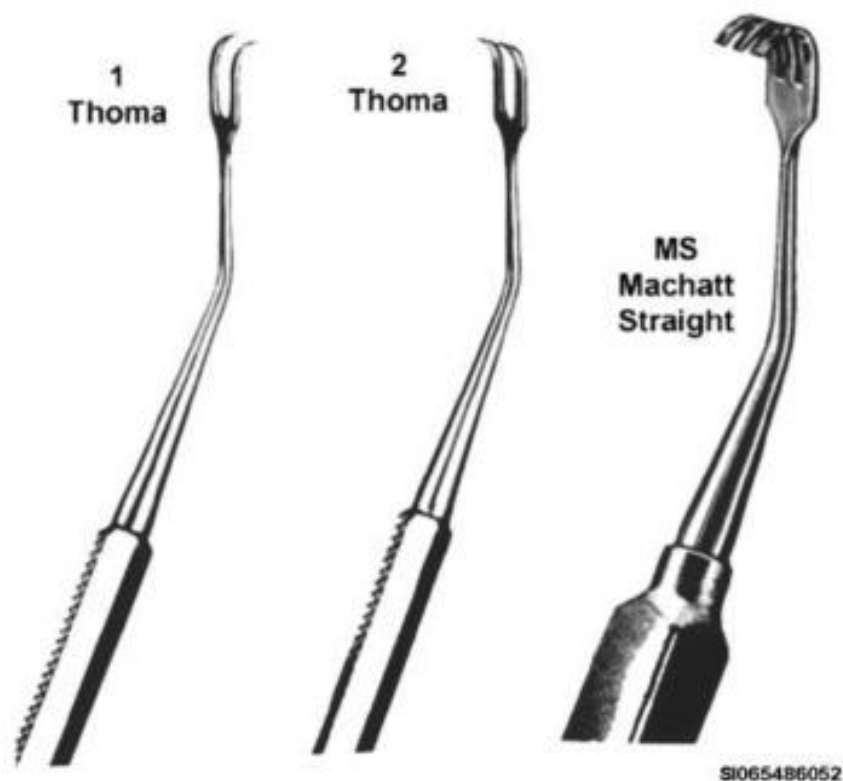


Figure 2-4. Tissue retractors  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### *Tongue and cheek retractors*

These retractors are designed to hold and retract the cheeks, tongue, or a portion of the mucosa during surgical procedures. The retractors are made of metal or plastic, and are large, curved, or angled. A commonly used retractor is the Minnesota retractor (fig. 2-5), which is a bent, angled piece of steel.

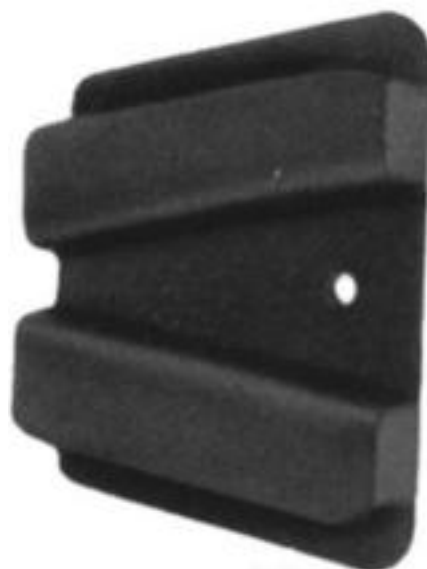


**Figure 2-5. Tongue and cheek retractor**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### ***Mouth props and gags***

Mouth props and gags hold the patient's mouth open mechanically. The mouth prop (fig. 2-6) is a solid piece of angled rubber, whereas the mouth gags (fig. 2-7) are lock-type forceps with rubber-covered extensions. The rubber provides protection against injury to the enamel of the teeth. The use of mouth props and gags is by no means limited to surgery; they are also commonly used in restorative and pediatric dentistry when patients have difficulty keeping their mouths open during the procedure.





SI065486054

Figure 2-6. Mouth prop  
(Courtesy of Hu-Friedy Mfg. Co. LLC).



SI065488055

Figure 2-7. Mouth gags  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

## Surgical scalpels

Surgical scalpels, composed of handles and blades, are used to incise or excise soft tissues, and come in various sizes and shapes. The use of each type depends on the type and accessibility of the tissue to be cut. The blades come in presterilized packages to be discarded after one use. Attach and remove the blades from the handles with hemostatic forceps in order to prevent accidental cuts and possible infection. There are two commonly used surgical scalpel handles—the #3 and Beaver-style, with each handle using a different kind of blade and attachment method.

The #3 handle is short and wide (fig. 2–8), using a slotted blade which slides onto the handle. The four blades used most often with this handle are the #10, #11, #12, and #15. Blades #10 and #15 have similar working ends. The greatest difference is that the #10 blade is larger. The cutting edge on both of the blades is on the curved part of the blade. Thus, they cut in either a straight or rocking fashion. Blade #11 has a straight cutting edge and is used for lancing. The #12 blade has a concave cutting edge, shaped like a hawkbill.



**Figure 2–8. Scalpel handle and blades**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

The Beaver-style scalpel (fig. 2–9) uses a much smaller blade designed for that handle only. The blade slides into a slot at the tip of the handle and is fastened in place by turning clockwise. The blades commonly used with this handle are referred to as the #62, #64 and #67 (fig. 2–10). The shape of the #62 blade differs significantly from the other two with its squared-end cutting style. The #64 blade has a rounded shape to the tip, whereas the #67 has a sharp pointed tip. The beaver scalpel is most commonly used in periodontal surgery.



**Figure 2–9. Beaver handle.**



Figure 2-10. Beaver style blades.

### Suture needles and materials

Suture needles and materials arrive in sterile packs with the needles already attached to the suture material. There is a wide variety of both needles and suture materials.

#### *Needles*

Most suture needles used in dentistry are semicircular. They have either smooth sides or cutting sides, and vary greatly as to the diameter of the semicircle, as shown in figure 2-11. The smaller sizes are used most often because of the limited space in the oral cavity.

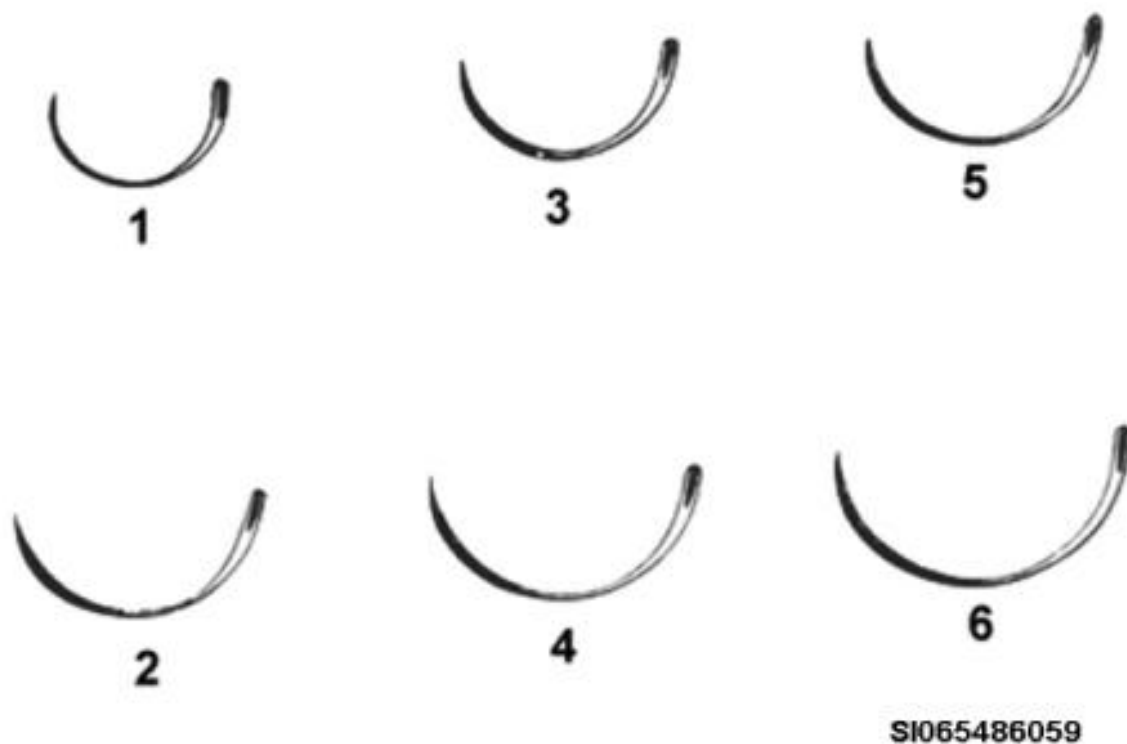


Figure 2-11. Suture needles  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

## Materials

Dentists use the suture material with a suture needle to close wounds in the oral cavity. Suture materials are usually classed as either absorbable or nonabsorbable. Nonabsorbable sutures must be removed after the wound heals enough to hold together. Absorbable sutures are dissolved and absorbed in the body. Examples of absorbable sutures are the natural (plain and chromic) gut and synthetic Vicryl types (fig. 2-12). Also, notice the different needle sizes shown on the packages.



Figure 2-12. Absorbable suture materials.

A variety of materials are used to make nonabsorbable sutures, including silk (fig. 2-13), cotton, nylon (fig. 2-14), polyester (fig. 2-15), and even corrosion-resistant steel wire. The most common suture material used in oral surgery is made of silk. The polyester material is comparable to the nylon, and the 5 to 0 size is stronger than silk.



Figure 2-13. Nonabsorbable silk suture materials.



Figure 2-14. Nonabsorbable nylon suture materials.

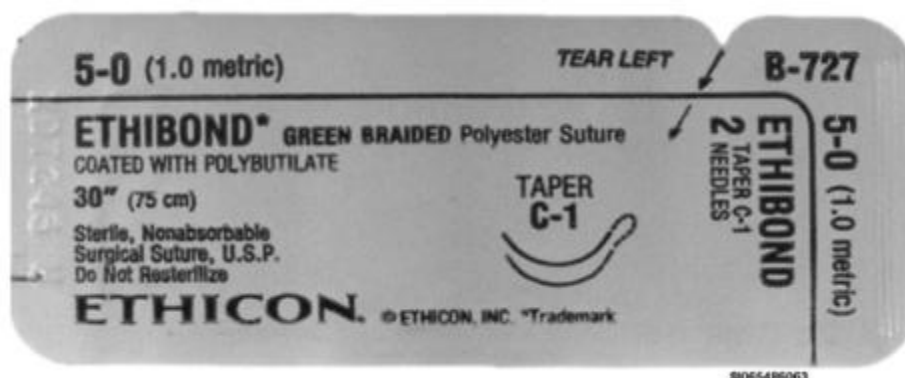


Figure 2-15. Nonabsorbable polyester suture material.

All of these suture materials are available in different diameters, as you can see in the figures. Always remember, the smaller the number the larger the diameter of the suture material. The 3 to 0 size is commonly used in periodontal surgery. The most commonly used size/material in the oral mucosa is the 4 to 0 silk. To suture facial lacerations, the 5 to 0 suture is most commonly used.

### Surgical scissors

Scissors are used in dental surgery to cut tissue and sutures. The scissors used to trim excess or irregular soft tissue have one serrated blade to eliminate slippage. Those with smooth blades are normally used for cutting sutures or other fabric material. Figure 2-16 shows only a few of the more commonly used scissors. As you can see, the tips are curved or straight, and blunt, sharp, or delicate. Often, the dentist will refer to the scissors as Kelly's, Mayo's, Dean's, or Iris'. It is important that you are able to recognize them in this manner.

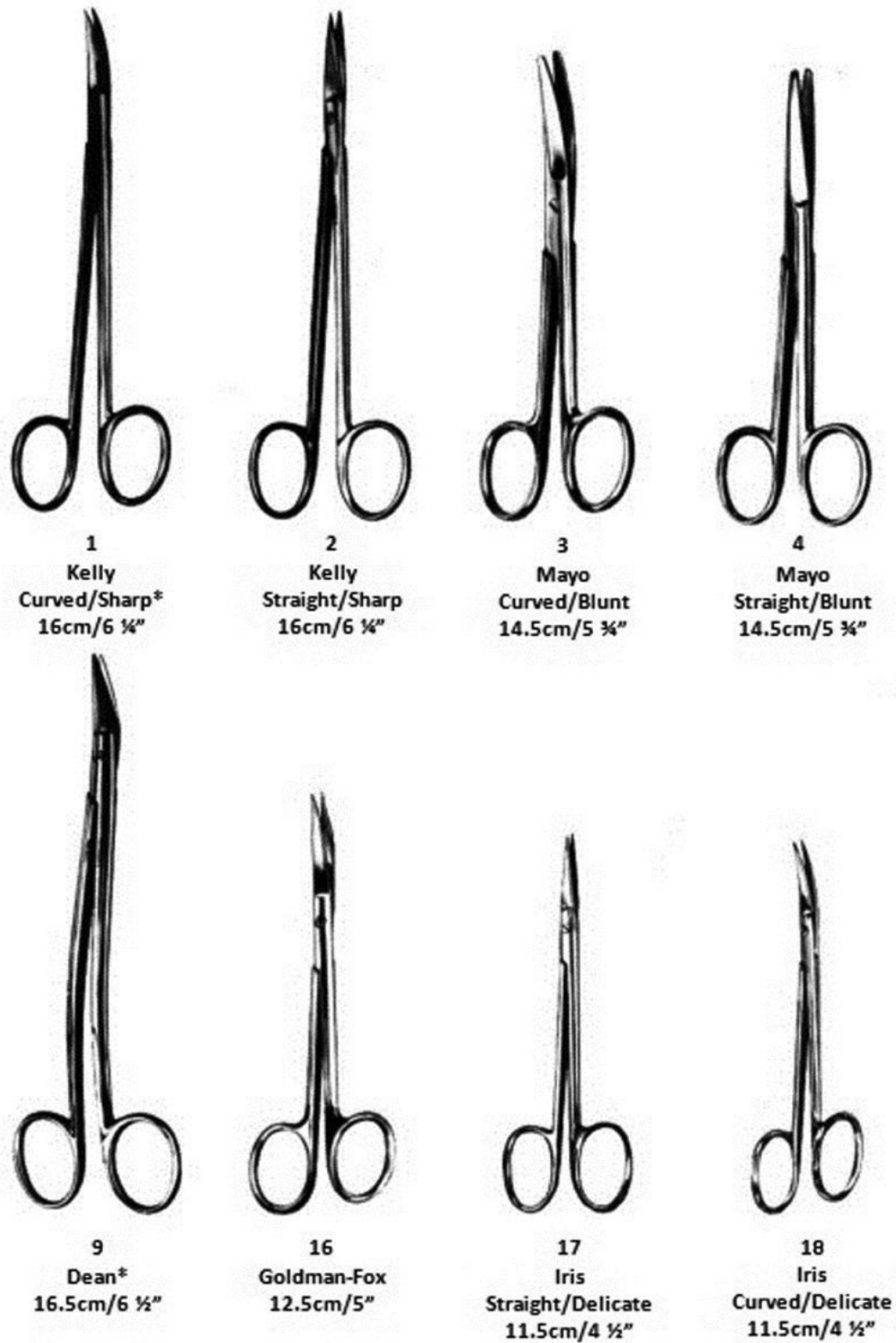


Figure 2-16. Surgical scissors. \*Indicates one serrated blade to eliminate slippage.  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### **Surgery forceps**

With the exception of the rongeur forceps, which are used to cut bone, most forceps are grasping-type instruments. The forceps that secure patient drapes, hold suture needles, control hemorrhage, and grasp oral soft tissues are commonly used in most dental surgeries. We'll consider them a miscellaneous group for our purposes.

### ***Towel-clamp forceps***

As the name implies, towel-clamp forceps are used to maintain surgical towels and drapes in the right position during an operation. The towel-clamp forceps have handles and a locking device similar to those on the needle-holder and hemostatic forceps (fig. 2-17). The working ends have either sharp points or blunt flat tips that overlap in the closed position.

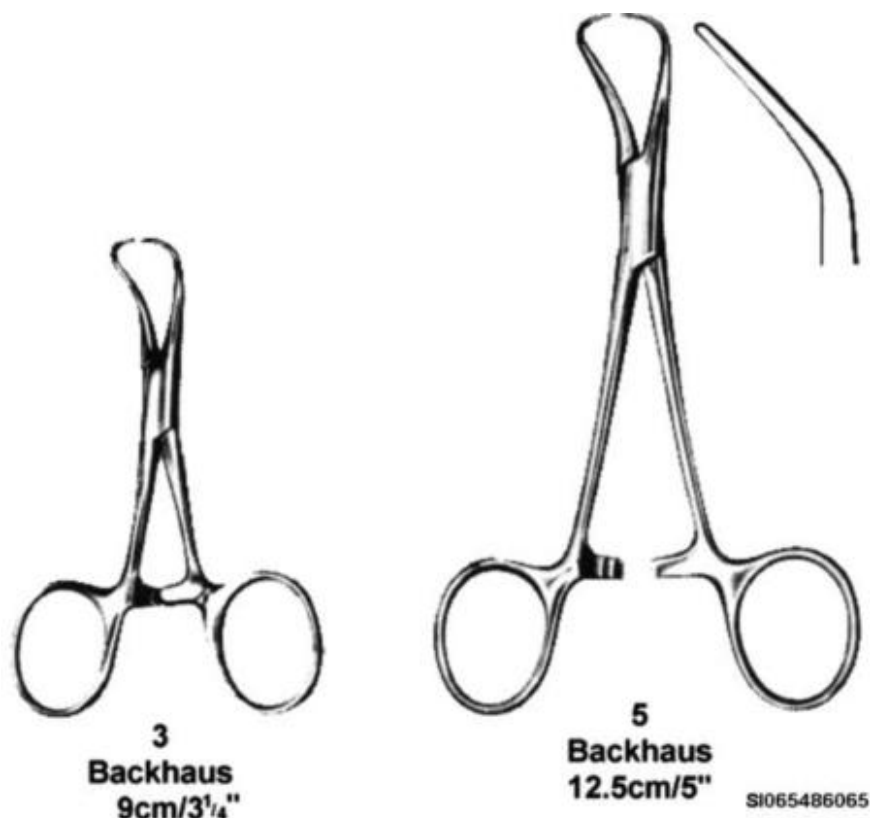


Figure 2-17. Towel-clamp forceps.  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### ***Needle-holder forceps***

Needle-holder forceps, as the name implies, hold needles during suturing procedures. The typical needle holder has two short, rather blunt, serrated beaks with a distinct groove in each beak (fig. 2-18). The grooves provide space for the placement and retention of the needle. At the end of the handles there is a graduated, notched-locking device that lets the dentist secure the suture needle in the suturing position as if the needle were an extension of the needle holder. In turn, the dentist can devote full attention to the suturing process and not be overly concerned about keeping a grip on the needle.

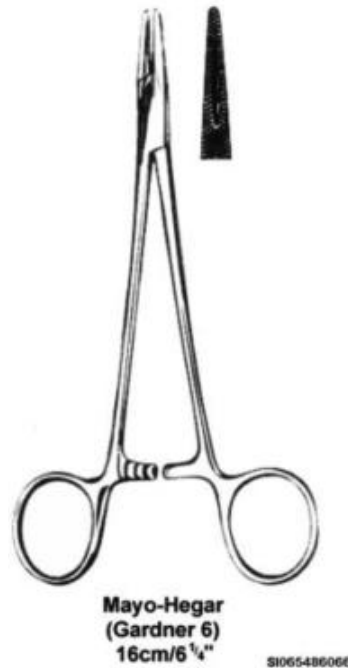


Figure 2-18. Needle-holder forceps  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### *Hemostatic forceps*

Hemostatic forceps look very much like needle-holder forceps. The main difference is that the beaks of the hemostatic forceps are longer and more slender. They also have both curved and straight beaks, and there is a locking device on the handle to keep the beaks closed. Figure 2-19 shows the straight and curved Kelly and Halsted-Mosquito hemostats. These forceps are used in surgery to control hemorrhage by clamping or constricting blood vessels. In dental surgery, they are more commonly used to remove bits of debris, such as bone chips or parts of teeth, from the oral cavity. Because of the extensive use of hemostatic forceps, have them ready for any procedure that involves the removal of teeth or bone.

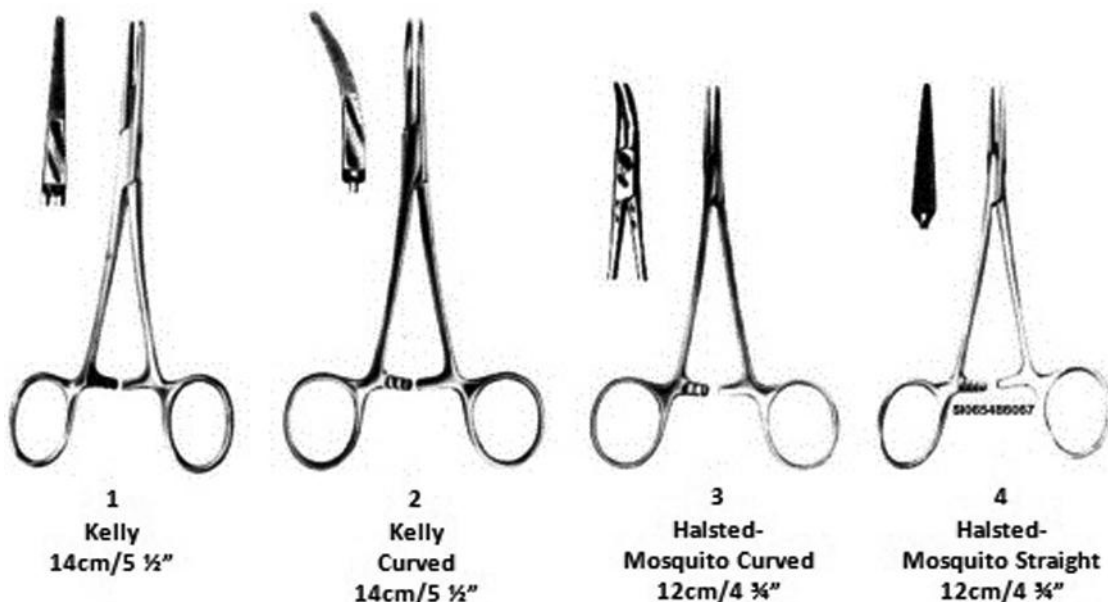


Figure 2-19. Hemostatic forceps  
(Courtesy of Hu-Friedy Mfg. Co. LLC).



### ***Tissue forceps***

At first glance, tissue forceps appear to be dressing forceps with straight working ends (fig. 2-20); however, on closer examination of the working ends, you notice a marked difference. One side of the working end has two very small, sharp-pointed extensions that form a W-shape. The other side has a single, sharp-pointed extension that meshes in the middle of the opposing W-shape when the instrument is in the closed position. Although the tissue forceps are used in oral surgery to grasp and stabilize loose tissue ends during suturing procedures, they are mainly used to hold tissue being excised.



**Figure 2-20. Tissue forceps.**

### **Cutting instruments used in dental surgery**

When most people hear the word “surgery,” the first thing they think about is the cutting of the body with scalpels. But scalpels are not the only cutting instruments used in surgery, particularly dental surgery. For instance, curettes, chisels, rongeur forceps, and bone files are used in some cutting functions.

#### ***Surgical curettes***

While surgical curettes are not strictly cutting instruments, they must do some cutting. Curettes are sharp, spoon-shaped instruments used to clean out infected cavities in bone and remove debris from tooth sockets. They come in many sizes and in straight or angled shapes. The type used depends on the nature of the socket, curvature of the roots that were in the socket, and the location of the cavity. The single-ended Molt curettes have large handles. They are the straight #2 and #4, and the paired, angled #5L and #6R (L for left, and R for right). They are shown in figure 2-21. Double-ended curettes have slender standard-sized handles. The double-ended Molt #2/4, shown in figure 2-22, is commonly used in periodontal surgery.

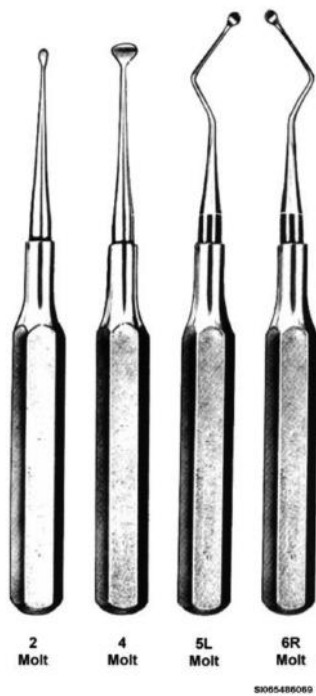


Figure 2-21. Single-ended surgical curettes  
(Courtesy of Hu-Friedy Mfg. Co. LLC).



Figure 2-22. Double-ended surgical curette  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### *Surgical chisels*

Surgical chisels are also classified as cutting instruments. Like surgical burs, chisels are used to remove bone and split teeth. Because their cutting edges are easily dulled, sharpen them after each use. Surgical chisels are much larger than the enamel chisels used in restorative dentistry. Some of the more common chisels used in oral surgery are the Gardner #2, #5, #5R, and #6, shown in figure 2-23. The #6 and #8 Chandler, and #18 McFarland (fig. 2-24), are also commonly used. Notice the #8 Chandler and #18 McFarland are bi-beveled in design. The surgery mallet, which resembles a gavel, is used along with a selected chisel to split teeth or reduce alveolar bone (fig. 2-25).



Figure 2-23. Surgical chisels  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

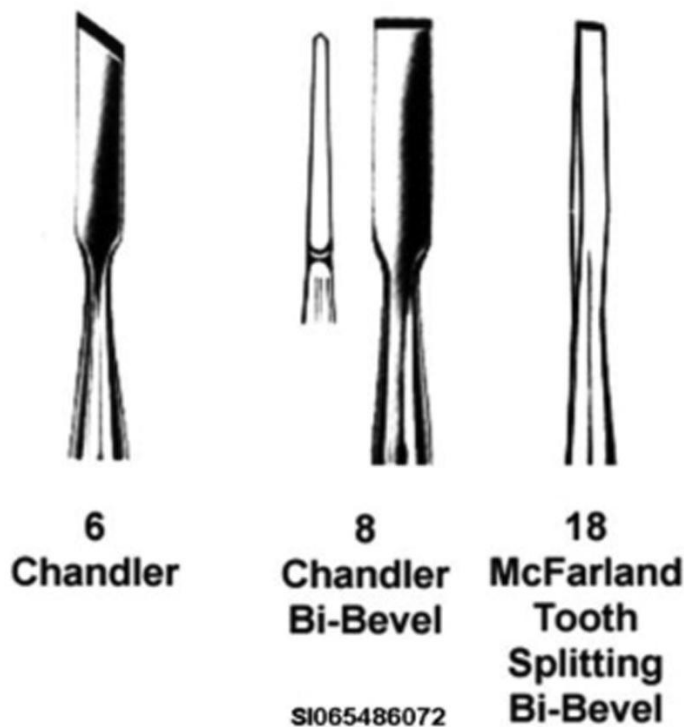


Figure 2-24. Surgical chisels  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

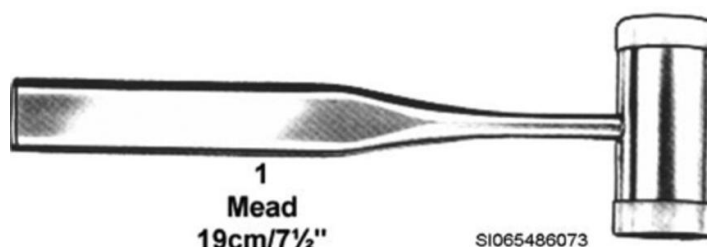


Figure 2-25. Surgical mallet  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### ***Rongeur forceps***

Rongeur forceps are used to trim projecting, uneven or overhanging bone (alveolectomy). Since these projections are painful to denture wearers, they must be trimmed.

The rongeur forceps' function is to snip off the bony projections. Some rongeur forceps cut only on one side. Others cut on the ends of the beaks. The cutting edges are sharp and should be examined for nicks after each use. Note that these forceps are similar in size and appearance to the tooth-extracting forceps, but each rongeur has a steel spring spreader, which opens the beaks when the pressure is released from the handles. Figure 2-26 shows two common rongeur forceps, the Mead #1A and Cleveland #4A.

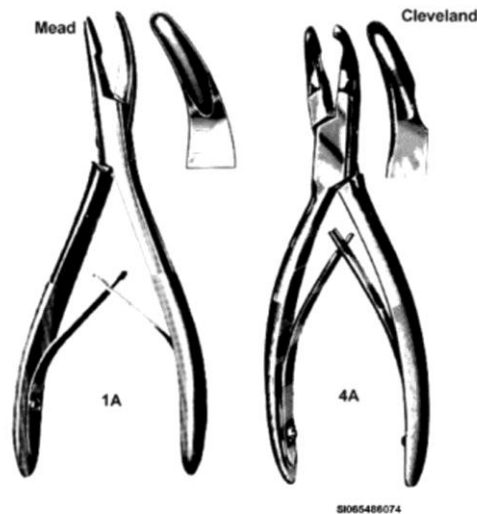


Figure 2-26. Rongeur forceps  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### ***Bone file***

Although most of the bony projections are removed with the rongeur forceps, some rough edges usually remain. The bone file is used to further shape and smooth the alveolar bone. The Seldin #11 is similar to the Miller #21 in figure 2-27. They are double-ended instruments, with both large and small working ends.



Figure 2-27. Surgical bone file  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### **Surgical elevators**

There are two types of elevators used in oral surgery—periosteal and root.

#### ***Periosteal elevators***

During surgery, the dentist often needs to separate a bone and the fibrous membrane called the periosteum that covers it. This is done with a periosteal elevator. The dentist also uses it to gain access to bone that needs trimming and retained roots. Two periosteal elevators are the Mead #9 and Seldin #23, shown in figure 2-28. The Mead #9 is used exclusively as a periosteal elevator; however, the Seldin #23 is also used as a retractor due to its wide working ends.

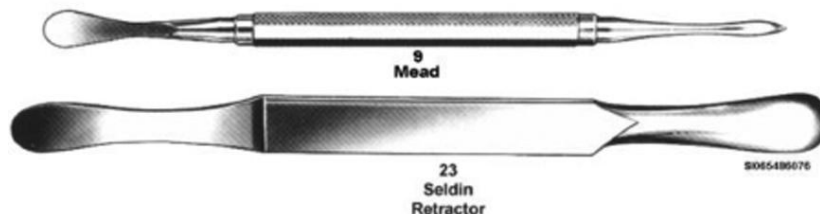


Figure 2-28. Periosteal elevators  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### **Root elevators**

Root elevators come in many sizes and shapes. At least one (and sometimes more) is used in every tooth extraction. Which elevator or elevators are used depends on the desire of the dentist. Root elevators have the following three functions:

1. Loosen the teeth in their sockets.
2. Remove parts of teeth (broken root tips or retained roots).
3. Sometimes, remove a complete tooth.

In the last case, the tooth is usually an underdeveloped third molar. The elevators are actually levers; the fulcrum (support point) for the elevator is usually the bone supporting the tooth.

The elevators composing the straight working end group are the #301 and the #34S (fig. 2-29 and 2-30). The working ends are in line with the handle and have a concave surface. The #301 has the smallest working end and is used when roots are deeply seated. The #34S has the largest end and is commonly used for anterior roots. The #92 also has a straight working end (fig. 2-31); however, it is serrated and the shank is angled rather than straight as in the #301 and #34S.



**301**  
Figure 2-29. Root elevator  
(Courtesy of Hu-Friedy Mfg. Co. LLC).



**34S**  
SI065486078  
Figure 2-30. Seldin root elevator  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

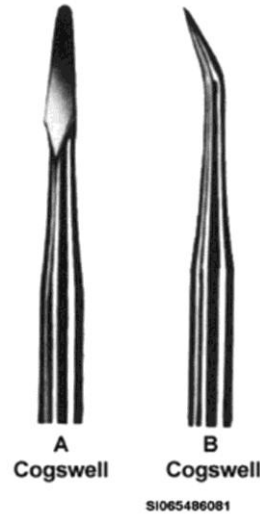


**92**  
**Serrated**  
SI065486078  
Figure 2-31. Serrated root elevator  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

Another style of elevator has spade- or wedge-type working ends. The Stout #11 and the Cogswell A (fig. 2-32 and 2-33) are examples of this style. The Cogswell B (fig. 2-33) is a pick-shaped root elevator whose working end is shaped somewhat like a rounded toothpick tip.



**Figure 2-32. Stout root elevator**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).



**Figure 2-33. Cogswell root elevators**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

In several sets of elevators, the handles are in line with the shank; however, the working ends are set at an angle. The Miller #73 and #74 elevators (fig. 2-34) have curved, thin working ends with smooth, rounded tips. These elevators are designed to elevate a tooth or large root fragment. The Seldins #1L and #1R (fig. 2-35) have sharp-tipped working ends with an abrupt 90° angle. The Seldins, sometimes referred to as East-West elevators, are designed for use on molar roots. The Cryer #25 and #26 are similar to the #1L and #1R Seldins; however, the working ends are angled greater than 90° (fig. 2-36).



**Figure 2-34. Miller Apex root elevators**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).



**Figure 2-35. East-West root elevators**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

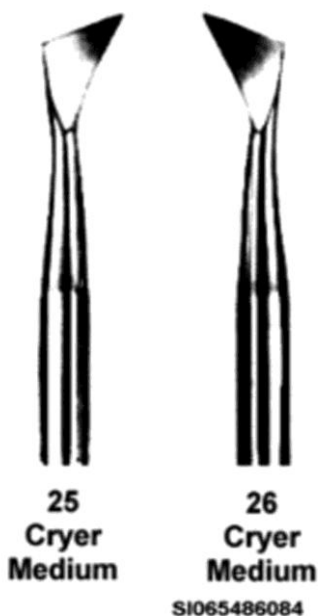


Figure 2-36. Cryer root elevators  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

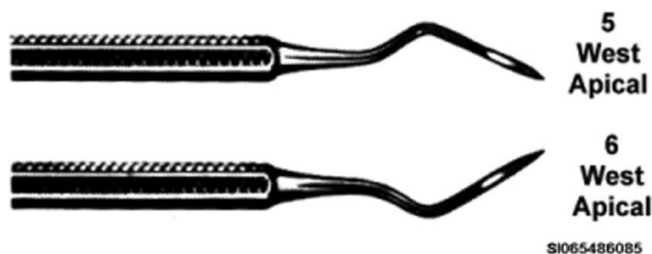


Figure 2-37. Apical root tip picks  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

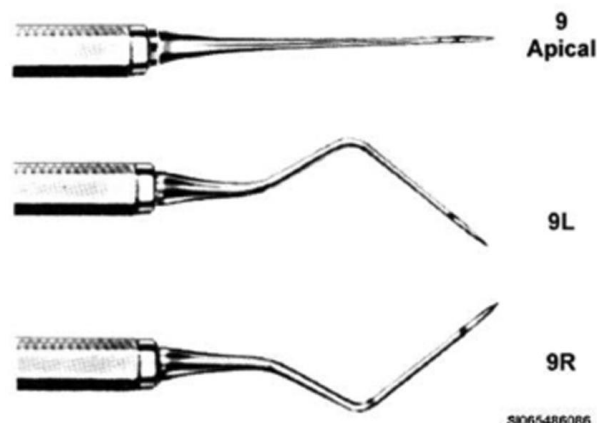


Figure 2-38. Apical root tip picks  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

One group of elevators is used to remove fractured root tips lodged deep in the root socket. These elevators are often referred to as root picks. Elevators that make up this group are the #5 and #6 West, and the #9 apical, #9L, and #9R. The working ends on these elevators are very thin, sharply pointed, and small. The #5 and #6 West (fig. 2-37) have much shorter terminal shanks and are designed to remove extremely small apical fragments. The #9 has a straight working end, and the working ends of #9L and #9R are set at left and right angles, respectively, to the handles (fig. 2-38). The handles are also small in diameter but longer than those on other elevators we've discussed.

### Tooth extraction forceps

There are several types of tooth-extracting forceps. Except for those made for some specific operation, they generally have the same features: beaks, a neck, and handles (fig. 2-39). The beaks of tooth extracting forceps are designed to grasp the tooth with maximum contact on the facial-lingual surfaces of the root(s) just below the cervix. The inner surface of each of the two beaks is concave and the outer surface is convex.

Tooth-extracting forceps are designed for use in specific areas of the mouth. The beak is always shaped to conform snugly to the contour of a tooth. For example, both beaks of maxillary forceps are usually angled away from the curvature of the handles. These varying angles make it easier to reach various parts of the arch. The beaks of mandibular forceps are usually at a much sharper angle and in the same direction as the curvature of the handles. This makes it easier to reach different parts of the lower arch.

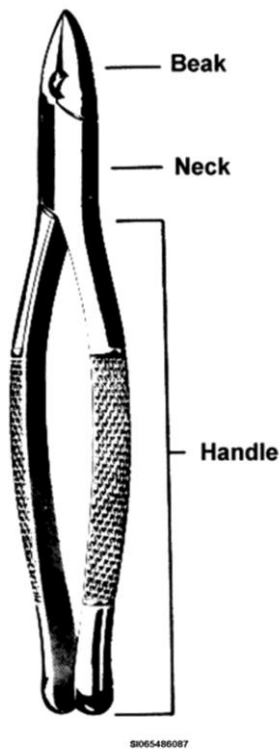


Figure 2-39. Parts of extraction forceps.

Another way of identifying the general area of the mouth in which tooth-extracting forceps should be used is by its neck. The neck is shaped so that the beak can be placed on the tooth and still be parallel with the long axis of the tooth. The handles are shaped so that a maximum amount of force can be applied to the beaks, while the handles are still in a comfortable position for the oral surgeon. The beaks are also shaped so that a force on the handles tends to force the tooth out of its socket.

The overall shape of the forceps, from the beak to the handle, can usually provide quick identification of the arch for which it is designed. Forceps which are C and L shaped are used on the mandibular arch (fig. 2-40). The S-, I-, and Z-shaped forceps are used on the maxillary arch (fig. 2-41).

The notches on the beaks serve as a guide to the region of the mouth where those particular forceps are to be used. To identify the forceps, picture the number of roots on the tooth to be removed. All anterior teeth have single roots and need forceps with a single curve on the end of each beak. If you examine the tops of anterior forceps head on, you will find that they resemble a set of parentheses, (fig. 2-42).

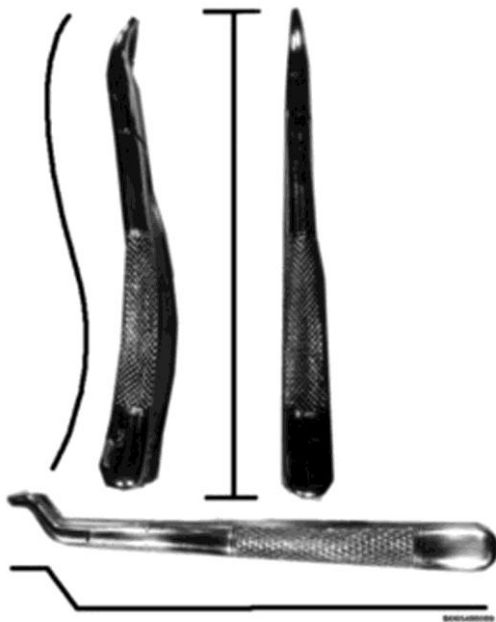


Figure 2-40. Mandibular shaped extraction forceps.

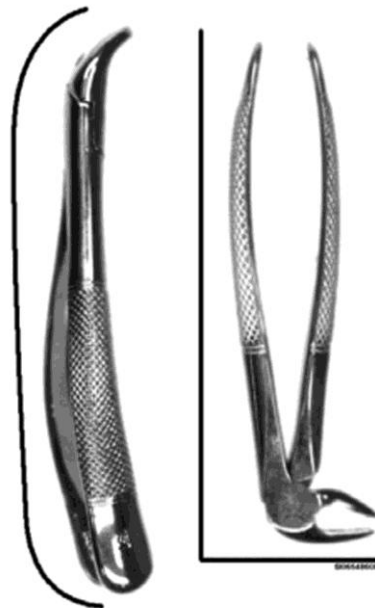


Figure 2-41. Maxillary shaped extraction forceps.





Figure 2-42. Beak arrangement on surgical extraction forceps.

Forceps for removing bicuspid teeth are similar to those for anterior teeth; however, they are generally wider. When you remember that mandibular molars have two roots (bifurcated), situated mesially and distally, you can easily see that any instrument designed to follow the curve of the root of the mandibular molars must be notched. The beaks of mandibular molar forceps, when examined head on, resemble two sets of parentheses arranged in the manner shown in figure 2-42. The *exception* to this is the mandibular cowhorn forceps whose beaks resemble cowhorns. These beaks enter into the bifurcation, facially and lingually, to lift the tooth out of the socket.

Maxillary molar teeth have three roots (trifurcated), two facial and one lingual. To be effective on these teeth, the forceps must have a notched beak on the facial side and an unnotched beak on the lingual side (*except* for the #88R and #88L, maxillary cowhorn forceps, which are just the opposite). As a result, you can see why maxillary molar forceps are manufactured as right and left forceps. Some manufacturers stamp the letters R and L on the handle; however, even without this identification it is easy to know which side of the mouth they are designed for if you remember the position of the notches in relation to the roots. By relating the “parentheses” to the maxillary molar forceps, you will find that for the right and left sides, the parentheses are arranged opposite to each other (fig. 2-42).

More than one forcep design is available for extracting any tooth. Dentists naturally choose the one that is the most comfortable and gets the best results. So that you can better assist the dentists you work with, you need to know where particular forceps are to be used.

### ***Maxillary incisors, cuspids, and bicuspid***

Some of the more commonly used extraction forceps designed for use in this area of the mouth include the #1 and #150.

#### ***Forceps #1***

The #1 extracting forceps, (fig. 2-43), are used to remove maxillary incisors and cuspids. The beaks (grasping parts) are in line with the handle. Because of this straight line design, a dentist can exert a lot of leverage with the #1 forceps, making them very effective.

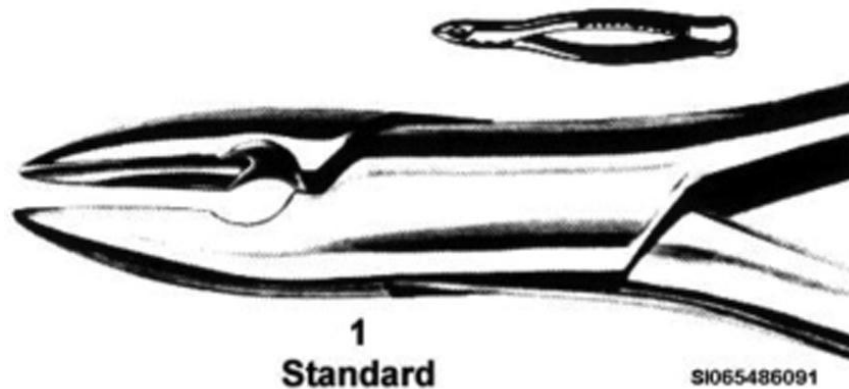


Figure 2-43. Surgical extraction forceps for maxillary incisors and cuspids.  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### *Forceps #150*

The #150 forceps are sometimes referred to as the maxillary universal forceps. Even though the #150 forceps can be used in any region of the maxillary arch, they are specifically designed to remove maxillary incisors, cuspids, bicuspid, and residual roots. The beaks are set at an angle to the handles, which makes them accessible to any part of the maxillary arch (fig. 2-44). When the handles are closed, the beaks on the #150 forceps are noticeably close together at the tips and curve opposite each other to resemble parentheses. Notice also that the handles themselves have a slight curvature.

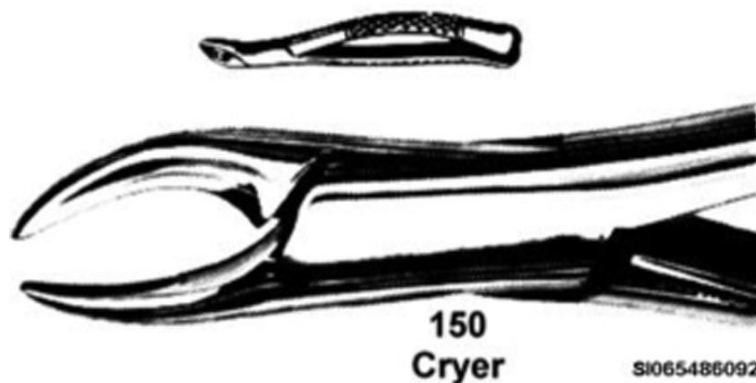


Figure 2-44. Universal maxillary extraction forceps  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### *Maxillary molars*

Extraction forceps for maxillary first and second molars are designed as left and right forceps because these teeth are trifurcated. Some of the commonly used forceps for these teeth are the #53L, #53R, #88L, and #88R. Forceps designed for third molars include the #210H and #210S.

*Forceps #53L and #53R*

The #53L and #53R forceps, (fig. 2-45), are used to extract maxillary first and second molars. The letters L and R indicate that the forceps are used on the left and right sides of the maxillary arch. They have straight handles with offset bayonet-type beaks. If you view the #53L forceps with the handles toward you, you will notice a point on the right beak tip; the left beak tip is rounded. The opposite is true on the #53R forceps.

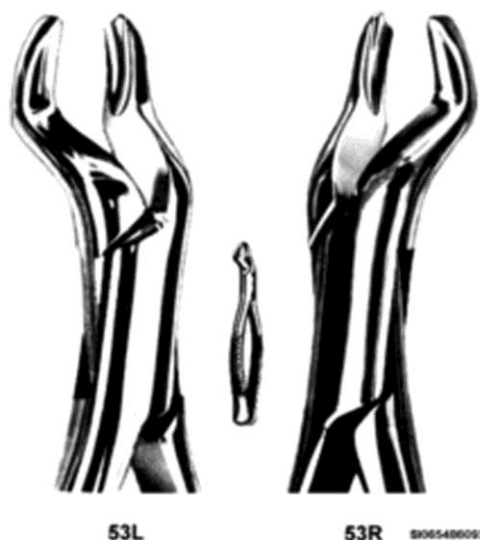


Figure 2-45. Left and right surgical extraction forceps for maxillary first and second molars. (Courtesy of Hu-Friedy Mfg. Co. LLC).

*Forceps #88L and #88R*

The #88L and #88R forceps, (fig. 2-46), are often called maxillary “eowhorns.” Like the #53L and #53R, they are used on the maxillary first and second molars. The #88L forceps have a long, slender, pointed right beak, and a forked or deeply notched left beak for grasping the root structures on maxillary left first and second molars. The exact opposite applies for the #88R forceps and maxillary right first and second molars. The #88L and #88R forceps have straight handles.

*Forceps #210H and #210S*

The #210H forceps are used to remove maxillary third molars. The short beaks on these forceps have smooth rounded tips and wide concave inner surfaces. When these forceps are held in the operating position, the end of the left handle is noticeably curled to form a finger rest. These characteristics make the #210H different from the other maxillary molar forceps. The wide inner concave surfaces on the short beaks make the #210H particularly effective in grasping the generally underdeveloped maxillary third molar crowns. The #210S forceps have a slightly wider beak than the #210H, and there isn't a finger rest curl (fig. 2-47). It is also used to extract maxillary third molars.

*Mandibular incisors, cuspids, and bicuspid*

Two commonly used extraction forceps for the mandibular anteriors and bicuspid are the #151 and #203.

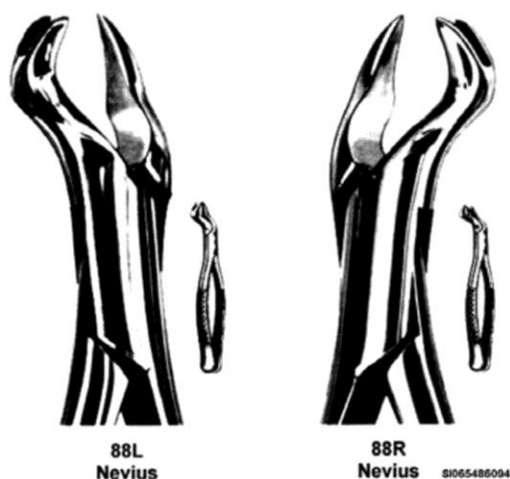


Figure 2-46. Left and right surgical extraction forceps for maxillary first and second molars. (Courtesy of Hu-Friedy Mfg. Co. LLC).

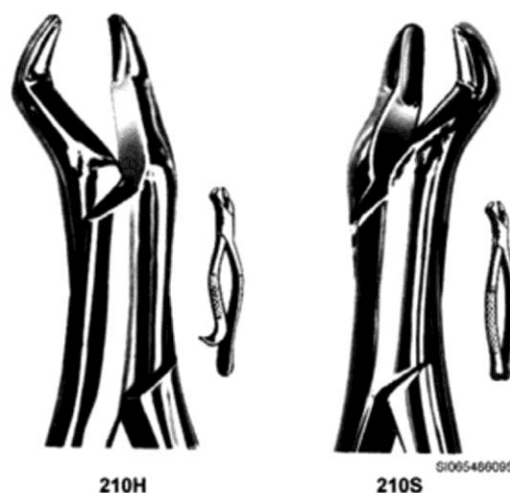


Figure 2-47. Maxillary third molar extraction forceps (Courtesy of Hu-Friedy Mfg. Co. LLC).

*Forceps #151*

The #151 forceps are used primarily to extract mandibular anteriors, bicuspid, and roots. These forceps are similar to the #150 forceps, except the beaks are set at an angle opposite to the slightly curved handles (fig. 2-48). Another similarity between these forceps is that as the #150 is known as the maxillary universal forceps, the #151 is known as the mandibular universal forceps.



**Figure 2-48. Mandibular universal extraction forceps**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

*Forceps #203*

The #203 forceps are used on mandibular anterior, bicuspid, and roots. These forceps are like the #101, except the beaks are more sharply angled from the handles. Like the #101 handles, the #203 handles are straight.

*Mandibular molars*

There are several popular extraction forceps for the mandibular molars, including the #15, #16, #17, #217 and #222.

*Forceps #15*

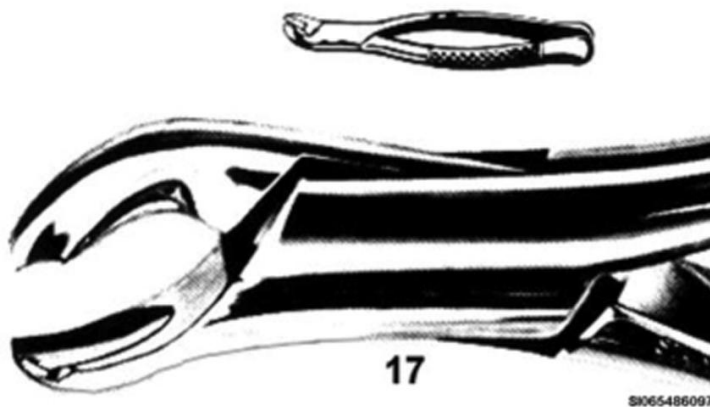
These forceps are used to remove mandibular first and second molars. The beaks on the #15 forceps have concave inner surfaces with pointed projections on the tips. These work well in grasping the crown with the two projecting tips extending to the bifurcation between the two roots on mandibular third molars. The left handle on the #15 has a finger rest.

*Forceps #16*

These forceps are used universally (right and left) to remove mandibular molars. The #16 forceps are nicknamed mandibular “cowhorns”, because the beaks actually resemble cowhorns when they are open. The left handle on the #16 forceps has a finger rest.

*Forceps #17*

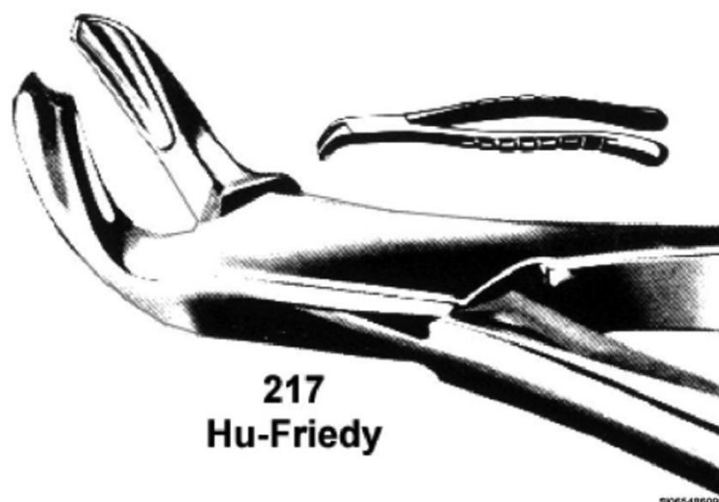
Like the #15 and #16 forceps, the #17 is used on mandibular first and second molars. The beaks of the #17 forceps are similar to beaks of the #15 forceps; however, the handle of the #17 forceps is straight without a curled finger rest (fig. 2-49).



**Figure 2-49. Mandibular first and second molar extraction forceps.**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### *Forceps #217*

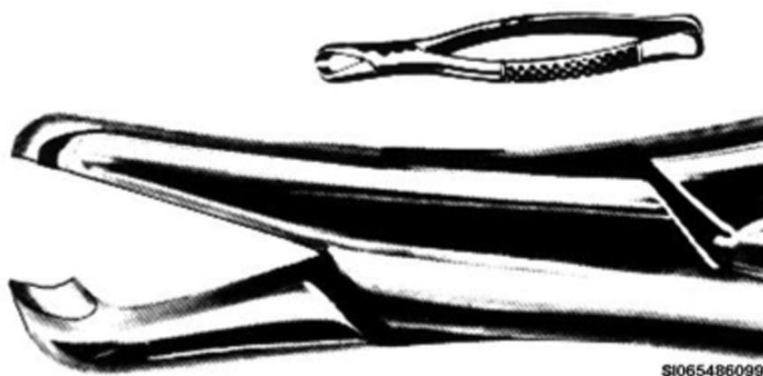
The #217 forceps are used to remove mandibular second and third molars. The beaks have inner concave surfaces and pointed projections much like those of the #15 forceps. The handles, however, have a slight curvature and resemble those on the #151 forceps (fig. 2-50).



**Figure 2-50. Mandibular second and third molar extraction forceps.**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### *Forceps #222*

The #222 forceps are the universal (left and right) mandibular third molar extraction forceps. The beaks on the #222 forceps are rounded with concave inner surfaces, and angle sharply from the handle (fig. 2-51).



**Figure 2-51. Mandibular left and right (universal) third molar extraction forceps.**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### *Hawkbill-type forceps*

There are three hawkbill-type forceps: the Mead #MD3, the #13, and the #22 (fig. 2-52). The Mead #MD3 forceps are used on mandibular anteriors and bicuspid; the #13 forceps on mandibular first and second bicuspid; and the #22 forceps on mandibular first, second, and third molars. Their beaks are perpendicular to the working action of the handles. This design gives the dentist a great deal of leverage with minimum effort. The major physical difference between these forceps is the width of their beaks, because they are used to remove different teeth.

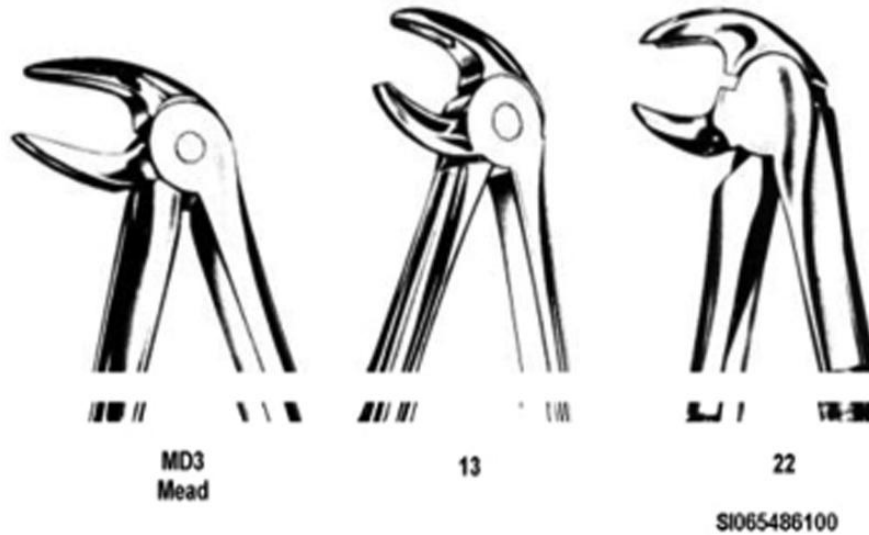


Figure 2-52. Hawkbill-type forceps used on mandibular teeth.  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

#### *Forceps #101*

These forceps (fig. 2-53) are used to remove both maxillary and mandibular cuspids, bicuspid, and any remaining roots.



Figure 2-53. Surgical extraction forcep for use on both maxillary and mandibular teeth.  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

#### *Pediatric extraction forceps*

Both the #150 and #151 have modified types of forceps (fig. 2-54). The #150S is used to remove maxillary deciduous teeth. It is a scaled-down version of the #150. The #151S, a smaller version of the #151, is used to remove mandibular deciduous teeth.



Figure 2-54. Pediatric extraction forceps  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

## 210. Basic periodontal instruments

Several instruments are commonly used in periodontal treatment. Among them are probes, scalers, curettes, hoes, files, chisels, and knives. Although you've already studied some of these instruments in other specialties, the instruments you will study here are designed for periodontal use and are somewhat different.

### Periodontal probes

A common practice of medical doctors and dentists is to follow a pattern when treating a patient. First, they check a patient's signs and symptoms and make a diagnosis. Only after they have a firm diagnosis do they begin treatment. The periodontal probe is one of the most important instruments used to make a diagnosis in periodontics. Periodontal probes are used to accurately determine the presence, depth, and form of periodontal pockets. An angled shank places the working end at about a 45° angle in relation to the handle. The thin, narrow working end is easily inserted to the depth of the periodontal pocket. These working ends are scored at millimeter intervals. The scored marks make it easy to determine the depth of the pocket. As figure 2-55 shows, some probes have a mark for millimeters at 3, 6, 8, and possibly 11. Others mark every millimeter from 1 through 3, then mark every 2 millimeters from 3 through 7, and finally mark every millimeter from 7 through 10. Some types of periodontal probes are color-coded at various millimeters to permit easier reading of the measurements. Probes are single-ended, double-ended, or a combination of probe and explorer as shown in figure 2-56.

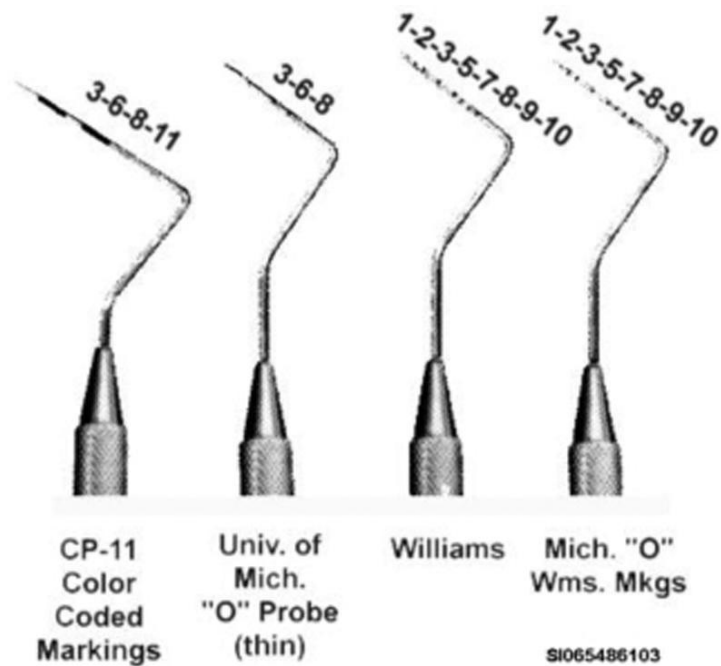


Figure 2-55. Different periodontal probe calibrations (Courtesy of Hu-Friedy Mfg. Co. LLC).

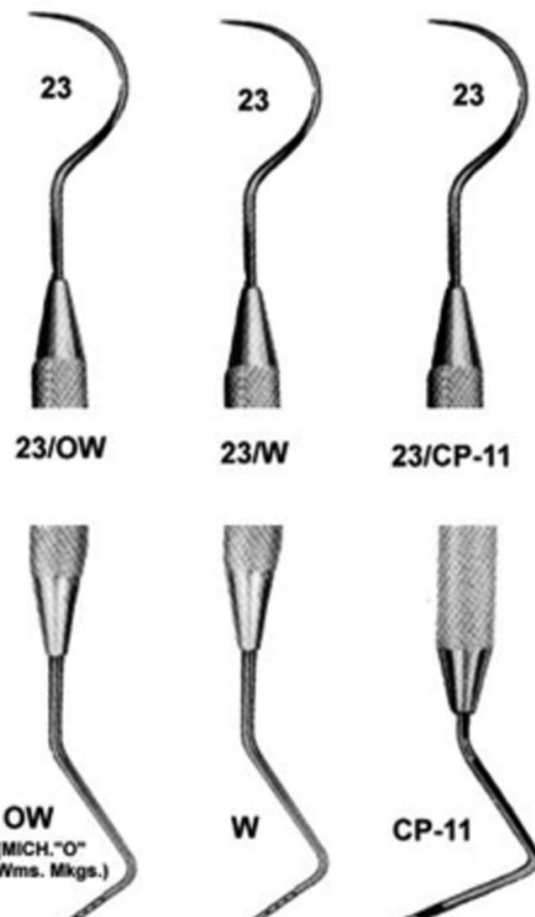


Figure 2-56. Combination explorer and periodontal probe.



### Furcation probes

When periodontal disease causes sufficient loss of attachment around multirooted teeth, the interradicular bone or furcation area may become involved. Most often, the interradicular involvement is not accompanied by recession of the gingival margin. The presence of gingiva and neighboring teeth frequently prevent accurate probing of the furcation area with the standard periodontal probe. The Nabers probes (fig. 2-57) are a double-ended pair of curved furcation probes designed to help determine the extent of the interradicular involvement.

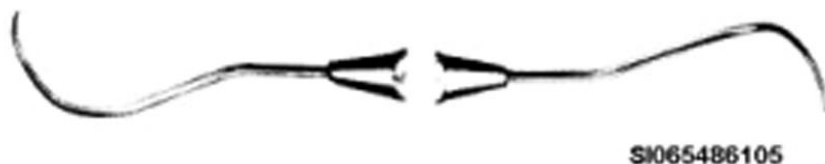


Figure 2-57. Furcation probe  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### Scaling and root planing instruments

The term *scaling* is used to identify the removal of calculus (mineralized plaque) from the surface of a tooth. Scaling can be supragingival or subgingival, depending on the location of the calculus relative to the gingival margin. The objective of scaling is the fracturing of calculus from the tooth surface. This is easy to accomplish when calculus is located on enamel. Calculus attached to the root surface, however, is embedded in the surface irregularities and is much more difficult to remove. To smooth out the irregularities and remove the calculus, some root structure must be removed. This is referred to as root planing. Several instruments have been designed for scaling and root planing. They include scalers, curettes, chisels, hoes, and files.

#### *Sickle scalers*

Sickle scalers are primarily designed for removal of supragingival calculus. Sickles with straight shanks are designed to adapt to anterior teeth, and those with contra-angled shanks adapt to posterior teeth. Sickle scalers have two cutting edges formed by the junction of the face with the two lateral surfaces. These scalers have either a straight or curved cutting edge when viewed from the face of the working end. The lateral surfaces also meet to form a pointed tip, and at the bottom or back of the instrument they form an unused third edge. The manner in which all the surfaces converge gives the sickle scaler a triangular shape when viewed from a cross-section.

A delicate scaler, such as the Towner U-15, can be used for limited subgingival calculus removal on proximal surfaces of anterior teeth where the interdental papillae rise to the facial and lingual gingival margins. Figure 2-58 shows the U-15/33, which is the most common scaler used in the prophylaxis section. It is a double-ended scaler with a sickle scaler (Towner U-15) on one end and a Jacquette (#33) on the other end. The U-15/30 (fig. 2-58) has a larger sized Jacquette and a more angled shank than the #33. Jacquette scalers are referred to in several commercial text books as posterior sickles. They are paired instruments with various angled shanks designed to allow access to all posterior tooth surfaces. The double-ended Jacquette #30/33 has the #30 medium sized blade and the miniature sized #33.

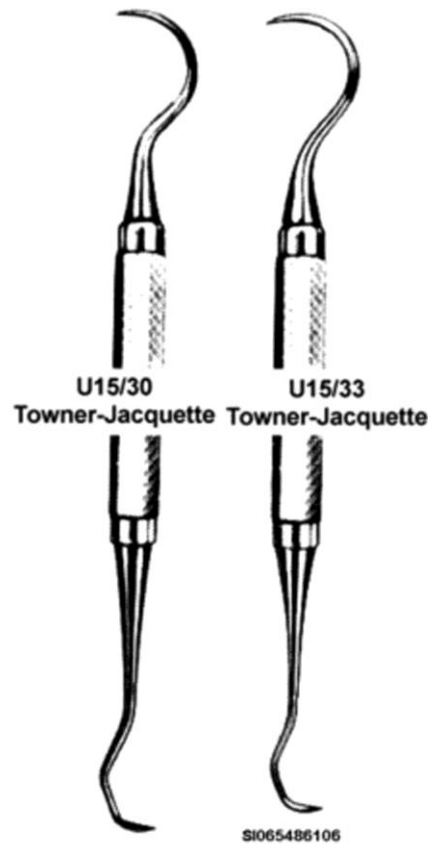


Figure 2-58. Sickle scalers (Courtesy of Hu-Friedy Mfg. Co. LLC).

### **Curettes**

The curette is the instrument of choice for subgingival calculus removal, root planing, and removing soft tissue from the periodontal pocket. The working ends of curettes form a spoon-shaped face and a rounded back. In a cross-section, the blade appears semicircular rather than the triangular shape of the sickle scaler. Each working end has a cutting edge on one or both sides of the blade. Cutting edges are either straight or rounded. Most curettes are smaller and thinner than sickle scalers, and have rounded toes rather than the pointed tips found on scalers. This design permits the cutting edge of the curette to reach the bottom of the pockets without excessive trauma to the soft tissue, and provides better tactile sensitivity for the provider.

The size of the curette blade varies and selection of an appropriate size depends on several factors—pocket depth, tissue consistency, bulk and tenacity of calculus, and accessibility of the area to instruments. Larger blades are used for removal of heavy calculus in pockets with edematous, displaceable soft tissue walls. Deeper pockets, or those with fibrous, unenlarged soft tissue walls, require finer instruments. There are two basic types of curettes, the universal and the area specific.

#### **Universal**

A universal curette is a paired instrument designed to adapt to *most* areas of the dentition by altering and adapting the finger rest, fulcrum, and hand position. Two parallel cutting edges are formed, one on either side of the face; either cutting edge can be used. In universal instruments, the relationship of the face of the blade to the lower shank (blade angulation) is 90°. The face of the blade of universal curettes is also curved in only one direction, from the head of the blade to the toe (the blade curves up, *not* off to the side). Universal instruments come in a variety of sizes and shank lengths. Some commonly used instruments are the Columbia #13/14, McCall's #13/14, and McCall's #17/18. The Columbia #13/14 has a true universal application, whereas the McCalls' have two cutting edges on

each blade but are better suited to certain areas of the mouth. The McCall's #13/14 are *best* suited for use on bicuspid and the #17/18 for molars.

#### *Area specific*

Area specific curettes differ from the universal curettes in several ways. First, they are a set of several instruments designed and angled to adapt to specific anatomic areas of the dentition. Second, these curettes are designed with only one lateral cutting edge. The blade is often referred to as an offset blade because it is angled  $60^{\circ}$  to  $70^{\circ}$  from the lower shank rather than  $90^{\circ}$  as is the universal. Third, the area specific curettes are curved in two directions, from head to toe and along the side of the cutting edge. Area specific curettes are the *best* choice for subgingival scaling and root planing because they provide the best adaptation to complex root anatomy.

The Gracey curettes are paired instruments that have similar small blades with different angulations and contra-angulations of the shank. This permits proper blade face-tooth relationships on the different surfaces. Figure 2-59 shows the complete set of double-ended Graceys. A sufficient (reduced) set consists of the #5/6, #7/8, #11/12, and #13/14.



Figure 2-59. Gracey area specific curette set  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

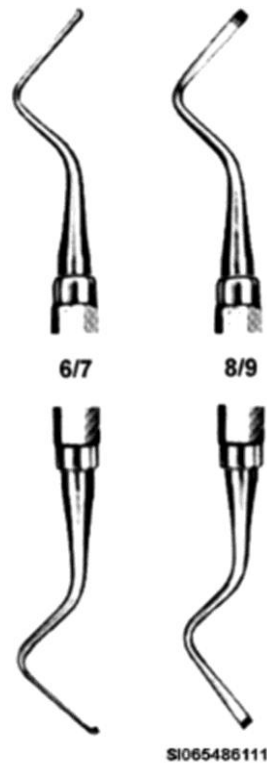
#### *Chisels*

Use of the periodontal chisel is extremely limited. It is used solely for removal of heavy supragingival calculus deposits that bridge open interproximal spaces of anterior teeth. The chisel has a single blade and a straight, heavy shank. The end of the blade is flat and beveled at a  $45^{\circ}$  angle. The blade is placed against the proximal surface from the facial aspect and pushed with a horizontal stroke toward the lingual aspect to engage the calculus.

#### *Hoes*

Periodontal hoes are usually limited to removal of large ledges of calculus located supragingivally and slightly subgingivally. For example, calculus that rings teeth on the facial, lingual, and distal surfaces have no adjacent posterior teeth that can be easily removed with the hoe. Two-paired periodontal hoes, Orban types #6/7 and #8/9 (fig. 2-60), are designed for removal of easily accessible calculus. They may be used subgingivally only when the gingiva is flabby and easily displaced. A hoe has a single straight cutting edge with the blade turned at a  $99^{\circ}$  to  $100^{\circ}$  angle to the shank. At the end

of the blade, the cutting edge is beveled at a 45° angle. The sharp corners of the cutting edges must be rounded with a sharpening stone to prevent cutting grooves into the root surfaces during use.



**Figure 2-60. Orban periodontal hoes**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### ***Files***

Periodontal files are strong instruments used to crush large calculus deposits and smooth the tooth surfaces at the cemento-enamel junction and in preliminary root planing. The working ends of the files are composed of a series of parallel blades. They are actually a series of miniature hoes on the same blade. As with the hoes, the corners of the cutting edges of the file must be rounded to prevent grooving of the root surface. Files have a variety of head shapes, ranging from rectangular to oval to oblong. The number of cutting edges varies also. Heavy files have a few large blades, whereas fine files have many small blades. The small, fine files that can be adapted subgingivally provide the greatest flexibility and accessibility. Files are usually paired for the facial and lingual, and the mesial and distal surfaces. The file is inserted between the papilla and tooth, and engaged against the deposit. The head of the small blades is then pressed against the deposit, and ground into the deposit, crushing it. Horizontal and vertical strokes can follow the crushing motion. Follow-up strokes with a curette are important for removing small fragments and smoothing the tooth structure.

The Orban #10/11 and #12/13 files (fig. 2-61) have flat, wide, rounded working ends. They are used to remove calculus on root surfaces in deep, narrow pockets. The Hirschfeld files #3/7, #5/11, and #9/10 (fig. 2-62) are used to remove calculus and root roughness in root furrows, deep pockets, and places where gingival tissues are tight. They have small heads and only three parallel blades.

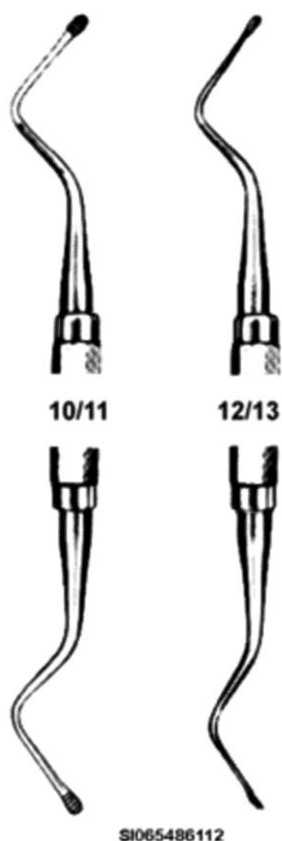


Figure 2-61. Orban periodontal files  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

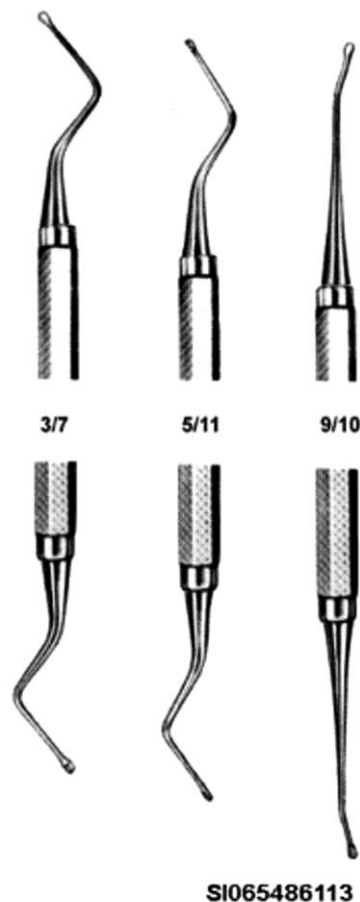






Figure 2-62. Hirschfeld root planning files  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### ***Implant scaling instruments***

Special scalers, made of plastic or Teflon, are designed for cleaning the abutments of dental implants. The special properties of the material enable optimum cleaning without damaging the abutment surface. *Never* use metal scalers and curettes because they could damage the smooth surface of the implant.

Several different versions are available to permit access in all situations. The four basic scalers are listed and described in the following table

Type	Use	Illustration
Universal	Use in <i>most</i> areas to clean the abutment surfaces and the apical portion of the framework.	 <p>Figure 2-63. Plastic or Teflon implant scaling instrument—Universal scaler.</p>

Type	Use	Illustration
Lingual	Designed for cleaning the lingual side of the abutment.	 <p>Figure 2-64. Plastic or Teflon implant scaling instrument—Lingual scaler.</p>
Posterior	Has a prolonged tip with a contra-angled design to enable access to the <i>most</i> posterior lingual abutment surfaces. It is moved in a coronal direction starting at the gingival margin.	 <p>Figure 2-65. Plastic or Teflon implant scaling instrument—Posterior scaler.</p>
Buccal	Designed for cleaning the buccal surface of the abutment. It is moved in a coronal direction starting at the gingival margin.	 <p>Figure 2-66. Plastic or Teflon implant scaling instrument—Buccal scaler.</p>

### Periosteal elevators

In addition to the previous periosteal elevators we covered, there is another one commonly used in periodontal surgery. The Kramer-Nevins #1 (fig. 2-67) is very similar in shape to the #7 wax spatula. One end is rounded and the other pointed for delicate tissue retraction.

### Periodontal knives

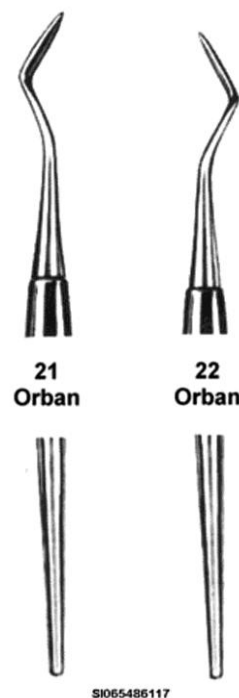
Periodontal knives are double or single ended in paired sets. The knives have a slightly angled, crescent-shaped blade. To provide access to the proximal surfaces of the tooth, the blade extends slightly from the long axis of the instrument. There are several knives manufactured for this purpose. Some of the more common are the Kirkland #15K/16K and the Orban #21 and #22. The Kirkland #15K/16K knives (fig. 2-68) are used to make the initial incisions for gingivectomy and gingivoplasty procedures. They are especially effective in the retromolar region. The Orban #21 and #22 knives (fig. 2-69) are used to excise (complete the removal of) the interproximal tissue in gingivectomy and gingivoplasty procedures.



**Figure 2-67. Kirkland double-end periodontal knives.**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).



**Figure 2-68. Periodontal periosteal elevator.**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).



**Figure 2-69. Orban single-ended periodontal knives.**  
(Courtesy of Hu-Friedy Mfg. Co. LLC).

### **Periodontal surgery curettes and sickles**

Larger and heavier curettes and sickles are often needed during periodontal surgery. These instruments are used to remove granulation tissue, fibrous interdental tissues, and tenacious subgingival deposits. The Kramer and Kirkland surgical curettes have wider, heavier blades, making them suitable for surgical procedures.

### **Periodontal surgery chisels, hoes, and files**

Due to the bone loss accompanied in some cases of periodontal disease, it may be necessary for the periodontist to recontour the bone during periodontal surgery. In such cases, the dentist will use periodontal surgery chisels, hoes, and files.

The Ochsenbein chisels #1 and #2 (fig. 2-70) are sharp, single-ended chisels with a semicircular indentation on both sides of the shank. This allows the instrument to engage around the tooth into the interdental area. They are designed for secondary sulcular incisions in flap procedures that facilitate removal of remaining connecting fibers on a tooth. They are also used to refine bone contour in ostectomy and osteoplasty procedures.

The double-ended Rhodes #36/37 back-action chisel (fig. 2-71) also is designed for recontouring bone. It is particularly valuable for removal of widow's peaks on difficult to reach distal surfaces of posterior teeth. The Kramer-Nevins #1/2 chisel is a double-ended modified Wedelstadt chisel with a slight curve. It is useful for delicate removal and shaping of interproximal bone during osseous surgery.

The surgical hoe is generally used for detaching pocket walls after the gingivectomy incision. It is also useful for smoothing root and bone surfaces accessible by the surgical procedure. Surgical hoes are usually used with a pull stroke, whereas chisels are engaged with a push stroke.

The Sugarman files #1S/2S and #3S/4S (fig. 2-72) have oval or conical shaped working ends. They are used primarily to smooth rough bony ledges and remove all areas of bone. They are used most often in the interdental areas with a push and pull stroke.



Figure 2-70. Periodontal surgery chisels (Courtesy of Hu-Friedy Mfg. Co. LLC).

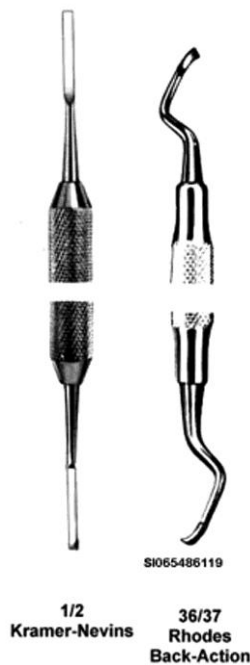


Figure 2-71. Double-ended periodontal surgery chisels (Courtesy of Hu-Friedy Mfg. Co. LLC).

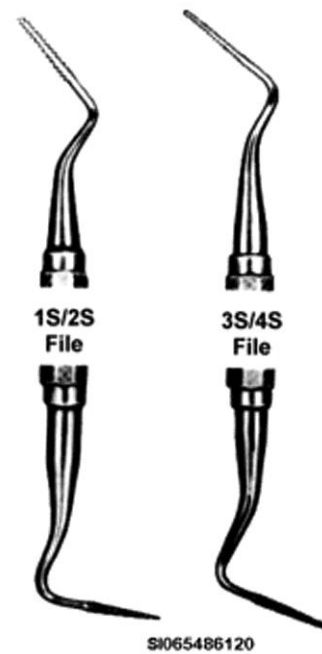


Figure 2-72. Sugarman periodontal surgery files (Courtesy of Hu-Friedy Mfg. Co. LLC).

## Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

### 209. Oral surgery instruments

1. What are surgical rotary instruments used for? What is the purpose of the longer shanks?
2. What type of bur does the Stryker surgical handpiece use and why?
3. What items are included in the surgical suction apparatus? How is the apparatus assembled?
4. What size tip is suitable for use in a tooth socket?
5. Name a commonly used tongue and cheek retractor and describe it.



6. What is the difference between a mouth prop and a mouth gag? Why do both use rubber?
7. How should surgical blades be attached and removed from their handles? Why?
8. Name and describe each of the two commonly used surgical scalpel handles.
9. Identify and describe the commonly used blades for each surgical scalpel handle.
10. How do suture needles and materials arrive?
11. What types of suture materials are absorbable?
12. What is the most common type and size of suture material used in the oral mucosa?
13. How are surgical scissors used in dental surgery?
14. Match each instrument in column B with its description in column A. Items in column B may be used only once.

Column A	Column B
___(1) Commonly used in dental surgery to remove bone chips or other debris from the oral cavity.	a. Tissue forceps.
___(2) One side of the working end has small pointed extensions that form a W-shape.	b. Hemostatic forceps.
___(3) Short, blunt, serrated beaks that are used to hold a suture needle securely.	c. Towel clamps forceps.
___(4) Working ends have either sharp points or blunt flat tips that overlap in the closed position.	d. Needle-holder forceps.
15. How are surgical curettes used?
16. Which curettes are straight, and which are an angled pair?
17. How is the surgical mallet used?

18. What are the uses of the rongeur forceps?
19. What is the bone file used for?
20. What are the uses of the periosteal elevators?
21. What are the three functions of root elevators?
22. Describe the working ends of the Stout #11, Cogswell A, and Cogswell B.
23. How are the Cryer #25 and #26 different from the #1L and #1R Seldins?
24. How are root picks used? Describe the working ends.
25. Describe the #5 and #6 West root picks.
26. Name the three parts of the extraction forceps.
27. How are the beaks of tooth extracting forceps designed to grasp the tooth?
28. What are the overall shapes of the extracting forceps used on each of the arches?
29. Match each forcep in column B with its designated area of use in column A. While items in column B may only be used once, some designated areas in column A will have more than one type of forcep associated with them.

## Column A

- \_\_\_(1) Maxillary incisors and cuspids.
- \_\_\_(2) Maxillary incisors, cuspids, bicuspid, and residual roots.
- \_\_\_(3) Maxillary first and second molars.
- \_\_\_(4) Maxillary third molars.

## Column B

- a. #1.
- b. #15.
- c. #16.
- d. #17.

- |  |                     |
|--|---------------------|
| ___(5) Mandibular anteriors, bicuspid, and roots.                            | e. #53L and #53R.   |
| ___(6) Mandibular first and second molars.                                   | f. #88L and #88R.   |
| ___(7) Mandibular molars.  | g. #101.            |
| ___(8) Mandibular second and third molars.                                   | h. #150.            |
| ___(9) Mandibular third molars.  | i. #150S.           |
| ___(10) Maxillary and mandibular cuspids, bicuspid, and any remaining roots. | j. #151.            |
| ___(11) Maxillary deciduous teeth.   | k. #151S.           |
| ___(12) Mandibular deciduous teeth.  | l. #203.            |
|  | m. #210H and #210S. |
|  | n. #217.            |
|  | o. #222.            |

30. Which forceps are referred to as the maxillary universal forceps?

31. Which forceps are often referred to as maxillary cowhorn forceps?

32. Which forceps are known as the mandibular universal forceps?

33. Which forceps are referred to as the mandibular cowhorn forceps?

34. Which forceps are referred to as the hawkbill forceps?

## **210. Basic periodontal instruments**

1. What periodontal instrument is used to accurately determine the presence, depth, and form of periodontal pockets? What intervals are used to score the working ends?
2. What instrument is designed to help determine the extent of the interradicular involvement?
3. What is the difference between scaling and root planing?
4. Sickle scalers are designed primarily for what use?
5. Briefly explain the cutting edges of sickle scalers.

6. How is the Towner U-15 used?
7. What are Jacquette scalers?
8. What is the instrument of choice for subgingival calculus removal, root planing, and removing soft tissue from the periodontal pocket?
9. Describe the working ends of curettes.
10. Name and explain the factors that determine the selection of an appropriate size curette blade.
11. Which type curette is best for subgingival scaling and root planing? Why?
12. What are periodontal chisels used for and how are they used?
13. What are the uses of periodontal hoes?
14. What are the uses of the periodontal files? Describe the working ends.
15. Explain how the periodontal file is used and with what type of stroke.
16. Why are special scalers made of plastic or Teflon used to clean the abutments of dental implants?
17. What are the four basic scaler versions?
18. Name and describe the periosteal elevator commonly used in periodontal surgery.
19. What are the uses of the surgical hoe?

## 2-2. Oral Surgery

Oral surgery deals with the surgical treatment or correction of diseases, defects, or injuries of the oral cavity, teeth, and facial structures. A sound knowledge of surgical assisting procedures and oral surgery is essential if you are to be an effective dental assistant. In order to assist you in gaining this knowledge, this section will discuss the functions of oral surgery, anesthetics, and the procedures for properly assisting in oral surgery and forensic dentistry.

### 211. Oral surgery function

Oral surgery provides surgical treatment or correction of diseases, defects, or injuries of the oral cavity and facial structures. A wide variety of surgical procedures take place in the oral-maxillofacial surgery area. *Exodontics* is the term used to describe the extraction of teeth in oral surgery. General dentists are trained in surgical procedures; however, they may choose to refer the patient with a more complicated case to an oral surgeon who has specialized training in the area. An oral-maxillofacial surgeon is an oral surgeon who specializes in the reduction of bone fractures and reconstruction of the maxilla or mandible, and performs reconstructive surgery.

In this lesson, we will discuss the indications and contraindications to treatment, the required examination to confirm any previously diagnosed findings, as well as providing the patient with the necessary information to allow the patient to make an informed decision on the course of treatment.

#### Indications and contraindications

Before a surgical procedure can be done, the oral surgeon must first evaluate each patient's record for indications and contraindications to treatment. Some indications for oral surgery include:

- Carious teeth unrestorable by restorative procedures.
- Nonvital teeth when endodontic treatment is not indicated or has little chance of success.
- Removal of teeth to provide space in the arch for orthodontic treatment.
- Teeth without sufficient bone support.
- Supernumerary or impacted teeth interfering with normal dentition.
- Malpositioned teeth that cannot be aligned.
- Root fragments from prior extractions or surgery.
- Removal of soft-tissue tumors.
- Removal of exostosis (overgrowth of bone), such as *Torus Mandibularis* and *Torus Palatinus*.
- Accidental fracture or reconstruction of the mandible or maxilla.

The oral surgeon must also evaluate the patient for possible contraindications to surgical treatment. Patients suffering from any potentially serious disease, such as heart disease, diabetes, and blood disorders, could require evaluation by a physician to determine if they can withstand the prescribed treatment. Pregnant patients may have nonemergent surgery postponed until they are in the second trimester or after delivery.

#### Examination

The oral surgeon examines the patient to confirm the findings of the referring dentist and gather any other additional information to make treatment recommendations. If not already taken, oral surgeons order radiographs of the teeth, mandible, maxilla, or other facial areas to verify the treatment recommendations. The radiographs may include periapical, extraoral of the skull or facial aspects, panoramic, temporomandibular, and occlusal. A comprehensive medical history is essential for the surgical patient because of the strain surgery places on the body. If there are any questions regarding a patient's health or ability to withstand surgery, the surgeon may consult with the patient's physician prior to surgery. During the examination, the oral surgeon also discusses appropriate pain-control

methods for the surgical treatment recommended and informed consent with the patient or legal guardian.

### **Informed consent**

Providing proper informed consent is an integral part of appropriate patient-provider relations. Dental providers should make every attempt to disclose all relevant information to the patient or legal guardian to enable the patient or legal guardian to make an informed decision regarding any proposed treatment. Documented consent should be obtained when it is required by current standards of dental practice. Examples of times when informed consent are required include the use of intravenous conscious sedation or general anesthesia, and certain oral or periodontal surgery procedures.

Most routine informed consents can be easily accomplished during the verbal verification of diagnosis and treatment presentation. Depending on the procedure, informed consents are documented on a special form and/or consist of a handwritten entry in the patient's record signed by the provider.

## **212. Anesthetic**

When dental surgery is indicated, whether oral or periodontal, there are several pain and anxiety control methods available to make surgery as smooth as possible and put the patient at ease. Within this lesson, we will consider the basic levels of anesthesia, monitoring the affects on the patient, as well as performing the necessary documentation. To begin with, the three basic levels of anesthesia are local, conscious sedation, and general.

### **Local anesthesia**

The primary effect of local anesthetic agents is to penetrate the nerve cell membrane and block the conduction of nerve impulses from the point where the local anesthetic is active. This produces anesthesia in the local area. Local anesthesia, using infiltration, nerve block, or a combination of both techniques, is used in all surgery cases to numb the surgery area.

Most dental surgery procedures require two or more injections of local anesthetic. For this reason, it is a good practice to include two aspirating syringes with each instrument setup. This will let you supply the dentist with a loaded anesthetic syringe for as long as needed with minimum loss of time. Since anesthetic solutions are bitter and there is a leakage from injection sites, you will need to irrigate and aspirate the fluids from the patient's mouth after injection.

### **Conscious sedation**

Conscious sedation is a minimally depressed level of consciousness that retains the patient's ability to independently and continuously maintain an airway, and respond appropriately to verbal commands. Conscious sedation involves using various drugs or a combination of drugs to achieve pain and anxiety control while maintaining the patient in a conscious state at all times. The common routes of administration of conscious sedation are oral premedication, inhalation, and intravenous.

### **Oral premedication**

The administration of an antianxiety, sedative, or hypnotic drug helps reduce a patient's apprehension. This method is used mostly on young children, on extremely apprehensive patients, and for extensive surgical treatment. The prescribed medication is directed to be taken by the patient orally the night before or several hours before the surgical procedure. Local anesthesia must also be administered at the time of the surgical treatment.

### **Inhalation**

The inhalation route of administration is limited to nitrous oxide for conscious sedation. Nitrous oxide is delivered as a gas in combination with oxygen to reduce apprehension and produce a state of pleasant relaxation. Its effects vary greatly from patient to patient but are generally described as

creating a pleasant, floating, tingling, relaxing, or dreamy sensation. Analgesia and euphoria, as well as sedation (sleepiness), are often produced.

An advantage of using nitrous oxide for conscious sedation includes a rapid onset and recovery time. The agent is taken up and eliminated rapidly by the lungs. Therefore, it takes effect and wears off within a few minutes of being increased or decreased. A disadvantage of using nitrous oxide is the requirement of special equipment and its maintenance for proper administration. Local anesthesia must be administered in conjunction with nitrous oxide for surgical treatment.

A responsible adult should be available to remain with the patient in the dental facility during the immediate recovery period. Appropriate assessment of the patient's full recovery from nitrous oxide sedation must be made prior to release from the recovery area. The dentist supervising the recovery of the patient determines the need for an escort at the time of discharge and documents the patient record.

### ***Intravenous***

The optimal and most ideal route for conscious sedation is the intravenous (IV) route, by which drugs are injected directly into the bloodstream through an IV catheter or needle. Small incremental doses of a drug are given in a stepwise manner until the desired effect is obtained. Since the drug is injected directly into the bloodstream, absorption is not a factor and drug effect will be seen rapidly (within a minute or less). If medications are injected too quickly, exaggerated effects may be produced. Any toxic reaction, such as an allergic reaction, may become more rapidly life threatening with this route. These problems can be avoided by initially giving a small test dose and slowly increasing the drug. Because of the increased potential for rapid development of complications with the IV route, the highest level of patient monitoring is necessary. Local anesthesia is used in conjunction with IV sedation.

A typical setup of items needed for an IV sedation is shown in figure 2-73. At the completion of treatment, any remaining amount of drugs must be disposed of in the presence of a witness. A responsible adult must accompany any dental patient undergoing IV conscious sedation in the dental clinic. An escort is required to provide necessary assistance during the immediate recovery period.



A. Towel and Towel Clamps  
B. 0.9% Sodium Chloride  
C. Adhesive Pad for Precordial Stethoscope  
D. Adhesive Bandage

E. Adhesive Electrode Monitoring Pads  
F. Tape  
G. Insulin Syringe & Needle  
H. 18-gauge Needle

I. IV Catheter  
J. IV Infusion Set  
K. Alcohol Pads & Betadine Swab  
L. Miniset Vein Infusion Set (Butterfly)  
M. Tourniquet

Figure 2-73. Tray setup for intravenous sedation.

### General anesthesia

General anesthesia is a controlled state of unconsciousness accompanied by a partial or complete loss of protective reflexes, including the ability to maintain an airway independently and respond purposefully to verbal commands. General anesthesia renders the patient unconscious through depression of the central nervous system, thus eliminating patient cooperation as a factor. Pain perception as well as pain reaction is eliminated at the central level. The advantages of total patient control and cooperation with general anesthesia must be weighed against the considerable risks of general anesthesia. The production of general anesthesia involves the administration of potent drugs to produce the loss of consciousness. These potent drugs will also cause loss of protective airway reflexes, and could produce profound cardiovascular, pulmonary, neurologic, renal, and other effects. For this reason, general anesthesia is administered by an anesthesiologist in the hospital operating room. Local anesthesia is also administered at the treatment site.

### Monitoring anesthesia and documentation

Often the dental assistant is relied on to monitor the patient during and after dental treatment when using conscious sedation. Preoperative and postoperative vital signs, such as blood pressure, pulse, and respiration, are required, as well as continuous observation of the patient's level of comfort, level



of consciousness and general appearance during treatment. Respiratory function should be assessed continuously by observing the depth and rate of breathing and skin color. The use of electronic monitoring equipment, such as electrocardiogram (ECG), pulse oximeter, and automatic blood pressure cuff, may be used.

Drugs, whether used for local anesthesia or conscious sedation by any route, must be documented in the patient's record by name, dose, and route of administration. When conscious sedation is used, a special anesthesia record must be incorporated into the patient's record. The AF Form 1417, Sedation Clinical Record, is used for this purpose, and should document the following:

- Vital signs before, during, and after sedation along with the method used to monitor the patient.
- Time sedation began.
- Time, types, and dosages of drugs or inhalation agents administered.
- Any untoward reactions to the drugs, inhalation agents, or procedures performed.
- Condition of the patient on discharge.
- Postoperative instructions given to the patient or escort.

AF Form 1417 is completed for all sedation procedures done in USAF dental treatment facilities, except for those performed in designated operating rooms under the supervision of the department of anesthesia. The original of this form is placed on the left side of the 2100 series outpatient dental record beneath the SF 603/603A, and SF 515, Medical Record—Tissue Examination. When AF Form 1417 is used for a dental procedure, an entry in section 10 of the SF 603/603A will state –See AF Form 1417.”

### **213. Assist with oral surgery procedures**

Prior to the surgery, discuss the essentials for each dental surgery procedure with the dentist. Advance preparation is essential to establish and maintain asepsis during the surgical procedure. With such preparation, be sure to have the necessary instruments, equipment, and materials ready for each patient. Your rapport with surgical patients is important, since these patients are more nervous and apprehensive than other dental patients.

#### **Establishing and maintaining asepsis**

Asepsis (sterility) means being free from pathogenic micro-organisms. Asepsis and strict cleanliness are essential for all surgical procedures. Establishing and maintaining the chain of asepsis means that the instruments, drapes, and gloves of the surgical team must be sterile. Contact with anything not sterile will break the chain of asepsis and contaminate the surgical area.

In order to establish asepsis, you may be required to perform a surgical preparation (scrub) of your hands and forearms, scrubbing from fingertips to the elbows. After rinsing from the hands to elbows, use a sterile or surgically clean towel to dry. Sterile surgical gloves are put on and worn during the entire procedure. Once you put on the sterile gloves, only touch other sterile areas. Additional personal protective equipment (PPE) such as masks, eyewear, and smocks, scrub suits, or gowns are worn. Surgical hats and shoe covers may also be required.

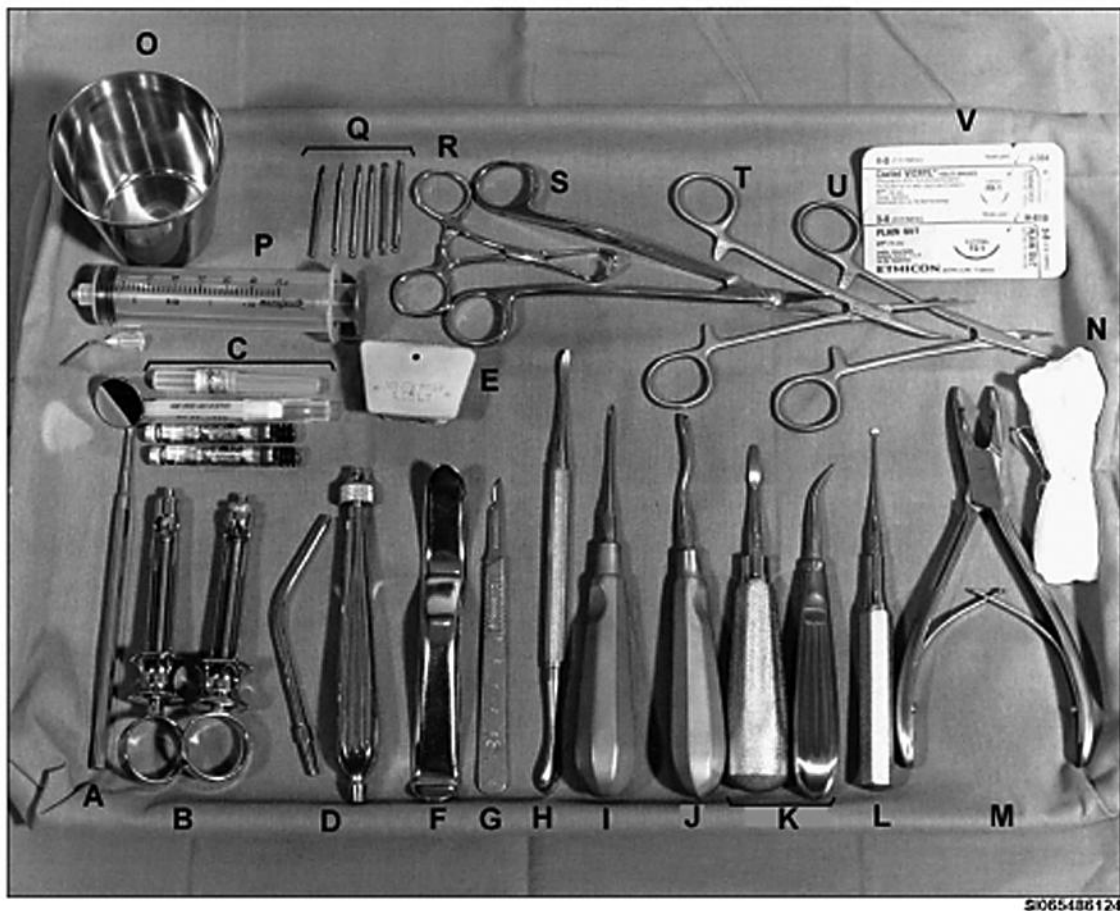
To keep the patient's hair out of the treatment area, place a sterile towel over the patient's hair. Place another sterile towel across the patient's chest and around the neck and shoulders. This surgical drape provides a sterile working area around the patient's face.

The importance of sterility for surgical instruments cannot be overemphasized. Surgery disrupts the natural protective barriers of the soft and hard tissues of the oral cavity. Instruments that are not sterile could cause the surgical site to be contaminated with micro-organisms; therefore, absolute sterility is essential. If an instrument or gloves accidentally touch a nonsterile area, they are

considered contaminated and are replaced before proceeding with the surgery. The barrier technique must always be used to protect the patient, assistant, and dentist.

### Instrument setup and materials

It is critical that you establish and maintain a sterile field when preparing for a surgical procedure. When you open a sterile surgical tray for the procedure, have on sterile gloves. Carefully unfold the corners of the wrap and allow them to drape over the surface where the tray is positioned to provide a sterile field. Arrange the instruments and materials in the sequence in which they are most commonly used for the procedure. This expedites the exchange of instruments between the assistant and dentist, and avoids searching the tray for an out-of-place instrument. Once instruments are used, return them to their proper location whenever possible. As the assistant, know all of the surgery instruments to be used by name, number, purpose, and sequence of use. As part of the preparation, assemble several items on the tray setup, such as aspirating syringes; scalpel and blade; and suction tip, handle, and tubing. You will want to fill the metal cup with sterile saline and fill the irrigation syringe from the cup. Figure 2-74 shows a tray setup for a complex or impacted surgical extraction. Keep the surgical tray setup covered with a sterile towel until the procedure begins.



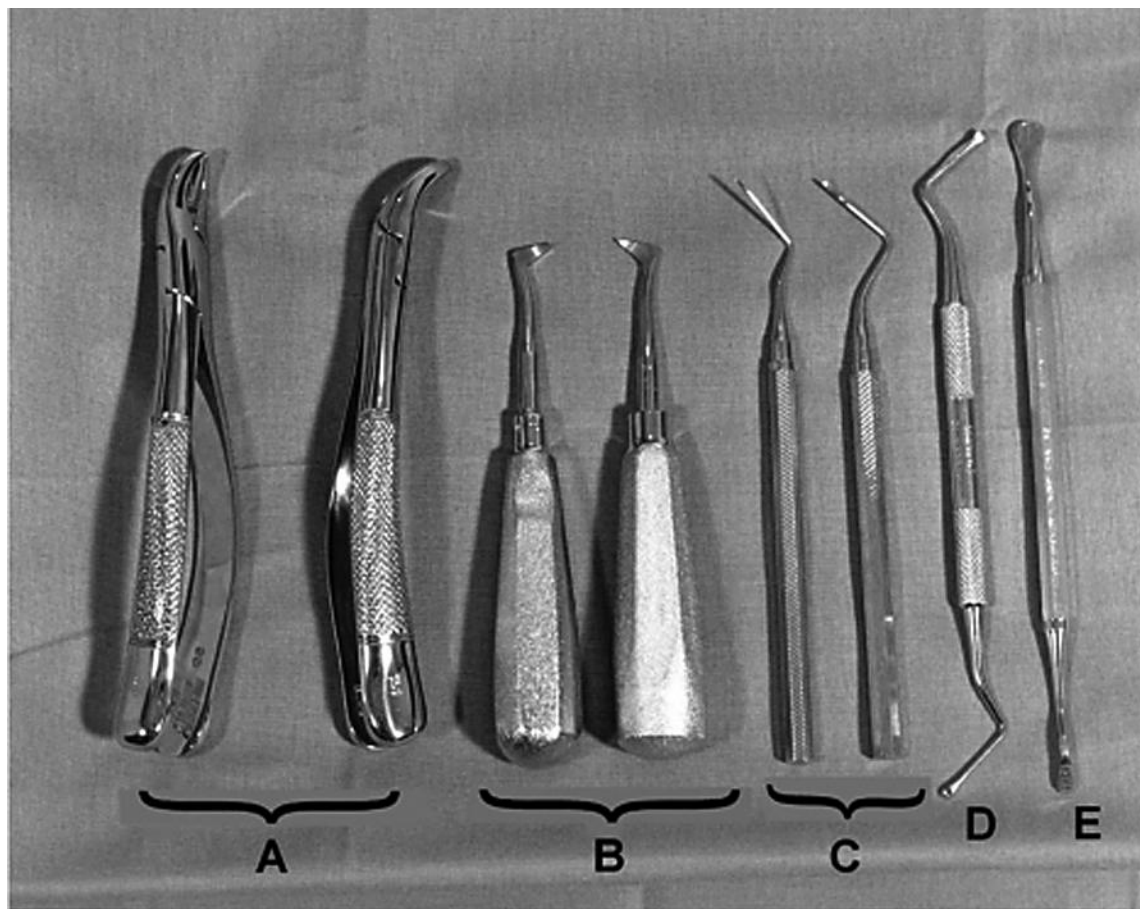
A. Mouth Mirror  
B. Anesthetic Syringes  
C. Anesthetic Needles & Carpules  
D. Surgical Suction Tip & Handle  
E. Mouth Prop  
F. Minnesota Retractor  
G. Scalpel with #15 Blade  
H. Periosteal Elevator

I. Tooth Elevator, #301  
J. Tooth Elevator, #92  
K. Cogswell A & B  
L. Molt Bone Curette  
M. Rongier Forceps  
N. Rolled 4x4 Gauze  
O. Metal Cup

P. Irrigation Syringe & Tip  
Q. Surgical Burs  
R. Towel Clamps  
S. Dean Scissors  
T. Curved Hemostat  
U. Needle Holder  
V. Suture Material

Figure 2-74. Tray setup for a complex or impacted surgical extraction.

Another method of handling surgical instruments is to package or wrap each instrument individually. Only those instruments that the dentist needs are placed on a sterile tray or towel at the time of surgery (fig. 2-75). If simple procedures are done routinely, this method may be more efficient.



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**A. Extraction Forceps, #150 & #151**  
**B. Root Elevators (East/West)**  
**C. Apical Root Tip Picks**

**D. Surgical Curette**  
**E. Bone File**

Figure 2-75. Individually wrapped items placed onto a sterile tray or towel at the time of surgery.

### Patient rapport

Since oral surgery patients tend to be more nervous and apprehensive than other dental patients, it is important that you be a calming influence. You can help a patient relax by performing your duties in a deliberate, calm, and self-confident manner. The key to self-confidence is preparation. When you become thoroughly familiar with each aspect of your job, self-confidence follows. The accomplished oral surgery assistant is a stabilizing influence to even the most nervous oral surgery patient. When the patient arrives, always check to ensure that any prescribed premedication was taken as directed. If not, alert the dentist immediately. Normally, patients awaiting oral surgical treatment will remain in the main patient waiting room. However, in some facilities, a small seating area is located just outside the surgery section. If your clinic has one of these areas, make sure that patients awaiting treatment cannot see into the treatment room. This will help keep them from becoming apprehensive.

Occasionally, a patient is premedicated with a sedative drug before the scheduled appointment time. When this happens, have the patient wait either in the clinic recovery room or a quiet area of the clinic. Be absolutely sure that presedated patients are not left alone, and that a family member or

friend escorts them and will stay until the treatment is finished. Prior to actually seating the patient in the chair, check to make sure that you left no traces of the previous patient's treatment. After you seat your patient and make the person comfortable, ask the patient to loosen any restrictive clothing, and make sure that any of the patient's removable dental appliances are removed and stored in appropriate receptacles.

The surgical assistant transfers instruments; aspirates blood and saliva; irrigates with sterile saline; provides a saline drip for cooling a rotary instrument; retracts the cheek, tongue, or lips; and observes the patient.

### **Anticipation and instrument transfer**

An effective dental assistant learns to understand what instruments are used, and in what order, for varying surgical procedures. This allows the assistant to anticipate the next instrument the dentist will need and have it available without delay. You won't develop such skills overnight, but as you work with a dentist and learn the sequence of the procedures, you will become part of a smooth dental surgery team. Efficiency in surgery lessens blood loss, decreases the time of tissue manipulation, and shortens the period of patient stress. All of these factors can promote better patient response.

Surgical instruments are transferred using the palm-thumb grasp. Hold the working end of the instrument in the palm of your hand in the position the instrument will be used. When passing the instrument to the dentist, place it firmly in the dentist's hand because gloves reduce tactile feeling. Do not release the instrument until the dentist grasps it firmly. When transferring sharp instruments, such as the Bard Parker with a blade attached, use extreme caution not to injure yourself, the doctor, or the patient.

As instruments are returned to the instrument tray, wipe the working end clear of blood and replace them in their proper sequence. This also increases efficiency, as in many procedures a specific instrument can be used more than once. The surgical tray essentially should be as organized at the end of the procedure as it is in the beginning.

### **Aspiration**

During surgical procedures, one of your primary duties is to aspirate fluids from the patient's mouth. The hemorrhage produced by surgical procedures, together with the saliva, presents a twofold problem. First, the use of surgical knives, chisels, and rotating instruments makes it imperative that dentists are able to see what they are doing. Second, the accumulation of blood and saliva in the rear of the patient's mouth tends to excite the patient's gag reflex. For these reasons, the need for constant, comprehensive aspirating cannot be overemphasized. Aspirate all areas of the mouth, not just in and around the treatment site. By anticipating the dentist's moves, you can aspirate ahead of the dentist. This keeps you from getting in the dentist's way.

### **Irrigation**

When a surgical procedure is performed, use an irrigating syringe filled with sterile saline to irrigate the surgical site. Using a sterile solution instead of the water from the 3-way syringe or handpiece prevents bacteria from contaminating the surgical site and possibly causing an infection in the area. Keep a container of sterile saline solution and an irrigating syringe on the instrument tray.

Periodically, flush the treatment site to remove blood, saliva, and debris. A Luer lock syringe with a curved, blunted needle is very helpful when flushing a tooth socket, particularly when attempting to remove a broken or retained root tip. When rotary instruments are used on bone or tooth, use the syringe and saline solution to provide a saline drip on the bur to keep it cool. If this is not done, bone cells will be destroyed, resulting in bone death and possibly increased postoperative pain and/or complications. Make the irrigation steady with the overflow aspirated from the mouth. Use the irrigating solution to dampen gauze sponges for moistening the patient's lips throughout the surgical procedure, clean blood and debris from instruments prior to returning them to the instrument tray, and clean the patient's tongue and lips at the procedure's conclusion.

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**Retraction**

Another of your important duties is the careful use of a retractor. There are, of course, many instruments designed as retractors. The mouth mirror also makes an excellent retractor. Make sure you have a firm hold on retracted tissue, particularly during procedures such as cutting, drilling, or suturing.

**Observation**

Stay constantly aware of the patient's physical condition during the entire surgical procedure. If any changes occur, quietly point them out to the dentist at once. Always be prepared to lend immediate assistance during an emergency. Under no circumstances make a remark on a sudden complication in the procedure. Such remarks tend to excite and further arouse the patient's nervousness. As you might suspect, this could lead to even further adverse patient reaction.

In order to be an effective assistant, you must have some knowledge of the treatment sequence. Simple extractions, impacted extractions, multiple extractions, and suture placement are some of the more commonly performed procedures.

**Simple extractions**

These extractions can be done without extensive instrumentation or complication during surgery. Often these extractions are referred to as forceps extractions, since they can be done with standard forceps without removing bone or sectioning the tooth. It is important that you have a basic understanding of the procedure to be an effective assistant. The steps are as follows:

- Pass the mouth mirror to the dentist for examination.
- Pass the prepared aspirating syringe to the dentist to administer local anesthetic.
- After you receive the aspirating syringe from the dentist, return the syringe to its proper place on the tray.
- Irrigate with saline and aspirate following the administration of the anesthetic. Throughout the procedure, you will irrigate, aspirate, and retract tissue many times.
- Pass a pointed instrument, such as an explorer, to the dentist, who will check the anesthesia by gently probing the gingiva surrounding the tooth to be extracted.
- The dentist should inform the patient that some pressure may be felt, and grating or cracking sounds may be heard during the extraction.
- Pass the periosteal elevator to the dentist, who will use it to gently loosen the gingival tissue and compress the alveolar bone surrounding the tooth.
- The dentist may use a tooth elevator to loosen the tooth prior to placing the extraction forceps.
- Pass the extraction forceps to the dentist, who will place the beaks parallel to the long axis of the tooth and seat them firmly to grasp the tooth around the cemento-enamel junction.
- The dentist rocks the tooth back and forth in the socket (luxates) to compress the bone and enlarge the socket.
- The dentist lifts the tooth from the socket and examines the extracted tooth to be certain that the root did not fracture and remain in the socket.
- If the root tip is fractured, the dentist will use root picks and root elevators to remove the fragments.
- Use the suction tip to debride the surgical site and keep the root tip visible, if one exists. If the suction loosens the root tip, remove it from the suction tip and reassemble it with the extracted tooth to be certain that all fragments are removed.

**Impacted extractions**

Impactions are caused by soft tissue, or bone and soft tissue, blocking the tooth from complete eruption. In either case, the soft tissue must be removed to gain access to the tooth before it can be extracted. The alveolar bone over the impaction is removed using a bur or a bone chisel and mallet. This is necessary to provide access for elevators or extraction forceps to extract the tooth. The tooth is sectioned into pieces with a bur and each piece removed separately. An example of an impacted extraction is the removal of unerupted third molars.

The sequence of this procedure begins the same as mentioned previously with examination, anesthesia, irrigation, and aspiration. The steps are:

- Place a mouth prop in the opposite side of the patient's mouth.
- Pass the Minnesota retractor and scalpel to the dentist to make the incision.
- Pass the periosteal elevator to the dentist to use it to lift the combination mucosa and periosteum (mucoperiosteal) from the surface of the underlying bone. The mucoperiosteal flap is retracted with the periosteal elevator to give the dentist access to the bony covering over the impacted tooth.
- You may need to pass the Dean scissors to the dentist to open the retro molar pad area.
- During the procedure you will constantly aspirate blood from the surgical site.
- The bony covering over the impacted tooth must be removed to gain access to the tooth. Removal of the bone is done with either a surgical mallet and chisels, or a Stryker handpiece with surgical burs.
- If the dentist uses a surgical mallet and chisels, you may be required to retract the mucoperiosteal flap while the dentist holds a chisel in one hand and the surgical mallet in the other. Some dentists prefer to retract the flap with one hand and hold the chisel in the other while you gently tap the end of the chisel with the surgical mallet. You will also need to irrigate the surgical site with saline and aspirate to remove bone fragments and improve visibility.
- If the dentist uses a surgical bur in a handpiece to remove the bone, continually drop saline solution on the bur while it is cutting. This keeps the bur from clogging and reduces frictional heat on the bone. Hold the suction tip in one hand and the irrigating syringe in the other. This is necessary so you can constantly irrigate and aspirate the surgical site during bone removal with the surgical bur. The dentist retracts the mucoperiosteal with one hand while operating the handpiece with the other.
- When the impacted tooth is uncovered, pass a tooth elevator, such as the #301 or #92 to the dentist.
- The dentist will use extraction forceps for the final removal of the tooth from the socket.
- The dentist may have to divide or section the crown of the tooth into two or more parts to allow room for luxation and removal of the tooth. The dentist will use either the mallet and chisel, or Stryker handpiece and surgical bur to section the tooth.
- The dentist examines the site to see that all loose debris has been removed.
- Pass the surgical curette to remove loose debris from the alveolus.
- Pass the rongeur forceps and bone file to smooth the bony edges of the opening into the alveolus which are sharp or rough.

**Multiple extractions**

In some situations, the dentist will extract several teeth at the same time. When this is done in preparation for complete or removable partial dentures, the dentist surgically contours the remaining bone and soft tissue.

The procedure begins in the same manner as discussed previously with examination, anesthesia, irrigation, and aspiration. After adequate anesthesia is achieved, pass the dentist a retractor and scalpel. When it becomes necessary to contour the edentulous ridge after the removal of the teeth, the dentist makes an incision and retracts the mucoperiosteal flap away from the teeth on the buccal aspect of the alveolar ridge. Once the incision is made and the flap is retracted, constantly aspirate blood from the surgical site.

Usually, the dentist starts extracting the teeth with the most posterior tooth and moves anteriorly. This gives the dentist some mechanical advantage in luxating the remaining teeth after the last molar in the arch is removed. Have the tooth elevator ready to pass to the dentist to luxate the tooth. When the dentist is ready to lift the tooth from the alveoli, pass the extraction forceps.

After each tooth is removed from the alveolus, irrigate and aspirate the site. The dentist will examine each extracted tooth to ensure the root has not been fractured and left in the socket. If the root tip has fractured, the dentist will use root picks and root elevators to remove the fragments. After the teeth are removed and all root tips recovered, the dentist is ready to recontour the alveolar bone, a procedure known as an alveoloplasty. Pass the rongeur forceps to the dentist to trim the alveolus.

After each cut with the rongeur forceps, use a sterile gauze square to remove any debris from the blades. Following the use of the rongeur forceps, have a bone file ready to pass to the dentist. The dentist will use the bone file to finish smoothing rough margins of the alveolar ridge. After each stroke with the file, use a clean sterile gauze square to remove any debris from the grooves of the file.

After the alveoloplasty, have the Dean scissors ready to pass to the dentist. Often, the dentist will trim the border of the mucoperiosteal flap and remaining attached gingiva. This removes any soft tissue that could have been damaged during the extraction procedure. It also eliminates excess soft tissue and provides for a smoother surface of the edentulous ridge.

### **Suture placement**

Irrigate and aspirate the surgical site before suturing takes place. Prepare and pass the suture material to the dentist. The dentist selects the type of suture needle and material. Prepare the suture needle and material by placing the threaded suture needle at a right angle to the needle holder or hemostat. Lock the suture needle in place and pass it to the dentist. Retract the tongue or cheeks to provide a clear line of vision as the dentist sutures the area. After each suture is tied, use the suture scissors to cut the sutures approximately 2 to 3 mm beyond the knot. The dentist may use a continuous suture technique to close more lengthy incisions. Always record in the patient's record the number of sutures, type of suture material, and type of suturing technique used.

Some of the more common postoperative procedures you will perform will include dismissing the patient and providing postsurgical instructions

### **Dismissing the patient**

Irrigate and aspirate the patient's mouth and place pressure packs over the surgical site. The pressure pack is made of several moistened, sterile gauze squares.

Once the surgical procedure is completed, cover the instruments and equipment with a towel and remove them before the patient has a chance to see them. The sight of one's teeth, tissues, and bloody sponges can be psychologically traumatic to a patient. Moisten a gauze sponge and remove all blood from the patient's face and lips. Sit the patient upright and ensure postsurgical instructions are given. Then, remove the drape and reposition the chair so that the patient is able to exit easily.

### **Postsurgical instructions**

Postsurgical instructions to patients are important guidelines they should follow to prevent complications and unnecessary discomfort. In many instances, the dental assistant is responsible for giving the postsurgical instructions to the patient. It is advisable to discuss these instructions with the patient after surgery to prevent confusion. If a patient is to be sedated, give verbal instructions to the

patient prior to the sedation and to the patient's escort. In either case, give patients a printed copy of the instructions to review after leaving the dental clinic. Patients tend to forget verbal instructions, especially when they are given right after surgery. The verbal instructions are given only to emphasize the important written guidelines.

Stress to the patient that home care following dental surgery is important and recovery could be delayed if this is neglected. Inform the patient that some swelling, stiffness, and discomfort are to be expected. If these reactions are greater than expected, tell the patient to call or return to the dental clinic for care.

Explain the expected effects of anesthesia, both local and conscious sedation agents, if applicable, to the patient and escort. Inform the patient to keep the gauze pack in place over the surgical site with light pressure until the hemorrhage stops or the gauze becomes saturated. Following the surgery, many patients are so relieved once the surgery is completed that they will try to talk and ask numerous questions. Firmly, discourage this by explaining to the patient that healing strongly depends on establishing good clots and steady firm pressure. Provide extra gauze and inform the patient to place new gauze over the surgical site as needed. The gauze pack need not be replaced if bleeding has ceased. Slight ooze can be expected at times and could continue for a few hours. Tell the patient that in order to avoid hemorrhage at the surgical site, it's best to limit activities and avoid strenuous work or exercise for a few days after surgery.

Keep the head elevated with pillows when resting or sleeping during the first 24 hours. Activity or lowering the head increases blood pressure and can promote continued bleeding.

Instruct the patient not to smoke or use a straw for at least 24 hours. Frequent spitting, sucking on the wound, and using mouthwashes should also be avoided during this time. Suction resulting from spitting, smoking, using straws or swishing of liquids stimulates bleeding and decreases the potential of securing an adequate blood clot. Sucking actions alone could dislodge an adequately formed clot.

Inform the patient to take the prescribed medications for pain and antibiotics to prevent infection. It is best if the patient takes the first dose of pain medication after removal of the initial gauze pack. This allows the pain medication to enter the bloodstream prior to the effects of local anesthetics being lost.

Instruct oral surgery patients to place an ice bag or chemical cold pack on the external area of the treatment site for the first 24 hours to minimize swelling. Apply the ice for at least 15 minutes on and 15 minutes off. Any amount of time less than this will not permit the cold to penetrate the tissues adequately. Cold is effective in decreasing edema by constricting blood vessels; therefore, it must penetrate to the affected tissue. Prolonged cold used to decrease swelling can restrict the blood supply to the area so much that an infection could occur secondary to the body's decreased defense. Heat may be placed on the jaw after the first 24 hours to minimize swelling. The use of heat any sooner could increase the swelling.

Recommend a soft diet and sipping large quantities of water and fruit juices for a few days following dental surgery. Make sure the patient has an appointment to return for a postsurgical check or suture removal in three to five days.

Remain with the surgical patients until they recover enough to be dismissed. Dismiss your patients as cordially as you received them. Closely observe the patients as they leave to make sure that they are steady and show no signs of distress. If patients exhibit any signs of dizziness, detain them until the oral surgeon can evaluate their condition.

#### **214. Forensic dentistry function**

The first, comparative, method of forensic dentistry can only happen when the deceased person has visited a dentist during his or her life time. Do you recall having a panograph taken of you when you entered basic training?



The panograph is duplicated one time, one radiograph is placed in your Air force dental record at your current base and the other is sent to a secured repository. In case of a member's untimely demise, the Air Force must be able to positively identify the individual. If your Air Force dental record is lost, we have the repository radiograph as a backup.

A forensic or qualified dentist examines each tooth carefully to see if it matches the victim's records. Usually, we will match charting on the SF 603/603A with the panograph and then match with the victim. There are four possible results from the examination. A positive identification can be made if every tooth matches the dental record. There can be a possible identification where only a few teeth match the dental record (location of the other teeth are unknown). There can be insufficient dental evidence to make a valid identification and finally, there can be a decision that the teeth do not match the records at all.

In a mass casualty situation (aircraft crash, natural disasters, or modern warfare), positive identification of the deceased may be extremely difficult. In many instances, the comparison of a thorough post-mortem dental examination to existing antemortem dental records is the only means available for identification. Restorations, missing teeth, prostheses, and dental anomalies can be just as valuable as fingerprints.

## **215. Assist with forensic dentistry procedures**

As a dental assistant, you may be called upon to assist in the identification of a deceased active duty member or civilians involved in a natural disaster. Your responsibilities are to assist the dentist in making a positive identification. Preparing for this procedure is similar to an oral surgery procedure. You will most likely be in mortuary environment.

### **Prepare for the examination**

Once called upon, you will need to prepare for the examination. You will first locate the dental record of the victim. If you are not able to locate the record, inform the dentist and he or she will request the duplicated panograph to be sent to the facility.

While waiting for the patient and the record/panograph to arrive, you will prepare for the exam by transferring instruments and equipment to the mortuary. Items needed for the examination will include digital x-ray equipment, a BDS to include a mouth mirror, explorer, tongue depressors and cotton forceps. PPE to include surgical cap, eye protection, gown, surgical gloves and foot covers will need to be taken for you and the dentist.

For the documentation of the examination, you will retrieve an AF Form 1801, Postmortem Dental Record, an AF Form 1802, Antemortem Dental Record, and an AF Form 1803, Dental Identification Summary Report. Ensure you include permanent markers, red/blue/black pens, and pencils in preparation for documentation. Before the procedure begins, you will be briefed by the dental officer. It is very important that the entire team be consistent! Charting standards should be provided to every member for reference. Two members of the antemortem staff should review the composite antemortem record as a quality insurance check after charting is complete.

### **Antemortem exam**

It is important to note that the antemortem exam is completed **WITHOUT** radiographs. The exam covers the clinical aspect of the teeth during the forensic examination, meaning what can be visualized in the patient's mouth. The steps in the antemortem examination procedures are as follows:

- Set up treatment room, i.e. instruments and PPE.
- Gain entry into the oral cavity.
- Remove debris and wipe the teeth clean.
- Check for the presence of prostheses (complete dentures, removable or fixed partial dentures).

Start with tooth #1 and inspect each tooth. Note missing teeth, existing restorations (surfaces involved and materials used), and any obvious caries. You will chart each item as if you were completing an initial examination on an SF Form 603. Record all findings from the clinical portion of the forensic examination on AF Form 1802 using the guidelines/instructions given.

WinID SYMBOLS			
PRIMARY CODES		SECONDARY CODES	
C	crown	A	anomaly
D	distal	B	primary tooth
F	facial	E	resin
I	incisal	G	gold
J	missing/trauma	H	porcelain
L	lingual	N	nongold metal
M	mesial	P	pontic
O	occlusal	Q	¾ crown
U	uniterupted	R	root canal
V	nonrestored	S	silver amalgam
X	extracted	T	denture tooth
/	no information	Z	tem fil/caries

Blocks on the form are provided to list caries (by surfaces involved) and restorations (by surfaces involved and materials used). Note that posterior teeth (molars and bicuspids) are illustrated in three aspects; the facial, occlusal, and lingual surfaces. Specific characteristics are noted by the following:

### ***Edentulous arch***

Inscribe two crossing lines, each running from the uppermost aspect of one third molar to the lowermost aspect of the third molar on the opposite side.

### ***Individual missing teeth***

Draw an **—X** on the root or roots of each natural tooth that is not present in the mouth. This applies to unerupted, extracted, congenitally missing teeth as well as those lost posthumously. Indicate the latter by placing **—K** between the outline of the tooth and its corresponding numeral.

### ***Deciduous “baby” teeth***

Deciduous teeth are assigned the same numbers as the permanent teeth they replace. If a deciduous tooth is present in place of a permanent tooth that never developed or erupted, place a **—D** around the corresponding tooth number. If a deciduous tooth has been retained in addition to its permanent successor, indicate its relative position with a block letter “D” around its appropriate numeral.

### ***Restorations***

Outline each of the following restorations:

- Amalgam restorations—outline and indicate its shape and extent. Block in solidly.
- Single gold restorations—outline and inscribe horizontal parallel lines within the outline.
- Non-metallic restorations—draw only the outline of size, location, and shape.
- Combination restorations—outline each restoration and indicate material used.

***Removable partial dentures***

Draw a horizontal line between the outline of the teeth and the numerals over the teeth replaced by the dentures. Note any identification labels/markings of the removable appliance such as name or social security number.

***Fixed partial denture***

Outline each aspect, including crowns on existing teeth as well as replacements for missing ones. Indicate materials used as outlined above with one exception. Show gold in a fixed partial denture by inscribing diagonal parallel lines.

Describe all dentures in detail in the —Dentures” section of form. Follow the directions given.

**Post mortem examination**

The main purpose for a second examination is the use of post mortem radiographs. The radiographs allow you and your team to see the non-clinical aspect of the patient’s mouth.

***Examination procedural steps***

Start with tooth #1 and inspect each tooth. Note missing teeth, existing restorations (surfaces involved and materials used), and any obvious caries. You will chart as if you were completing an initial examination on an SF Form 603. Record all findings on AF Form 1801, Postmortem Dental Identification Chart using the guidelines/instructions given.

First examiner makes statement of findings and is recorded by second examiner. After completion of exam, the process is repeated with examiner roles reversed.

Factors to be considered/recorded are restorations, missing teeth, and prosthetic appliances and note any unique features. Be sure to document the age estimate, possible gender, or racial group.

Accomplish the examination on AF Form 1801; it should be mirror image of AF Form 1802.

- This allows side-by-side comparison.
- Use the same charting and symbols as antemortem record.

***Radiography***

Use digital radiography to take images requested by team leader.

- Portable 50kvp unit is adequate.
- Practice safe shielding techniques.
- Only process one case at a time.
- Use 4×4 gauze packs and Play-Doh to stabilize sensor during exposure.
- Goal is to try to reproduce standard full mouth x-ray series.
- Must capture all apices and occlusal/incisal edges.

All radiographs must be placed on one labeled CD for postmortem record which allows for the following:

- Provides objective legal evidence.
- Antemortem/postmortem comparison is invaluable.
- Unique alveolar/dental anatomy can establish identifications if no restorations exist.
- ID can be made on as little as one fragment or one tooth if unique anatomy or restoration is present.

Postmortem Dental Records & Comparison allows for the following:

- Compares antemortem/postmortem records for possible matches.

- Once significant comparison point is reached, radiographs of respective records are reviewed to help establish identity.

**NOTE:** Dentists must still make positive identification!

***Positive dental identification***

Once positive dental ID is made, proper documentation is accomplished by completing AF Form 1803. All of victim's documents are placed together and secured. All positive IDs are routed through dental chief to ID Center Chief.

**NOTE:** DO NOT RELEASE INFORMATION OUTSIDE OF THIS CHAIN.

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## **Self-Test Questions**

**After you complete these questions, you may check your answers at the end of the unit.**

### **211. Oral surgery function**

1. What is the function of oral surgery?
2. What is an oral-maxillofacial surgeon?
3. What are some indications for oral surgery treatment?
4. When should pregnant patients *not* have nonemergent surgery?
5. What is the purpose of the oral surgery examination?
6. What is informed consent?
7. When should documented informed consent be obtained? Give some examples.
8. How is informed consent documented?

### **212. Anesthetic**

1. What are the three basic levels of anesthesia?

2. What type of anesthesia is used in all surgery cases to numb the surgery area?
3. Why are two aspirating syringes included with each instrument setup?
4. Why is it necessary to irrigate and aspirate the patient's mouth after injections?
5. What is conscious sedation? What are the three routes of administration?
6. When is the oral premedication method used most?
7. When is the oral premedication actually taken?
8. What is used in the inhalation route of conscious sedation?
9. What are the advantages and disadvantages of nitrous oxide?
10. Who determines the need for an escort when nitrous oxide is administered?
11. What is the optimal and most ideal route for conscious sedation?
12. Why are intravenously administered drugs initially given in a small test dose and slowly increased?
13. Why is the highest level of patient monitoring necessary with the IV administration?
14. Name the typical items needed for an IV tray setup. (Refer to figure 2-73.)
15. What is done with any remaining amount of drugs following an IV sedation?

16. Who must accompany any dental patient undergoing IV sedation in the dental clinic and why?
17. What is general anesthesia?
18. Who administers general anesthesia and where?
19. What may the dental assistant be required to monitor during and after dental treatment when using conscious sedation?
20. What type of electronic monitoring equipment may be used?
21. Explain how drugs must be documented in the patient's record.
22. What form is used to record anesthesia into the patient's record when conscious sedation is used?
23. What should the anesthesia record document?
24. What form is completed for all sedation procedures done in dental treatment facilities in the USAF except for those performed in designated operating rooms under the supervision of the department of anesthesia? Where is the original copy of this form filed?

**213. Assist with oral surgery procedures**

1. What breaks the chain of asepsis and contaminates the surgical area?
2. How is asepsis established?
3. How do you establish and maintain a sterile field when opening sterile surgical trays?
4. Why are instruments and materials arranged in the sequence in which they are most commonly used during the procedure?

5. What items on the instrument tray require assembly or preparation?
6. Why is it important that you perform your duties in a deliberate, calm, and self-confident manner when working in oral surgery?
7. What should you ensure when surgery patients arrive?
8. What should be done when a prescheduled patient arrives before the scheduled appointment time?
9. What items should patients remove after you seat them?
10. Why is it important to be efficient when assisting in oral surgery?
11. Briefly explain how surgery instruments are transferred.
12. Why is the working end of instruments wiped clear of blood and replaced in the proper sequence?
13. Why is it important to perform constant, comprehensive aspiration during the surgical procedure?
14. Why is sterile water used to irrigate the surgical site?
15. Why is it necessary to provide a saline drip on the bur when rotary instruments are used on the bone or tooth?
16. What instrument makes an excellent retractor?
17. Why is it important not to make a remark about a sudden complication in the procedure?

18. What instrument does the dentist use to check anesthesia?
19. What instrument does the dentist use to gently loosen the gingival tissue and compress the alveolar bone surrounding the tooth?
20. Why does the dentist examine the extracted tooth?
21. What should you do if the suction loosens the root tip?
22. What do you pass to the dentist after the mouth prop is placed?
23. What must you do constantly once the incision is made and the flap retracted?
24. What does the dentist use to remove the bony covering over the impacted tooth?
25. What must you provide if the dentist uses a surgical bur in a handpiece to remove bone?
26. What instrument do you pass to the dentist once the impacted tooth is uncovered?
27. What instruments does the dentist use to trim and smooth bony edges of the opening into the alveolus?
28. Where does the dentist usually start when extracting multiple teeth, and why?
29. What instrument do you pass when the dentist is ready to lift the tooth from the alveoli?
30. What instruments should you have ready to pass if the root tip has fractured?



31. Explain how to prepare the suture needle and material.
32. How do you assist the dentist while the sutures are being placed?
33. What information regarding suture placement is recorded in the patient's record?
34. When should postsurgical instructions be discussed? How should they be given?
35. What advice should you give a patient to avoid hemorrhage at the surgical site?
36. Why should patients be instructed not to smoke, spit, or use straws following surgery?

**214. Forensic dentistry function**

1. Explain why the panograph is duplicated.
2. What are the four possible methods for making a positive identification of a deceased person?

**215. Assist with forensic dentistry procedures**

1. Name the three forms used in dental forensics identification.
2. When starting the antemortem exam, which tooth do you inspect first?
3. What is the purpose for a second examination?

**2-3. Periodontics**

Periodontics is the branch of dentistry that involves the diagnosis and treatment of diseases of the supportive structures of the teeth. These supportive structures, collectively termed *the periodontium*, consist of the gingiva, periodontal ligaments and alveolar bone. Diseases that damage the periodontium are called periodontal diseases.

The lessons within this section will provide you with a thorough understanding of the function of periodontics, as well as indications and contraindications; periodontic examinations, charting and treatment plans; as well as assisting with periodontic procedures.

## **216. Periodontal function and indications**

Dental technicians assist with periodontal charting, periodontal surgeries, and provide home care instructions to the patients. As a result, the purpose of this lesson is to provide you with a thorough understanding of the function of periodontal treatment as well as indications and contraindications of periodontal diseases.

### **Function**

The treatment of periodontal diseases encompasses both the dental and medical professions. If it is determined that the cause of a patient's periodontal disturbance is due to systemic factors, the patient is referred to the medical facility for diagnosis and treatment.

The dental treatment of a periodontal patient requires coordinated treatment from the other specialty areas. Often, patients needing periodontal treatment are referred from other specialty areas where they were seeking treatment for other related dental problems. Sometimes the referring dentist must wait until the periodontal treatment is completed before proceeding with the original treatment. For example, the patient may need a prosthetic appliance to replace some missing teeth. However, the patient's periodontal condition requires treatment before the appliance can be made. In evaluating and treating a patient's periodontal disease, the periodontist may decide to eliminate periodontal pockets surrounding some teeth and determine other teeth are nonrestorable. In this case, the patient is referred to an oral surgeon for removal of these teeth. The periodontist may determine that other periodontal problems can be alleviated by having a dentist in general dentistry remove and replace faulty restorations. In some situations, the services of the orthodontist may be required to reposition malposed teeth. As you can see, referring a patient may be necessary from any one specialty to another.

Since periodontal disease affects the supportive structures of the teeth, the primary function of periodontal treatment is the elimination of periodontal pockets. There are several reasons to eliminate pockets. A pocket is an area of food and bacterial accumulation, and infection. It can create conditions, such as loss of gingival covering that can lead to exposure of the root and possible caries. A pocket can cause degenerative changes in the gingiva, which could increase the susceptibility to acute necrotizing ulcerative gingivitis (ANUG). Pockets can cause degenerative changes in the periodontal ligaments, and the inflammation from the pocket walls is a factor responsible for the bone loss in periodontal disease. These pockets can be a source of discomfort to a patient during mastication.

### **Indications and contraindications**

Most periodontal diseases are characterized by inflammation that initially affects the gingiva. Advancement of the inflammatory process, if not stopped, could proceed to cause damage to periodontal ligament tissue and alveolar bone. Inflammatory diseases confined to the gingiva are termed *gingivitis*, whereas those that cause damage in the deeper supporting structures are classified as periodontitis.

Early signs and symptoms of periodontal disease found in the interdental papilla and marginal gingival include the following:

- Redness.
- Tendency to bleed easily.
- Evidence of exudate.
- Sponginess.

- Tenderness.
- Slight swelling.
- Probing depth of pockets.

Periodontal treatment is indicated when a periodontal condition cannot be eliminated through preventive care, including improved oral hygiene and diet. Resorption of the alveolar bone and the periodontal tissues are also indications for treatment. If the progress of the disease is stopped, the teeth might have adequate support for retention. For successful periodontal treatment, a patient must be willing to accept the periodontal treatment and the requirements necessary to maintain good oral hygiene. Often, periodontal treatment is indicated in connection with dental treatment provided in other areas, such as endodontics and prosthodontics.

There are several situations that contraindicate periodontal treatment. A patient in poor general health with a poor prognosis for successful treatment and healing is one example. Another would be a patient with an extensive infection within the periodontium and/or bone loss too extensive to provide support for the tooth following periodontal surgery. Periodontal treatment is definitely contraindicated if the patient has a negative attitude and unwillingness to cooperate in establishing and maintaining good oral hygiene and nutrition.

### **217. Examination, charting, and treatment plan**

Within this lesson, we will discuss the comprehensive nature of the initial examination, charting and treatment plan that you need to be familiar with as a dental assistant technician when working in the area of periodontics.

The initial examination of the periodontal patient includes thoroughly reviewing the patient's medical-dental health history, dental treatment history, and radiographs; charting of periodontal probing depths, occlusion, and tooth mobility; and determining a treatment plan. The review of the patient's medical-dental health history should reveal systemic conditions, such as chronic illness or diseases that could influence the progress of periodontal disease or its treatment.

The dental treatment history provides valuable information regarding the dental status of the patient, such as past dental treatment, the patient's oral hygiene habits, and attitude toward dental health. A current full series of periapical radiographs and vertical bite wings are necessary for a thorough periodontal examination. Radiographs are extremely useful in the diagnosis and treatment of periodontal disease because conditions such as bone loss around the teeth, calculus, poor margins and overhangs on restorations, and open tooth contacts are visible. In addition to radiographs, some dentists may make clinical photographs of their patient's mouth. In some cases, diagnostic study casts are also indicated.

The results of the examination are recorded on AF Form 935, Periodontal Diagnosis and Treatment Plan. This form provides a permanent record of examination, diagnosis, and treatment plan for initiation of each new course of therapy for treatment of periodontal disease. The form is an anatomical chart that contains diagrams of the teeth with spaces for comments. The findings related to the teeth that are charted include missing, unerupted, malpositioned, or replaced teeth; dental caries; open or faulty contacts; defective or poor restorations; food impaction; pain on percussion; and plunger cusps. Findings of the periodontium include the gingival level on the tooth, areas of gingival recession or clefts, gingival enlargement or craters, probing depths, frenum attachments, furcation invasion (disease extension between the roots of multirrooted teeth), bleeding points, tooth resection, and tooth mobility. This form also permits documentation of changes in the teeth, occlusal relations, soft tissue alterations, and information gained from radiographs.

Perhaps the most important findings are the probing depths of the gingival sulcus or periodontal pockets. The dentist determines these measurements using a periodontal probe calibrated in millimeters. The dentist inserts the periodontal probe into the gingival sulcus to the depth of the epithelial attachment. The distance between the attachment and the gingival margin is measured and

recorded. Six measurements are made of the gingival sulcus or pocket depth on each tooth—three on the facial and three on the lingual. The dentist walks the probe around the tooth for the three measurements on the facial surface of each tooth in the arch: distofacial, facial, and mesiofacial (fig. 2-76). The dentist repeats the probing procedure for the three measurements on the lingual surfaces of each tooth in the arch: distolingual, lingual, and mesiolingual. The probing process is repeated for the opposite arch.

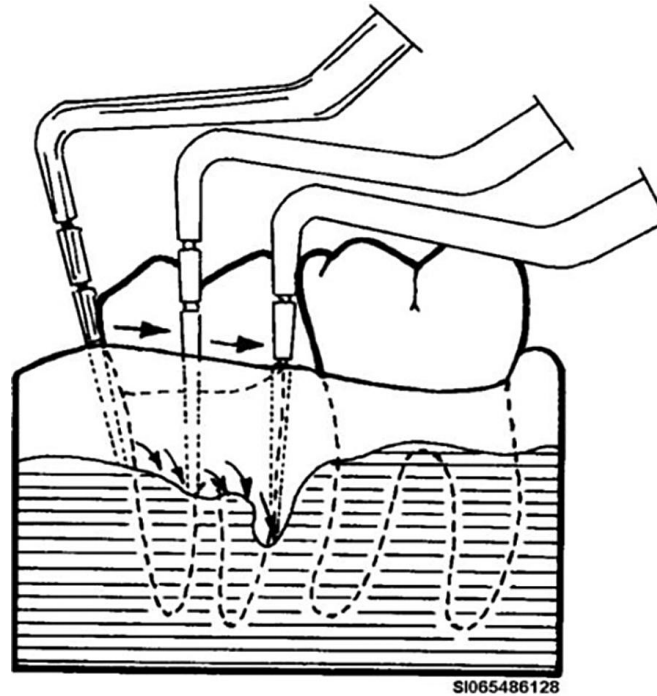


Figure 2-76. Walking the periodontal probe around the tooth.

The dentist tests each tooth for mobility by finger pressure to push it in a facial-lingual direction and pressing on the occlusal or incisal surface. A scale of one to three is used to describe and record mobility, as shown in the following table.

Scale	Explanation
I	Slightly greater than normal
II	Moderate mobility
III	Extensive mobility in all directions (depressible and rotatable)

At the same time, the dentist evaluates each tooth individually for sensitivity to pain on percussion (slight tapping). Drifted, missing, or malposed teeth and open contacts are recorded since they could be factors in the progression of periodontal disease. Existing restorations and prosthetic appliances are assessed to determine their possible contribution to periodontal problems.

Findings from radiographs, occlusal findings of tooth-to-tooth occlusal contacts, any significant temporomandibular joint findings or habits, accumulation of plaque or calculus on the teeth are noted and recorded.

Your primary responsibility during the examination is to record the findings on AF Form 935 as the dentist dictates them. In order to accomplish this effectively, you must be familiar with the approved charting symbols used on AF Form 935 (fig. 2-77).

You will use ink to record the patient's name, social security number (SSN), significant medical history, and blood pressure. All other notations are made in red, blue, or regular pencil. Additional instructions for completing this form are included in AF Instruction (AFI) 47-101, *Managing Air Force Dental Services*.

## 218. Assist with periodontic procedures

In order to better equip you for your responsibilities, this lesson will provide insight on procedures for treatment of periodontal disease and occlusal trauma, such as equilibration, periodontal scaling, scaling and root planing, and root desensitization

Gingival curettage, which is considered a periodontal surgery procedure, is commonly performed in conjunction with scaling and root planing. Your responsibilities in periodontics include many of the tasks you've already studied. For example, you will perform the elements of infection control, prepare the dental treatment room (DTR) for the procedures, receive and prepare the patient, interview the patient, take and record vital signs, chart forms, prepare local anesthetic, irrigate, aspirate, retract tissue, and perform post treatment procedures. If trained, you may also perform scaling and root planing. Instrument sharpening is also an important responsibility of the periodontal assistant.

### Occlusal equilibration

Healthy periodontium depends not only on constant elimination of local factors and good nutrition but also on favorable forces being applied to the teeth. Traumatic occlusion does not cause periodontal pocket formation. It does, however, act to accelerate pocket formation in the presence of inflammation caused by local irritants. Traumatic occlusion alone can cause hypersensitivity and hypermobility, even in the absence of periodontal pocket formation. Discrepancies in a patient's occlusion are injurious not only to periodontal tissues but also to the temporomandibular joint and the muscles of mastication. Occlusal interferences and oral habits, such as bruxism and clenching, can cause the mandible to shift out of its normal position when maxillary and mandibular teeth occlude. This chronic shifting of the mandible during oral functions is traumatic to the joint, and muscle spasms are frequently associated with undesirable occlusion.

The elimination of all occlusal interferences and establishment of favorable occlusal forces on the teeth is called occlusal equilibration. It is also referred to as an occlusal adjustment. A *limited occlusal adjustment* involves reshaping the occlusal or incisal surfaces of one or more selected teeth by grinding to improve interarch tooth contact relationships. An adjustment is limited when one or more selective teeth are reshaped. A *complete occlusal adjustment* involves reshaping the occlusal and/or incisal surfaces by grinding to achieve harmonious contact during functional movement. An adjustment is complete when all or nearly all the teeth are involved and no further adjustment is required.

You will need to prepare a tray with a mirror, explorer, periodontal probe, cotton forceps, articulating paper forceps, various rotary stones, rubber wheels and points, high-speed handpiece, articulating paper, occlusal waxes, and gauze sponges. An occlusal equilibration may require that study casts be made to determine where the occlusion must be adjusted. During the procedure, the dentist uses articulating paper or occlusal wax on the patient's teeth for an accurate registration of occlusal contacts. You will use gauze sponges to wipe off marks and keep the teeth dry to assure the accuracy of marking. Unusual wear areas on teeth cannot be well marked except when the teeth are dry. The dentist removes the occlusal interferences by selectively grinding the teeth with a diamond stone in the high-speed handpiece. The dentist uses the articulating paper or occlusal wax to check the accuracy of the adjustment. Once the dentist completes the grinding, he or she polishes the adjusted tooth surfaces with abrasive rubber wheels or points. The dentist may perform an equilibration in conjunction with other periodontal therapy or as a separate procedure.

### Periodontal scaling, root planing, and gingival curettage

These three procedures are often performed in conjunction with one another to eliminate periodontal pockets. For scaling and root planing, and gingival curettage procedures, you will need to prepare a tray with a mirror, explorer, periodontal probe, cotton forceps, selected curettes and scalers, topical anesthetic, aspirating syringe, needles, anesthetic carpules, gauze sponges, cotton tip applicators and aspirating tip. The dentist may also choose to use an antiseptic mouth rinse and a solution of three percent hydrogen peroxide mixed with equal parts of warm distilled water.

You may be tasked with the responsibility of giving the patient postoperative instructions following scaling, root planing, and curettage procedures. Inform your patients that they may experience moderate discomfort for several hours after the anesthesia wears off and there may be slight soreness for a few days. The dentist may prescribe pain medication or instruct the patient to take over-the-counter medication. Patients will be able to maintain their normal diet; however, foods that have husks that could become lodged under the gingiva, such as popcorn and peanuts, should be avoided until complete healing of the area occurs. Instruct patients to resume their home-care routine the day after the procedure. Stress to your patients that good home care is essential to the healing and success of the procedures.

### ***Scaling***

Scaling procedures performed independently involve the complete removal of subgingival calculus and bacterial debris with hand or mechanical instrumentation. Usually it is done by sextants of the patient's mouth.

### ***Scaling and root planing***

Scaling and root planing performed together involve more extensive scaling procedures to remove subgingival calculus located in periodontal pockets and smoothing of root surfaces. Once calculus is removed from the root surface, the underlying cementum is often rough from the effects of the calculus. This roughness must be removed to prevent the gingiva from being continually irritated.

Voids in the cementum become ideal areas for the rapid accumulation of plaque and subsequent calculus formation all over again. The roughness of the cementum and voids are removed by root planing. This leaves the root clear and smooth for the deposition of secondary cementum and reattachment of the tissues of the periodontium. With the irritants removed, inflammation in the soft tissue subsides and the tissue shrinks and returns to a healthy state. Usually, scaling and root planning is the only treatment needed for gingivitis and slight periodontitis. This procedure is also the initial treatment in both moderate and advanced periodontitis. The tissue response is often dramatic. Scaling and root planing procedures usually are done by sextants of the patient's mouth with local anesthesia.

### ***Gingival curettage***

Gingival curettage is the intentional removal of the soft tissue wall of a periodontal pocket done under local anesthesia. Curettage consists of removing the necrotic and degenerated tissue lining the gingival wall of the periodontal pocket. This is done by using a scraping action with the blade of a sharp curette turned against the soft tissue of the pocket. Scaling and root planning are often sufficient to result in tissue shrinkage, but curettage is done to gain additional tissue shrinkage in suprabony pockets (above the bone). Once the calculus and other debris have been removed by scaling and root planing, and the pocket lining curetted, the periodontal ligament could reattach to the root surface, thus eliminating the pocket.

### ***Root desensitization***

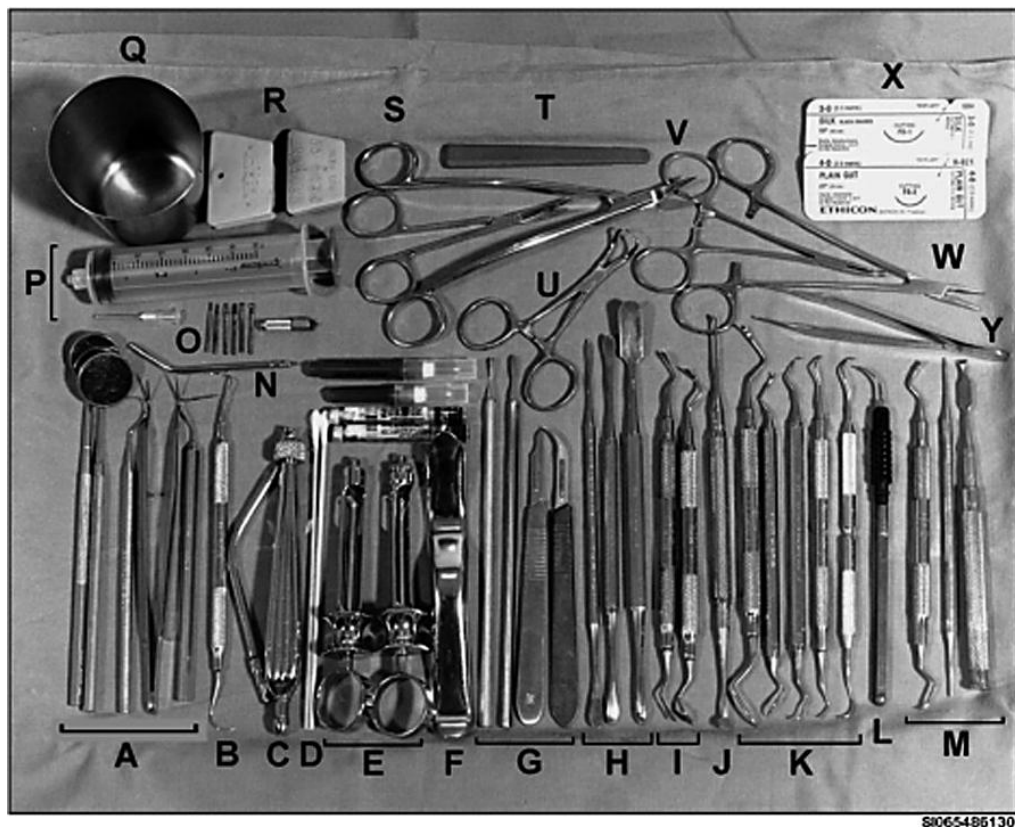
Periodontal patients could experience root sensitivity when elimination of periodontal pockets exposes root surfaces. Root desensitization involves the application of agents or drugs to exposed root surfaces to reduce or eliminate dentinal sensitivity.

### ***Periodontal surgery***

Ideally, resolution of soft tissue inflammation occurs as the result of scaling, root planing, curettage, and improved oral hygiene. This is often the case when treating gingivitis and slight periodontitis. With moderate to severe periodontal pocket depths, the provider will find removing all plaque or calculus and properly smoothing the root surface difficult. Active inflammation could continue with progressive destruction. In such situations, the periodontist performs surgical procedures to gain access to the roots of the teeth in order to achieve desired results. Other surgical procedures are designed to correct various soft and hard tissue defects. Surgery directed toward these tissue defects requires some tissue removal and is termed *resective surgery*. Other periodontal surgery procedures

are designed to increase the amount of keratinized soft tissue or cover tooth roots where recession occurred. Defects in bone can also be filled with bone grafts or artificial bone substitutes. All of these types of surgery attempt to repair the periodontium and are called *regenerative surgery*. Many of the periodontal surgery procedures are performed in conjunction with each other as a part of the overall surgical treatment.

Your responsibilities in periodontal surgery are similar to those of oral surgery. The same aspects of informed consent and pain and anxiety control that you learned about in oral surgery apply to periodontal surgery. Keep in mind that the periodontist has several variations of treatment of periodontal disease. To properly carry out your responsibilities, you have to know which instruments and instrument packs the periodontist desires. Have all instruments and supplies needed for the particular periodontal treatment set up prior to the arrival of the patient; figure 2-78 shows a typical periodontal surgery tray. You must remember to establish and maintain asepsis in periodontal surgery in the same manner as oral surgery. Receiving and preparing the patient, instrument transfer, aspiration, irrigation, retraction, and postoperative procedures in periodontics are similar to those carried out in oral surgery. Suture removal may be delegated after the dentist examines the surgical site.



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- |  |                                |                               |
|--|--------------------------------|-------------------------------|
| A. BDS Setup                                 | H. Periosteal Elevators        | Q. Metal Cap                  |
| B. Marquis & Nabors Probes                   | I. Periodontal Knives          | R. Adult and Pado Mouth Props |
| C. Surgical Suction Tip and Handle           | J. Bone Curettes               | S. Scissors: Iris & Dean      |
| D. Cotton Tip Applicators                    | K. Periodontal Curettes        | T. Sharpening Stone           |
| E. Anesthetic Syringes, Carpules and Needles | L. Ultrasonic Tip              | U. Towel Clamps               |
| F. Minnesota Retractor                       | M. Bone Chisels                | V. Curved Hemostat            |
| G. Scalpels, Beaver & #3 with Blades         | N. 3-Way Syringe               | W. Needle Holder              |
|  | O. Burs                        | X. Suture Material            |
|  | P. Irrigating Syringe & Needle | Y. Tissue Forceps             |

Figure 2-78. Periodontal surgery tray.



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### **Periodontal surgery procedures of the soft tissues**

Periodontal surgery procedures involving the soft tissues include gingivectomy, gingivoplasty, periodontal flap, and soft tissue graft procedures.

#### ***Gingivectomy***

Gingivectomy is the surgical excision of the soft tissue wall of suprabony pockets (above the alveolar bone). The procedure is limited to gingival pockets where broad amounts of attached gingiva occur.

This surgery exposes tooth roots and results in gingival recession. If a gingivectomy is indicated, the gingival tissue must be first cleared of acute infection to prevent the spread of disease in the oral cavity and throughout the body.

The dentist uses a scalpel or periodontal knife to make an incision. After the incision, the dentist removes the detached gingiva with a curette and tissue forceps. With the diseased gingiva removed, the dentist has direct access to any calculus not eliminated during previous scaling and root planing. This allows the dentist to scale and root plane the exposed surfaces as needed.

When the scaling and root planing procedures are complete, thoroughly irrigate and aspirate the surgical site. The dentist inspects the area for complete pocket elimination and proper contour. Any refinements are made if needed. If necessary, the dentist places sutures to secure the remaining gingiva in the proper position for healing. Depending on the dentist's preference, you may need to prepare and place a periodontal dressing over the entire surgical area.

Be prepared to give your patients postoperative instructions. Inform them that mild to moderate discomfort can be expected, especially during the first 24 hours. Instruct them in the use of medications the dentist prescribed for pain and antibiotics to prevent infection. Inform periodontal surgery patients to use an ice pack immediately after surgery to control swelling. Advise them to keep the ice in place for 15 minutes and then remove it for 15 minutes continually for the next 24 hours. Patients can expect some bleeding within the first 24 hours. Advise patients if bleeding continues after that time to return to the dental clinic. Inform patients not to rinse their mouth during the first 24 hours. After this time, they can rinse frequently but gently with warm salt water or prescribed mouth rinse. Patients should avoid large pieces of hard foods, alcohol, citrus fruit, and spicy foods that will irritate the oral tissues. Excessive activity should be avoided for the first few days to permit a firm clot to form in the surgical area. Stress the importance of regular home care in areas of the mouth not involved in surgery. Before dismissing the patient, be sure to arrange a postoperative appointment within three to seven days.

#### ***Gingivoplasty***

Gingivoplasty involves the reshaping of gingival deformities to improve form and function, and is a useful technique when gingival overgrowth or gingival craters exist. The gingivoplasty technique is similar to the gingivectomy technique; however, its purpose is different. A gingivectomy is performed in order to eliminate periodontal pockets and may include reshaping the gingiva as part of the technique. A gingivoplasty is done in the absence of pockets with the sole purpose of removing excess tissue and recontouring the gingiva. Gingivoplasty may be performed with a periodontal knife, a scalpel, or electrosurgery. The gingivoplasty consists of tapering the gingival margin, creating a scalloped marginal outline, and shaping the interdental papillae to provide sluiceways for the passage of food on the firm free gingiva during mastication. Following the surgery, sutures and a periodontal dressing may be indicated. Postoperative instructions following gingivoplasty surgery are similar to those for a gingivectomy.

#### ***Periodontal flaps***

A periodontal flap is a technique used in an attempt to correct gingival defects. With the flap technique, a section of gingiva and/or mucosa is surgically separated from the underlying tissues. A portion of the separated section remains attached to its original site. The loosened end is repositioned

to correct a gingival defect and sutured into place. The three types of periodontal flaps are presented in the following table:

Periodontal Flap/Wedge	Description
Mesial/distal wedge	Used to reduce pocket depth or tissue thickness mesial or distal to a terminal tooth in a sextant.
Gingival flap	Used to gain access to root surfaces by surgically separating the gingival from the roots. The collar of tissue around the necks of the teeth is removed. Close interproximal flap adaptation is employed.
Mucogingival flap	The detachment of the gingival and other soft tissue in order to visualize and obtain access to the alveolar process or tooth structure, or to reposition the gingival unit. This is performed facially or lingually.

The dentist can systematically scale and root plane the root surfaces with direct vision. You will repeatedly irrigate the surgical site with sterile saline solution from an irrigating syringe and aspirate the fluid and debris. If necessary, the dentist can recontour the alveolar bone. After the recontouring is complete, you will irrigate the surgical site thoroughly with sterile saline solution and aspirate the fluid and debris. The dentist inspects the surgical site, repositions the flap, and sutures it in place. You may place a 2×2 inch gauze compress moistened with saline solution over the surgical site and instruct the patient to bite on it. The dentist may choose to use a periodontal dressing. If so, follow the manufacturer's instructions to prepare it. When treatment is complete, irrigate and aspirate the patient's mouth and clean the patient's face if necessary. Give the patient postoperative instructions and arrange a postoperative appointment before dismissing the patient.

### ***Periodontal soft tissue grafts***

A soft tissue graft involves the complete separation of tissue from the donor site and replacement in another location to correct periodontal or mucogingival defects. The donor tissue, which usually consists of epithelium and a thin layer of underlying connective, is sutured into place on the prepared receptor site. An example is a *free gingival graft*, which permits enhanced width of gingival tissue and coverage of some denuded roots. Exercise special care to avoid aspiration of the tissue graft with the suction equipment. The epithelial side of the graft also must not be placed against the recipient tissue. Use sterile saline to keep the graft moist on a sterile gauze sponge until the dentist places and sutures the graft at the recipient site with the connective tissue against the site. In some unique situations, a soft tissue graft may involve repositioning of a soft tissue flap that remains attached at the donor site. This is called a *pedicle graft*. This technique maintains the blood supply and is used most often to cover a denuded root surface from an adjacent soft tissue donor site.

### **Periodontal surgery procedures involving the hard tissues**

Periodontal surgery procedures involving the hard tissues include osseous surgery, metallic implants, root amputations, hemisections, and bicuspidizations.

#### ***Osseous surgery***

As inflammation proceeds into the deeper supporting tissues, the bone resorbs, creating defects or deformities such as those described in the following table.

Deformity	Explanation
Craters	The most common deformity, this occurs as a saucer-shaped defect. The facial and lingual bony walls remain but the central portion of the interproximal bone resorbs.
Furcation involvement	Bone resorbs between the roots of multirrooted teeth.
Intrabony pocket	These are pocket depths apical to the level of alveolar bone. Several surgical procedures are designed to treat these defects.

Osseous surgery can be either additive or subtractive in nature. *Additive osseous surgery* includes procedures directed at restoring the alveolar bone to its original level. *Subtractive osseous surgery* is designed to restore the form of pre-existing alveolar bone to the level existing at the time of surgery or slightly more apical to it. Most surgical procedures that involve correction of the bone require access through soft tissues by a surgical flap.

### ***Osseous resective surgery***

This involves subtractive procedures used to correct osseous defects. These procedures are classified into two groups: ostectomy and osteoplasty.

#### ***Ostectomy***

Ostectomy includes removal of tooth-supporting bone in the treatment of periodontal disease. An ostectomy eliminates shallow osseous craters resulting from chronic periodontitis by removing and reshaping the tooth's supporting bone with burs or diamond stones mounted in a handpiece. The facial and lingual walls of the crater are also reshaped in order to give a good base of gingival soft tissue.

#### ***Osteoplasty***

Osteoplasty refers to reshaping the alveolar bone without removing tooth-supporting bone. An osteoplasty is used to reshape bony ledges, overgrowths of bone, uneven bone margins, and abnormal form, without removing the supporting bone of the teeth. Although osteoplasty is most often performed with burs and diamond stones in a handpiece, bone files, rongeurs, and chisels are also used. Whenever the dentist uses burs and stones, irrigate the area with sterile saline to minimize injury to the bone from frictional heat and aspirate the debris.

### **Osseous reconstructive surgery**

This involves additive procedures involving regeneration of lost bone, and the reestablishment of the periodontal ligament, gingival fibers, and junctional epithelium at a more coronal level.

#### ***Osseous graft***

An osseous graft is a procedure that involves implanting living tissue or inert material into periodontal osseous defects to regenerate new periodontal attachment (bone, periodontal ligament, and cementum). Donor bone is obtained from adjacent cortical and cancellous bone, mixed with the patient's blood. Other sources for bone are from endentulous ridges or the maxillary tuberosity. Bone also can be obtained from bone banks, or various crystalline synthetic substances can be placed to fill bony voids. The bony implant site is approached by soft tissue flap. All granulated tissue and periodontal fibers are removed from the bone defect with a curette. The bony tissue is removed from the donor site and placed into the implant site. You must be extremely careful not to aspirate the bone implant pieces. Both the implant and donor sites are sutured closed. After several days, the sutures are removed.

#### ***Guided tissue regeneration***

A guided tissue regeneration procedure involves the placement and removal of a membrane over the root surface of surgically exposed and debrided areas. This is an approach to prevent epithelial migration along the cemental wall of the pocket. It consists of placing barriers of different types covering the bone and periodontal ligament. One technique uses the Gore-Tex membrane, which is made of expanded polytetrafluorethylene. Five weeks after the surgical placement, the membrane is removed.

### **Root amputation**

Sometimes the bone loss is so great around the root of a multirrooted tooth that a root or section of tooth must be removed. The remaining portion of the tooth can be saved if sufficient periodontal support is present. Endodontic treatment is required prior to treatment of the remaining portion of the

tooth. The complete removal of one or more roots of a multirooted tooth, without removal of any portion of the crown, is termed root resection or root amputation.

### **Hemisection**

Surgical sectioning of a multirooted tooth through the furcation area so that the blocked, defective, or periodontally involved root or roots can be removed along with the associated portion of the crown is called a hemisection. This is often done on the mandibular molars and consists of removal of either the mesial or distal half, depending on which root is involved. An artificial crown is required on the remaining half of the crown.

### **Bicuspidization**

When a multirooted tooth is sectioned through the furcation and both halves of the tooth are retained, this procedure is called a *bicuspidization*. By creating two separate teeth from the single molar, the tunnel-like effect of the furcation involvement is eliminated. This will allow access to the root surfaces for scaling and root planing, and the patient's control of plaque. Both sections of the tooth require crowns.

### **Oral hygiene instructions after surgery and maintenance**

Many periodontists expect their dental assistant to provide oral hygiene instructions and teach preventive measures to periodontal surgery patients. Periodontal surgery could result in gingival recession, exposure of root surfaces, and open gingival embrasures. Food impaction, root caries, and dentin sensitivity are examples of several postsurgical dangers. You must modify oral hygiene techniques for these patients.

#### ***Oral hygiene instructions***

Oral hygiene instructions are provided at the postoperative appointment after suture removal. It is important that patients understand the importance of oral hygiene following periodontal surgery. They may be afraid of hurting themselves or may mistakenly believe that surgery cured their periodontal problems permanently. Caution them that bacteria and plaque will continue to form and periodontal disease can reoccur.

In addition to continued use of a soft toothbrush and unwaxed dental floss, introduce other hygiene aids to the patient. Interproximal brushes, end-tufted brushes, rubber-tipped interdental stimulators, soft balsa wood toothpicks, and super-floss may be required to keep areas free of plaque properly.

Recommend rinses or gels containing fluoride to patients to prevent dental caries. Antimicrobial mouth rinses may be prescribed to reduce bacterial formation. If the teeth are sensitive to hot, cold, or sweet stimuli, then clinical desensitization and desensitizing toothpastes may be required. Patients that form calculus rapidly should use an antitartar (anticalculus) dentifrice.

#### ***Periodontal maintenance and recall system***

Patients who have had periodontal disease are rarely motivated sufficiently to achieve efficient and perfect daily oral hygiene well enough that they no longer require periodic professional care. Therefore, periodontal patients are placed on a schedule of periodic recall visits for maintenance care to prevent recurrence of periodontal disease. It is meaningless to inform patients to return for periodic recall visits without identifying the importance and describing what is expected of patients between visits. Patients must understand the purpose of the maintenance program and realize that preserving their teeth depends on it.

Mechanical debridement (scaling and root planing) and the motivational environment during the appointment are necessary for good maintenance results. Between appointments, patients tend to slip in their oral hygiene efforts. Just knowing that their hygiene will be evaluated causes them to perform better oral hygiene in anticipation of the appointment. Most patients who have experienced periodontal disease require maintenance every three months. The recall interval may vary from two to

12 months, depending on the severity of the case, degree of patient motivation and manual dexterity, as well as the capacity of the dental health team.

Patients who are not maintained on a supervised recall program following active treatment show signs of recurrent periodontitis, such as increased pocket depth, bone loss, and tooth loss. In fact, patient motivation and acceptance of the required maintenance program are prime considerations prior to performing periodontal surgery.

Establishing a recall system for periodic maintenance and maintaining it efficiently is a responsibility delegated to the periodontal assistant, periodontal therapist, or dental hygienist working with the periodontist. Several methods are used, including a computerized recall system or a dual file card system. If using the dual card system, one card will contain the patient's name, address, and recall interval. File this card alphabetically. The second card will contain the same information; however, file it in a chronological file by month. Near the end of each month, remove all cards in the chronological file for the next month and contact the patients to schedule their appointments. At the recall appointment, remove both cards from the files, enter the new recall interval, and refile the cards.

Periodic recall appointments form the foundation of a long-term prevention program through maintenance. The primary goals of periodontal maintenance include the following:

- Maintenance of oral health achieved through reexamination and reevaluation.
- Maintenance of optimum chewing function achieved through remotivation and new information for the patient.
- Prevention of new infection, such as gingivitis or periodontitis, through continued instruction in home-care techniques.
- Prevention of reinfection of inactive residual pockets (periodontitis) through scaling and root planing.
- Prevention of dental caries through topical fluoride application.

Periodontists can delegate most of the routine clinical procedures involved in periodontal maintenance therapy to trained periodontal assistants, periodontal therapists, or dental hygienists. This allows periodontists to actively participate in providing therapy to more complicated situations and monitor the routine cases.

The periodontal maintenance provided at each recall appointment consists of the following three stages:

1. Examination and evaluation of the patient's current oral health.
2. Oral hygiene reinforcement and treatment.
3. Determination of future treatment needs.

#### *Examination and evaluation*

The examination and evaluation stage is similar to the initial examination; however, the primary purpose is to identify changes that occurred since the last evaluation. Assessment of the patient's current oral hygiene status is essential. Measurements of plaque, bleeding, and pocket depth should be done at the recall appointment. These findings are recorded on the AF Form 935A, Periodontal Maintenance Record, and AF Form 935B, Plaque Index/Bleeding Point Record.

On AF Form 935A, the patient's name, SSN, original charting date, maintenance visit date, and name of therapist providing treatment is recorded in ink. The remaining information is recorded in red, blue, or regular pencil. This form must be completed once a year on all periodontal maintenance patients. The dentist also must check the patient annually and indicate this by signing the form. On the AF Form 935B, the patient's name, SSN, and date of each plaque score determination is recorded

in ink. All other notations are made in red, blue, and regular pencil. Additional instructions for completing these forms are included in AF Instruction 47-101.

#### *Oral hygiene reinforcement*

As part of the oral hygiene reinforcement and treatment stage, monitor and correct the patient's oral hygiene procedures at each recall appointment. Errors often slip into the home-care technique, and certain areas of the dentition or tooth surfaces may be neglected or missed. Remotivate patients toward improved oral hygiene each time since home care usually declines between appointments. The use of a disclosing agent provides a visual aid to the patient by temporarily discoloring the teeth or areas that have been neglected and exhibit plaque and calculus. Repeat oral hygiene instructions and correct brushing and interdental cleaning techniques until the patient demonstrates the necessary proficiency. For some patients, this may require additional instruction sessions.

Teeth or areas with bleeding on probing, active residual pockets, or deposits of plaque and calculus require scaling and root planing. Following this procedure, polish all the teeth using a rubber cup and prophy paste. Apply topical fluoride if indicated.

#### *Maintenance*

In the last stage of periodontal maintenance therapy, future treatment needs are determined. This includes the next recall interval, the appointment length, and the need for further periodontal or other dental therapy.

#### **Periodontal maintenance for implant patients**

The procedures for periodontal maintenance of patient dental implants are similar to those previously discussed. These patients must be able to remove plaque from the implant surfaces adjacent to the gingival tissues. The best mechanical means to do this is the use of an ultrasoft, single tufted-end toothbrush; a Proxabrush; and yarn-like materials. The use of irrigation devices, tartar-control dentifrices; daily chlorhexidine mouthwashes may be indicated also. Patients are often afraid to touch the implants but must be encouraged to keep the areas clean.

Because metal instruments can scratch titanium, the conventional hand instruments are contraindicated on the implants. Only special plastic curettes are used for plaque and calculus removal. A rubber cup may be used to polish, provided the abrasive paste is not too coarse. The interval between recall appointments depends on the rate of plaque buildup on the prosthesis and tissue response to bacteria. Most patients should be placed on a three-month recall; however, patients with special needs may need monthly appointments. During this time, professional cleanings and training in oral hygiene techniques should be provided until the gingival inflammation is controlled. When the prosthetics must be unscrewed and removed for maintenance, it is best done in the dental facility. Each time the prosthetics are reattached, there is usually a slight change in the occlusion. Time must be allowed for occlusal corrections.

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### **Self-Test Questions**

**After you complete these questions, you may check your answers at the end of the unit.**

#### **216 Periodontal function and indications**

1. Why may the dental treatment of a periodontal patient require coordinated treatment from other specialty areas?
2. What is the primary function of periodontal treatment?

3. What happens if the initial inflammatory process of periodontal disease is not stopped?
4. What are the early signs and symptoms of periodontal disease found in the interdental papilla and marginal gingiva?
5. When is periodontal treatment indicated?
6. What is necessary from the patient for successful periodontal treatment?

**217. Examination, charting, and treatment plan**

1. What does the initial examination of the periodontal patient include?
2. What should reveal systemic conditions that could influence the progress of periodontal disease or its treatment?
3. What provides information such as past dental treatment, oral hygiene habits, and attitude toward dental health?
4. Why is a current full series of periapical radiographs and vertical bitewings necessary for a thorough periodontal examination?
5. Where are the results of the examination recorded? What does it provide?
6. What findings related to the periodontium are charted?
7. What is your primary responsibility during the periodontal examination?
8. What entries on AF Form 935 are made in ink? What is used to record all other entries?

**218. Assist with periodontic procedures**

1. What is involved in a limited occlusal adjustment?
2. What is involved in a complete occlusal adjustment?
3. What items are needed to prepare a tray for an occlusal adjustment?
4. Why is it necessary that you use gauze sponges to keep the teeth dry?
5. Briefly explain occlusal adjustment procedure.
6. What is the difference between independent scaling, and scaling and root planing?
7. What is gingival curettage? What does it include?
8. What is resective surgery?
9. What is regenerative surgery? Give some examples.
10. What are some of your responsibilities in periodontal surgery?
11. What is a gingivectomy?
12. After the diseased gingiva is removed, what procedure will the dentist perform to remove any calculus?
13. How should the periodontal surgery patient use an ice pack?



14. How long can periodontal surgery patients expect some bleeding?
15. When can periodontal surgery patients rinse their mouth and what should they use?
16. Within what time frame should a postoperative appointment be scheduled?
17. What procedure involves the reshaping of gingival deformities to improve form and function?
18. What is the difference between a gingivectomy and gingivoplasty?
19. What is a soft tissue graft?
20. What type of graft permits enhanced width of gingival tissue and coverage of some denuded roots?
21. What special handling should you be aware of when assisting with a free gingival graft procedure?
22. What type of soft tissue graft involves repositioning of a soft tissue flap that remains attached at the donor site?
23. What osseous surgery procedures are directed at restoring the alveolar bone to its original level?
24. What osseous surgery procedures are designed to restore the form of pre-existing alveolar bone to the level existing at the time of surgery or slightly more apical to it?
25. What is the difference between an osteoplasty and an ostectomy?
26. What items are normally used to perform osteoplasty and ostectomy procedures? What must you provide while these items are being used?

27. What procedure involves implanting living tissue or inert material into periodontal osseous defects to regenerate new periodontal attachment?
28. What procedure involves the placement and removal of a membrane over the root surface of surgically exposed and debrided areas?
29. How does a root amputation differ from a hemisection?
30. When should you provide oral hygiene instructions to the periodontal surgery patient?
31. What type of hygiene aids should you introduce to the patient to keep areas free of plaque?
32. What is prescribed to reduce bacterial formation?
33. What is the purpose of periodontal maintenance and recall?
34. What must patients understand and realize about the maintenance program?
35. How often do patients require periodontal maintenance?
36. To whom is the responsibility of establishing and maintaining an efficient recall system delegated?
37. To whom can the periodontist delegate most of the routine clinical procedures involved in periodontal maintenance therapy? Why is it delegated?
38. List the three stages of periodontal maintenance required at each recall appointment.
39. Where are the measurements of plaque, bleeding, and pocket depth recorded at the recall appointment?

40. What information is recorded in ink on AF Forms 935A and 935B? How is the remaining information recorded?
41. When must AF Form 935A be completed?
42. What type of instruments are contraindicated on implants for plaque and calculus removal? What instruments are used?
43. What is the interval between recall appointments for implant patients?
44. If the prosthetic must be unscrewed, removed for maintenance, and reattached, what usually changes and requires correction?

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### Answers to Self-Test Questions

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**209**

1. To cut bone or section teeth. Longer shanks provide accessibility in surgical procedures.
2. Special J-notch burs; to eliminate outward migration.
3. Hose, handle, and tips. The bulbous portion of the handle is slipped into one end of the sterile hose tubing, and the chuck end holds the tips. The loose end of the tubing is connected to the suction to function as a single suction unit.
4. A smaller #2 tip.
5. The Minnesota retractor is a bent, angled piece of steel.
6. The mouth prop is a solid piece of angled rubber, whereas the mouth gags are lock-type forceps with rubber-covered extensions. The rubber provides protection against injury to the enamel of the teeth.
7. With hemostatic forceps in order to prevent accidental cuts and possible infection.
8. The #3 and beaver styles. With the #3, the handle is short and wide, and uses a slotted blade that slides onto the handle. The beaver style scalpel uses a much smaller blade designed for that handle only. The blade slides into a slot at the tip of the handle and is fastened in place by turning clockwise.
9. The #3 handle uses blades #10 and #15, which have similar working ends. The #10 blade is larger, and the cutting edge on both of the blades is on the curved part of the blade, cut in either a straight or rocking fashion. The #3 handle also uses blade #11 and #12. The #11 has a straight cutting edge, used for lancing; #12 blade has a concave cutting edge, shaped like a hawkbill. The beaver-style handle uses #62, #64, and #67 blades. The #62 has a squared-end cutting style, the #64 blade has a rounded shape to the tip, and the #67 has a sharp pointed tip.
10. In sterile packs with the needles already attached to the suture material.
11. Natural gut and synthetic vicryl.
12. 4 to 0 silk.
13. To cut tissues and sutures.
14. (1) b.  
(2) a.

- (3) d.
- (4) c.
- 15. To clean out infected cavities in bone and remove debris from tooth sockets.
- 16. The single-ended #2 and #4 Molt and double-ended #2/4 Molt are straight; the single-ended #5L and #6R Molt are angled pair.
- 17. Along with a selected chisel to split teeth or reduce alveolar bone.
- 18. To trim projecting, uneven, or overhanging bone (alveolectomy).
- 19. To further shape and smooth the alveolar bone.
- 20. To separate a bone and the fibrous membrane (the periosteum) that covers it and to gain access to bone that needs trimming and to retained roots.
- 21. Loosen the teeth in their sockets, remove parts of teeth (broken root tips or retained roots), and sometimes remove a complete tooth.
- 22. The Stout #11 and the Cogswell A have spade- or wedge-type working ends; the Cogswell B is a pickshaped root elevator whose working end is shaped somewhat like a rounded toothpick tip.
- 23. The working ends of the Cryer #25 and #26 are angled at angles greater than 90°.
- 24. To remove fractured root tips lodged deep in the root socket. The ends are very thin, sharply pointed, and small.
- 25. They have much shorter terminal shanks and are designed to remove extremely small apical fragments.
- 26. Beaks, neck, and handles.
- 27. With maximum contact on the facial-lingual surfaces of the root(s) just below the cervix.
- 28. The S, I, and Z shaped forceps are used on the maxillary arch; C and L shaped are used on the mandibular arch.
- 29. (1) a.
  - (2) h.
  - (3) e, f.
  - (4) m.
  - (5) j, l.
  - (6) b, d.
  - (7) c.
  - (8) n.
  - (9) o.
  - (10) g.
  - (11) i.
  - (12) k.
- 30. #150.
- 31. #88L and #88R.
- 32. #151.
- 33. #16.
- 34. Mead #MD3, #13, and #22.

**210**

- 1. A probe, scored in millimeters.
- 2. A furcation probe.
- 3. Scaling is the fracturing of calculus from the surface of a tooth. Root planing is the removal of root structure required to remove calculus attached to the root surface and embedded in the surface irregularities.
- 4. Removal of supragingival calculus.

5. There are two cutting edges, formed by the junction of the face with the two lateral surfaces, with either a straight or curved cutting edge when viewed from the face of the working end. Lateral surfaces also form a pointed tip, and at the bottom or back of the instrument they form an unused third edge.
6. For limited subgingival calculus removal on proximal surfaces of anterior teeth where the interdental papillae rise to the facial and lingual gingival margins.
7. Some commercial textbooks refer to them as posterior sickles, which are paired instruments with various angled shanks designed to allow access to all posterior tooth surfaces.
8. A curette.
9. They form a spoon-shaped face and a rounded back. In a cross-section, the blade appears semicircular rather than the triangular shape of the sickle scaler. Each working end has a cutting edge on one or both sides of the blade. Cutting edges are either straight or rounded.
10. The pocket depth, tissue consistency, bulk and tenacity of calculus, and accessibility of the area to instruments are all factors. Larger blades are used for removal of heavy calculus in pockets with edematous, displaceable soft tissue walls. Deeper pockets or those with fibrous, unenlarged soft tissue walls require finer instruments.
11. Area specific; because they provide the best adaptation to complex root anatomy.
12. Solely for removal of heavy supragingival calculus deposits that bridge open interproximal spaces of anterior teeth. The blade is placed against the proximal surface from the facial aspect, and pushed with a horizontal stroke toward the lingual aspect to engage the calculus.
13. Usually limited to removal of large ledges of calculus located supragingivally and slightly subgingivally.
14. To crush large calculus deposits, smooth the tooth surfaces at the cemento-enamel junction, and to do preliminary root planing. Working ends are a series of parallel blades—actually a series of miniature hoes on the same blade. There is a variety of head shapes, ranging from rectangular to oval to oblong.
15. The file is inserted between the papilla and tooth, and engaged against the deposit with the head of the small blades pressed against the deposit, and ground into the deposit, crushing it. Horizontal and vertical strokes can follow the crushing motion.
16. Metal scalers or curettes could damage the smooth surface of the implant.
17. Universal, lingual, posterior, and buccal.
18. Kramer-Nevins #1, similar in shape to the #7 wax spatula, has one rounded end and one pointed for delicate tissue retraction.
19. Generally used for detaching pocket walls after the gingivectomy incision; also useful for smoothing root and bone surfaces accessible by the surgical procedure.

## 211

1. To provide surgical treatment or correction of diseases, defects, or injuries of the oral cavity and facial structures.
2. An oral surgeon who specializes in the reduction of bone fractures and reconstruction of the maxilla or mandible, and performs reconstructive surgery.
3. Carious teeth unrestorable by restorative procedures; nonvital teeth when endodontic treatment is not indicated nor has little chance of success; removal of teeth to provide space in the arch for orthodontic treatment; teeth without sufficient bone support; supernumerary or impacted teeth interfering with normal dentition; malpositioned teeth that cannot be aligned; root fragments from prior extractions or surgery; removal of soft-tissue tumors; removal of exostosis (overgrowth of bone), such as *Torus Mandibularis* and *Torus Palatinus*; and accidental fracture or reconstruction of the mandible or maxilla.
4. After they are in the second trimester or after delivery.
5. To confirm the findings of the referring dentist and gather any other additional information to make treatment recommendations.
6. An attempt to disclose all relevant information to the patient or legal guardian to enable the patient or legal guardian to make an informed decision regarding any proposed treatment.
7. When required by current standards of dental practice. Intravenous conscious sedation or general anesthesia, and certain oral or periodontal surgery procedures.
8. On a special form or consists of a handwritten entry in the patient's record and signed by the provider.

**212**

1. Local, conscious sedation, and general.
2. Local.
3. Two syringes will let you supply the dentist with a loaded anesthetic syringe for as long as needed with minimum loss of time.
4. Anesthetic solutions are bitter and there is a leakage from injection sites.
5. A minimally depressed level of consciousness that retains the patient's ability to independently and continuously maintain an airway, and respond appropriately to verbal commands. Oral premedication, inhalation, and intravenous.
6. When treating young children, extremely apprehensive patients, and patients with extensive surgical treatment.
7. The night before or several hours before the surgical procedure.
8. Nitrous oxide.
9. An advantage is a rapid onset and recovery time. The agent is taken up and eliminated rapidly by the lungs. Therefore, it takes effect and wears off within a few minutes of being increased or decreased. A disadvantage is the requirement of special equipment and its maintenance for proper administration.
10. The dentist supervising the recovery of the patient.
11. The intravenous (IV) route where drugs are injected directly into the bloodstream through an IV catheter or needle.
12. If medications are injected too quickly, exaggerated effects could be produced. Any toxic reaction, such as an allergic reaction, could become more rapidly life threatening with this route.
13. Because of the increased potential for rapid development of complications.
14. Towels, towel clamps, 0.9% sodium chloride, adhesive pad for precordial stethoscope, adhesive bandage, adhesive electrode monitoring pads, tape, insulin syringe and needle, 18-gauge needle, IV catheter, IV infusion set, alcohol pads, betadine swab, miniset vein infusion set (butterfly), and tourniquet.
15. They must be disposed of in the presence of a witness.
16. A responsible adult as an escort to provide necessary assistance during the immediate recovery period.
17. A controlled state of unconsciousness accompanied by a partial or complete loss of protective reflexes, including the ability to maintain an airway independently and respond purposefully to verbal commands.
18. An anesthesiologist in the hospital operating room.
19. The patient's preoperative and postoperative vital signs, such as blood pressure, pulse, and respirations, as well as continuous observation of the patient's level of comfort, level of consciousness and general appearance during treatment.
20. ECG, pulse oximeter, and automatic blood pressure cuff.
21. Whether the drugs are used for local anesthesia or conscious sedation by any route, they must be documented in the patient's record by name, dose, and route of administration.
22. AF Form 1417, Sedation Clinical Record.
23. Vital signs prior to, during, and after sedation along with the method used to monitor the patient; time sedation began; time, types, and dosages of drugs or inhalation agents administered; any untoward reactions to the drugs, inhalation agents, or procedures performed; condition of the patient on discharge; postoperative instructions given to the patient or escort.
24. AF Form 1417. On the left side of the 2100 series outpatient dental record beneath the SF 603/603A, and SF 515.

**213**

1. Contact with anything not sterile.
2. Through such practices as performing a surgical scrub; wearing sterile gloves and PPE; and using a surgical drape, sterile instruments, and barrier technique.
3. Wear sterile gloves and carefully unfold the corners of the wraps and allow them to drape over the surface where the tray is positioned to provide a sterile field.

4. This expedites the exchange of instruments between the assistant and dentist, and avoids searching the tray for an out-of-place instrument.
5. Aspirating syringes; scalpel and blade; and suction tip, handle, and tubing. Also, fill the metal cup with sterile saline and fill the irrigation syringe from the cup.
6. Surgery patients tend to be more nervous and apprehensive than other patients. An accomplished assistant can be a calming influence, help patients relax, and be a stabilizing influence to surgery patients.
7. Check to ensure any prescribed medication was taken as directed. If not, alert the dentist immediately.
8. Have the patient wait either in the clinic recovery room or a quiet area of the clinic; however, be absolutely sure that the patient is not left alone.
9. Any removable dental appliances.
10. It lessens blood loss, decreases the time of tissue manipulation, and shortens the period of patient stress. All of these factors can promote better patient response.
11. Use the palm-thumb grasp by holding the working end of the instrument in the palm of your hand in the position the instrument will be used. When passing the instrument to the dentist, place it firmly in the dentist's hand because gloves reduce tactile feeling. Do not release the instrument until the dentist grasps it firmly. When transferring sharp instruments, such as the Bard Parker with a blade attached, use extreme caution not to injure yourself, the doctor, or the patient.
12. It increases efficiency since many procedures require instruments to be used more than once.
13. It is imperative that dentists are able to see what they are doing, and the accumulation of blood and saliva in the rear of the patient's mouth tends to excite the patient's gag reflex.
14. It prevents bacteria from contaminating the surgical site and possibly causing an infection in the area.
15. It keeps the bur cool. If it is not done, bone cells will be destroyed, resulting in bone death and possibly increased postoperative pain and/or complications.
16. Mouth mirror.
17. It would tend to excite and further arouse the patient's nervousness, possibly leading to even further adverse patient reaction.
18. A pointed instrument, such as an explorer.
19. Periosteal elevator.
20. To be certain that the root did not fracture and remain in the socket.
21. Remove it from the suction tip and reassemble it with the extracted tooth to be certain that all fragments are removed.
22. The Minnesota retractor and scalpel.
23. Aspirate blood from the surgical site.
24. Either a surgical mallet and chisels, or a Stryker handpiece with surgical burs.
25. A continual drip of saline solution on the bur while it is cutting.
26. A tooth elevator, such as the #301 or #92.
27. Rongeur forceps and bone file.
28. With the most posterior tooth and moves anteriorly. It gives the dentist some mechanical advantage in luxating the remaining teeth after the last molar in the arch is removed.
29. Extraction forceps.
30. Root picks and root elevators.
31. Place the threaded suture needle at a right angle to the needle holder or hemostat and lock the suture needle in place.
32. Retract the tongue or cheeks to provide a clear line of vision as the dentist sutures the area. After each suture is tied, you may use the suture scissors to cut the sutures approximately 2 to 3 mm beyond the knot.
33. The number of sutures, type of suture material, and type of suturing technique used.
34. After the surgery, unless the patient is to be sedated. When the patient is to be sedated, verbal instructions must be given to the patient prior to the sedation and to the patient's escort. They should be given verbally and in writing.

35. Limit activity and avoid strenuous work or exercise for a few days after surgery.
36. Suction resulting from these activities stimulates bleeding and decreases the potential of securing an adequate blood clot. Sucking actions alone could dislodge an adequately formed clot.

**214**

1. In case of a member's untimely passing, the Air Force must be able to positively identify who the individual is. If your Air Force dental record is lost we have the repository radiograph as a backup.
2. If every tooth matches the dental record; there can be a possible identification where only a few teeth match the dental record (location of other teeth are unknown); there can be insufficient dental evidence to make a valid identification; and there can be a decision that the teeth do not match the records at all.

**215**

1. AF Forms 1801, 1802, and 1803.
2. Tooth #1.
3. The use of postmortem radiographs which allow you and your team to see the non-clinical aspect of the patient's mouth.

**216**

1. Patients needing periodontal treatment are often referred from other specialty areas where they were seeking treatment for other or related dental problems. Sometimes the referring dentist must wait until the periodontal treatment is completed before proceeding with the original treatment.
2. Elimination of periodontal pockets.
3. It could proceed to cause damage to periodontal ligament tissue and alveolar bone.
4. Redness, tendency to bleed easily, evidence of exudate, sponginess, tenderness, slight swelling, and probing depth of pockets.
5. If a periodontal condition cannot be eliminated through preventive care, including improved oral hygiene and diet; when there is resorption of the alveolar bone and the periodontal tissues; when the teeth may have adequate support for retention if the progress of the disease is stopped.
6. Acceptance of the periodontal treatment and requirements necessary to maintain good oral hygiene.

**217**

1. Thoroughly reviewing the patient's medical-dental health history, dental treatment history, and radiographs; charting of periodontal probing depths, occlusion, and tooth mobility; and determining a treatment plan.
2. A review of the patient's medical-dental health history.
3. The dental treatment history.
4. Radiographs are extremely useful in the diagnosis and treatment of periodontal disease because conditions such as bone loss around the teeth, calculus, poor margins and overhangs on restorations, and open tooth contacts are visible.
5. AF Form 935, Periodontal Diagnosis and Treatment Plan. A permanent record of the examination, diagnosis, and treatment plan for initiation of each new course of therapy for treatment of periodontal disease.
6. Gingival level on the tooth, areas of gingival recession or clefts, gingival enlargement or craters, probing depths, frenum attachments, furcation invasion (disease extension between the roots of multirrooted teeth), bleeding points, tooth resection, and tooth mobility.
7. Using approved charting symbols, record the findings on AF Form 935 as the dentist dictates them.
8. The patient's name, SSN, significant medical history, and blood pressure. Red, blue, or regular pencil.

**218**

1. Reshaping the occlusal or incisal surfaces of one or more selective teeth by grinding to improve interarch tooth contact relationships.
2. Reshaping the occlusal and/or incisal surfaces of all or nearly all the teeth by grinding to achieve harmonious contact during functional movement.



3. Mirror, explorer, periodontal probe, cotton forceps, articulating paper forceps, various rotary stones, rubber wheels and points, high-speed handpiece, articulating paper, occlusal waxes, and gauze sponges.
4. Unusual wear areas on teeth cannot be well marked except when the teeth are dry.
5. The occlusal interferences are removed by selectively grinding the teeth with a diamond stone in the highspeed handpiece. Articulating paper or occlusal wax is used to check the accuracy of the adjustment. Once the grinding is completed, the adjusted tooth surfaces are polished with abrasive rubber wheels or points.
6. Performed independently, scaling involves the complete removal of subgingival calculus and bacterial debris. Scaling and root planing performed together involve more extensive scaling procedures to remove subgingival calculus located in periodontal pockets and smoothing of root surfaces.
7. The intentional removal of the soft tissue wall of a periodontal pocket done under local anesthesia. It consists of removing the necrotic and degenerated tissue lining the gingival wall of the periodontal pocket by using a scraping action with the blade of a sharp curette turned against the soft tissue of the pocket.
8. Surgery directed toward hard and soft tissue defects which requires some tissue removal.
9. Surgery that attempts to repair the periodontium. Procedures designed to increase the amount of keratinized soft tissue or cover tooth roots where recession occurred; defects in bone can also be filled with bone grafts or artificial substitutes.
10. Having all instruments and supplies needed for the particular periodontal treatment set up prior to the arrival of the patient, establishing and maintaining asepsis, receiving and preparing the patient, instrument transfer, aspiration, irrigation, retraction, postoperative procedures, and suture removal.
11. The surgical excision of the soft tissue wall of suprabony pockets (above the alveolar bone).
12. Scaling and root planing.
13. Use an ice pack immediately after surgery, keeping it in place for 15 minutes and then removing it for 15 minutes continually for the next 24 hours.
14. Within the first 24 hours.
15. After the first 24 hours; warm salt water or prescribed mouth rinse.
16. Three to seven days.
17. Gingivoplasty.
18. A gingivectomy is performed in order to eliminate periodontal pockets and may include reshaping the gingiva as part of the technique. A gingivoplasty is accomplished in the absence of pockets with the sole purpose of removing excess tissue and recontouring the gingiva.
19. The complete separation of tissue from the donor site and replacement in another location to correct periodontal or mucogingival defects.
20. Free gingival graft.
21. Avoid aspiration of the tissue graft with the suction equipment. The epithelial side of the graft must not be placed against the recipient tissue. Use sterile saline to keep the graft moist on a sterile gauze sponge until the dentist places and sutures the graft at the recipient site with the connective tissue against the site.
22. Pedicle graft.
23. Additive.
24. Subtractive.
25. Osteoplasty refers to reshaping the alveolar bone without removing tooth-supporting bone. Ostectomy includes removal of tooth-supporting bone.
26. Burs and diamond stones in a handpiece. Irrigation of the area with sterile saline to minimize injury to the bone from frictional heat and aspiration of the debris.
27. An osseous graft.
28. Guided tissue regeneration.
29. A root amputation is the complete removal of one or more roots of a multirrooted tooth, without removal of any portion of the crown. A hemisection removes the root along with the associated portion of the crown.
30. At the postoperative appointment after suture removal.

31. Interproximal brushes, end-tufted brushes, rubber-tipped interdental stimulators, soft balsa wood toothpicks, and super-floss.
32. Antimicrobial mouth rinses.
33. To prevent recurrence of periodontal disease.
34. Its purpose, and that preserving their teeth depends on it.
35. Most patients who have experienced periodontal disease require maintenance every three months. The recall interval may vary from two to 12 months, depending on the severity of the case, degree of patient motivation and manual dexterity, as well as the capacity of the dental health team.
36. The periodontal assistant, periodontal therapist, or dental hygienist working with the periodontist.
37. Trained periodontal assistants, periodontal therapists, or dental hygienists. It allows periodontists to actively participate in providing therapy to more complicated situations and monitor the routine cases.
38. Examination and evaluation of the patient's current oral health, oral hygiene reinforcement and treatment, and determination of future treatment needs.
39. AF Form 935A and AF Form 935B.
40. On the AF Form 935A, the patient's name, SSN, original charting date, maintenance visit date, and name of therapist providing treatment; the remaining information is recorded in red, blue or regular pencil. On the AF Form 935B, the patient's name, SSN, and date of each plaque score determination; all other notations are made in red, blue or regular pencil.
41. Once a year on all periodontal maintenance patients.
42. Conventional hand instruments. Special plastic curettes.
43. Most patients should be placed on a three-month recall; however, patients with special needs may need monthly appointments.
44. The occlusion.

**Complete the unit review exercises before going to the next unit.**

## Unit Review Exercises

**Note to Student:** Consider all choices carefully, select the *best* answer to each question, and *circle* the corresponding letter.

41. (209) Which type of surgical blade is used in a beaver-style scalpel and has a squared-end cutting style?
  - a. #10.
  - b. #11.
  - c. #62.
  - d. #67.
42. (209) The shape of suture needles used *most* often in dentistry is
  - a. hooked.
  - b. straight.
  - c. circular.
  - d. semicircular.
43. (209) Which suture material is absorbable?
  - a. Silk.
  - b. Nylon.
  - c. Polyester.
  - d. Natural gut.
44. (209) The size of the suture material indicates the
  - a. larger the number, the larger the diameter.
  - b. smaller the number, the larger the diameter.
  - c. larger the number, the larger the suture thickness.
  - d. smaller the number, the smaller the suture thickness.
45. (209) Which type of forceps has working ends designed with a single, sharp-pointed extension that meshes in the middle of the opposing W-shaped end when the instrument is in the closed position?
  - a. Needle-holder.
  - b. Towel-clamp.
  - c. Hemostatic.
  - d. Tissue.
46. (209) What instrument is used to trim the projecting, uneven, or overhanging alveolar bone?
  - a. Tissue forceps.
  - b. Rongeur forceps.
  - c. Surgical scissors.
  - d. Hemostatic forceps.
47. (209) If the dentist calls for a Seldin #11, what type of instrument would you pass?
  - a. Curette.
  - b. Bone file.
  - c. Crossbar elevator.
  - d. Periosteal elevator.

48. (209) Which root elevator has the smallest straight working end and is used when roots are deeply seated?
- a. #74.
  - b. #92.
  - c. #301.
  - d. #34S.
49. (209) Which root elevator has a working end shaped somewhat like a rounded toothpick tip?
- a. Stout #11.
  - b. Seldin #23.
  - c. Cogswell A.
  - d. Cogswell B.
50. (209) Which root elevators are sometimes referred to as East-West elevators?
- a. Seldin #1L and #1R.
  - b. Miller #73 and #74.
  - c. Cryer #25 and #26.
  - d. Cogswell A and B.
51. (209) What is the overall shape of forceps used on the maxillary arch?
- a. C and L.
  - b. S, Z, and I.
  - c. C, S, and Z.
  - d. S, Z, and L.
52. (209) To remove maxillary incisors and cuspids, which tooth extracting forceps are *most* effective?
- a. #1.
  - b. #53L.
  - c. #88L.
  - d. #217.
53. (209) The tooth extracting forceps #53L and #53R are designed to remove
- a. mandibular bicuspid.
  - b. mandibular molars.
  - c. maxillary cuspids.
  - d. maxillary molars.
54. (209) Which extracting forceps are called the maxillary cowhorns?
- a. #53L and #53R.
  - b. #88L and #88R.
  - c. #150 and #151.
  - d. #210H and #210S.
55. (209) Which extracting forceps are known as the mandibular universal forceps?
- a. #101.
  - b. #150.
  - c. #151.
  - d. #203.
56. (209) Which hawkbill-type forceps are used on mandibular molars?
- a. #MD3.
  - b. #13.
  - c. #17.
  - d. #22.

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57. (209) Which extracting forceps are used to remove both maxillary and mandibular cuspids, bicuspid, and any remaining roots?
- a. #101.
  - b. #150.
  - c. #151.
  - d. #222.
58. (209) Which extracting forceps are designed to remove maxillary deciduous teeth?
- a. #150.
  - b. #151.
  - c. #150S.
  - d. #151S.
59. (210) What instrument is used to accurately determine the presence, depth, and form of periodontal pockets?
- a. Probe.
  - b. Curette.
  - c. Explorer.
  - d. Pocket-marking forceps.
60. (210) Which periodontal instrument is designed to adapt to *most* areas of the dentition by altering and adapting the finger rest, fulcrum, and hand position?
- a. Area specific curette.
  - b. Universal curette.
  - c. Sickle scaler.
  - d. Jacquette.
61. (210) Which periodontal instrument has two parallel cutting edges, a blade angulation of 90°, and a blade face which curves from head to toe only?
- a. Area specific curette.
  - b. Universal curette.
  - c. Sickle scaler.
  - d. File.
62. (210) Which periodontal instrument is the *best* choice for subgingival scaling and root planing because it provides the best adaptation to complex root anatomy?
- a. Sickle scaler.
  - b. Sickle curette.
  - c. Universal curette.
  - d. Area specific curette.
63. (210) Which periodontal instruments have small heads with only three parallel blades and are used to remove calculus and root roughness in root furrows, deep pockets, and places where gingival tissues are tight?
- a. Orban #10/11 and Hirschfeld #5/11.
  - b. Hirschfeld #3/7, #5/11, and #9/10.
  - c. Orban #6/7, #10/11, and #12/13.
  - d. Hirschfeld #3/7 and Orban #6/7.
64. (210) What type of instrument is the Kramer-Nevins #1?
- a. Periodontal elevator.
  - b. Periosteal elevator.
  - c. Root elevator.
  - d. Wax spatula.

65. (210) Which periodontal surgical chisels have a semicircular indentation on both sides of the shank, allowing the instrument to engage around the tooth into the interdental area?
- Ochsenbein #1 and #2.
  - Kramer-Nevins #1/2.
  - Wedelstadt #1/2.
  - Rhodes #36/37.
66. (211) What area of dentistry provides surgical treatment or correction of diseases, defects, or injuries of the oral cavity and facial structures?
- Endodontics.
  - Periodontics.
  - Oral surgery.
  - Prosthodontics.
67. (211) When should documented informed consent be obtained?
- For certain oral or periodontal surgery procedures only.
  - For all oral surgery procedures and intravenous conscious sedation.
  - With intravenous conscious sedation and all periodontal procedures.
  - With intravenous conscious sedation, and certain oral or periodontal surgery procedures.
68. (211) Depending on the procedure, how should informed patient consent be documented?
- Only on a special form signed by the provider.
  - Only on a handwritten entry in the patient's record signed by the patient.
  - On a special form or handwritten entry in the patient's record and signed by the patient.
  - On a special form or handwritten entry in the patient's record and signed by the provider.
69. (212) To help reduce a patient's apprehension, what type of sedation is administered as an antianxiety, sedative, or hypnotic drug several hours before the surgical procedure?
- Inhalation.
  - Intravenous.
  - General anesthesia.
  - Oral premedication.
70. (212) What is the optimal and *most* ideal route for conscious sedation?
- Inhalation.
  - Intravenous.
  - Intramuscular.
  - Oral premedication.
71. (212) How must any remaining amounts of drugs used in intravenous sedation be disposed?
- In a sanitary sewer.
  - As hazardous wastes.
  - By the dentist or assistant.
  - In the presence of a witness.
72. (212) Which pain- and anxiety-control methods require that a responsible adult must be present to provide necessary assistance during the immediate recovery period?
- All conscious sedation methods.
  - All inhalation sedations.
  - Intravenous sedations.
  - Oral premedications.

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73. (213) What should you do when patients who are premedicated with a sedative drug arrive before the scheduled appointment times?
- Seat them in the dental sick call treatment room.
  - Seat them in an empty treatment room, unattended.
  - Have them remain in the main patient waiting area.
  - Place them in a quiet area of the clinic with an escort.
74. (213) What grasp is used to transfer surgical instruments?
- Pen grasp.
  - Palm-thumb grasp.
  - Modified pen grasp.
  - Modified palm grasp.
75. (213) Which *best* describes the instrument sequence for a simple extraction?
- Aspirating syringe, mirror, explorer, tooth elevator, extraction forceps, hemostats, and suture needle.
  - Aspirating syringe, explorer periosteal elevator, tooth elevator, and hemostats and suture needle.
  - Mirror, aspirating syringe, explorer, tooth elevator, periosteal elevator, and extraction forceps.
  - Mirror, aspirating syringe, explorer, periosteal elevator, tooth elevator, and extraction forceps.
76. (213) What must you provide if the dentist uses a surgical bur in a handpiece to remove bone?
- A continual drip of saline solution on the bur while cutting the bone.
  - A continual drip of water on the bur while cutting the bone.
  - Irrigation from the three-way syringe to the surgical site.
  - Irrigation from the three-way syringe onto the bur.
77. (213) What does the dentist use to divide or section the crown of the tooth into two or more parts to allow room for luxation and removal of the tooth?
- Mallet and chisel, or Stryker handpiece and surgical bur.
  - Stryker handpiece and surgical bur or tooth elevator.
  - Mallet and chisel, or high-speed handpiece and bur.
  - High-speed handpiece and bur, or tooth elevator.
78. (213) Postsurgical swelling can be controlled by applying
- ice for the first 24 hours in a cycle of 15 minutes on and 15 minutes off.
  - ice for the first 48 hours in a cycle of 30 minutes on and 30 minutes off.
  - heat for the first 24 hours in a cycle of 15 minutes on and 15 minutes off.
  - heat for the first 48 hours in a cycle of 30 minutes on and 30 minutes off.
79. (213) All of the following are postsurgical instructions *not* recommended to the oral surgery patient *except*
- using ice for at least 30 minutes on and 30 minutes off during the first 24 hours.
  - using a straw and frequent rinsing with a mouthwash during the first 24 hours.
  - limiting activities and avoid strenuous work or exercise for a few days.
  - applying heat during the first 24 hours to minimize swelling.
80. (213) When can sutures be removed?
- Three to seven days following surgery, depending on the material and procedure.
  - One to two weeks following surgery, regardless of the material and procedure.
  - Three to five days following surgery, regardless of the material or procedure.
  - Five to 10 days following surgery, depending on the material and procedure.

81. (214) How many results are possible with the completion of the forensic examination?
- 1.
  - 2.
  - 3.
  - 4.
82. (215) How many members of the antemortem staff should review the composite record as a quality insurance check after charting is complete?
- 1.
  - 2.
  - 3.
  - 4.
83. (216) What is the primary function of periodontal treatment?
- Occlusal equilibration.
  - Replacement of missing teeth.
  - Elimination of periodontal pockets.
  - Repositioning of malattached gingival.
84. (216) Periodontal treatment is indicated when
- the teeth are nonrestorable.
  - the patient's oral hygiene is poor.
  - bone loss is too extensive to support the teeth.
  - resorption of the alveolar bone and periodontal tissue are present.
85. (217) What aspect of the periodontal examination provides valuable information regarding the dental status of the patient, such as oral hygiene habits and attitude toward dental health?
- Patient's medical-dental health history.
  - Dental treatment history.
  - Charting probing depths.
  - Radiographs.
86. (217) What symbol is used to indicate extensive tooth mobility in all directions?
- I.
  - II.
  - III.
  - IV.
87. (218) Which *best* describes the items you'll need to prepare a tray setup for an occlusal equilibration procedure?
- Mirror, explorer, periodontal probe, cotton forceps, articulating paper forceps, rotary stones, rubber wheels and points, high-speed handpiece, articulating paper, occlusal waxes, and gauze sponges.
  - Mirror, explorer, periodontal probe, cotton forceps, articulating paper forceps, rotary stones, rubber wheels and points, low-speed handpiece, and articulating paper.
  - Periodontal probe, articulating paper forceps, rotary stones, rubber wheels and points, high-speed handpiece, articulating paper, occlusal waxes, and gauze sponges.
  - Rotary stones, rubber wheels and points, low-speed handpiece, articulating paper, occlusal waxes, and gauze sponges.



- 
- 
88. (218) What items will you need to prepare a tray setup for scaling and root planing, and gingival curettage procedures?
- a. Cotton forceps, mirror, explorer, selected curettes and scalers, aspirating syringe, needles, anesthetic carpules, and aspirating tip.
  - b. Mirror, explorer, periodontal probe, cotton forceps, selected curettes and scalers, gauze sponges, cotton tip applicators, and aspirating tip.
  - c. Cotton forceps, periodontal probe, selected curettes and scalers, topical anesthetic, gauze sponges, cotton tip applicators, aspirating tip, suture needle and material, scissors, and hemostat.
  - d. Mirror, explorer, periodontal probe, cotton forceps, selected curettes and scalers, topical anesthetic, aspirating syringe, needles, anesthetic carpules, gauze sponges, cotton tip applicators, and aspirating tip.
89. (218) All of the following statements are postoperative instructions for a patient following scaling, root planing, and curettage procedures *except*
- a. moderate discomfort may be experienced for several hours after anesthesia wears off.
  - b. avoid foods which may become lodged under the gingiva.
  - c. resume home routine care 72 hours after the procedure.
  - d. slight soreness may be experienced for a few days.
90. (218) What are pocket depths apical to the level of alveolar bone called?
- a. Suprabony.
  - b. Intrabony.
  - c. Psuedo.
  - d. Crater.
91. (218) What type of osseous surgery is designed to restore the form of pre-existing alveolar bone to the level existing at the time of surgery or slightly more apical to it?
- a. Additive.
  - b. Subtractive.
  - c. Osseous graft.
  - d. Reconstructive.
92. (218) What procedure eliminates shallow osseous craters resulting from chronic periodontitis by their removal and reshaping of the tooth's supporting bone?
- a. Ostectomy.
  - b. Frenectomy.
  - c. Osteoplasty.
  - d. Alveoloplasty.
93. (218) What procedure is used to reshape bony ledges, overgrowths of bone, uneven bone margins, and abnormal form, without removing the supporting bone of the teeth?
- a. Ostectomy.
  - b. Osteoplasty.
  - c. Gingivoplasty.
  - d. Sequestrectomy.
94. (218) What procedure involves the placement and removal of a membrane over the root surface of surgically exposed and debrided areas to prevent epithelia migration along the cemental wall of the pocket?
- a. Guided tissue regeneration.
  - b. Soft tissue graft.
  - c. Osseous graft.
  - d. Pedicle graft.

95. (218) Which procedure involves the complete removal of one or more roots of a multi-rooted tooth, without removal of any portion of the crown?
- a. Hemisection.
  - b. Apicoectomy.
  - c. Bicuspidization.
  - d. Root amputation.
96. (218) Following periodontal surgery, what may be required if the patient's teeth are sensitive to hot, cold, or sweet stimuli?
- a. Clinical desensitization and desensitizing toothpastes.
  - b. Antimicrobial mouth rinses and antitartar toothpastes.
  - c. Clinical desensitization and fluoride rinses or gels.
  - d. Fluoride rinses or gels and antitartar toothpastes.

## Unit 3. Instrument Sharpening

<b>3–1. Basics of Instrument Sharpening and Techniques .....</b>	<b>3–1</b>
219. Periodontal scaling instruments .....	3–1
220. Sharpening techniques .....	3–11

**T**HE CARE OF hand instruments involves more than cleaning and sterilizing. As hand instruments are used, they become dull and lose their cutting efficiency. Therefore, it becomes necessary to sharpen them. Several methods and techniques exist to sharpen the various dental instruments. The method and technique used depends on the type of instrument to be sharpened and the preference of the technician.

### 3–1. Basics of Instrument Sharpening and Techniques

As a technician, it is your responsibility to sharpen a variety of periodontal hand instruments, such as scalers and curettes, used to remove calculus, root plane, and curettage soft tissue. Periodontal scalers and curettes are the most common instruments you will need to sharpen.

To be able to sharpen instruments proficiently, it is important to understand some basics of instrument sharpening. For example, why do instruments even need sharpening, and how can you identify if an instrument needs sharpening? It is also important to understand the design of the instrument in relationship to the technique used, as well as the method and type of stone selected.

#### 219. Periodontal scaling instruments

The success of periodontal instrumentation procedures is directly related to the quality of the instruments used. Effective scaling, root planing, and soft-tissue curettage depend on the use of sharp instruments for successful treatment. There are many advantages to using sharp instruments. A sharp cutting edge will:

- Enhance operator tactile sensitivity, a critical factor in nonsurgical therapy.
- Reduce amount of pressure exerted, thereby reducing heavy handedness of the operator.
- Increase control of the instrument.
- Reduce the number of strokes to remove a deposit, resulting in decreased amount of time to complete the procedure and the likelihood of stripping the root surface.
- Increase the overall effectiveness of nonsurgical therapy by efficiently fracturing the deposits from the tooth surface.

All instruments should be sharp at the start of a procedure, and periodontal instruments need continual resharpening during scaling and root planing procedures. Depending on the condition of the root surfaces, 20 to 40 strokes may be needed just to plane one surface. After 10 to 12 scaling strokes, the cutting edge is no longer optimally sharp and the effectiveness of scaling, root planing, or curettage is significantly reduced.

Providers who work with properly sharpened instruments are more effective and efficient. Both patient and provider will benefit from the time saved during the appointment by using sharp instruments. An additional benefit is that instruments resharpened frequently require less recontouring. Only a small amount of metal must be removed from well-maintained instruments, so less time is required to sharpen and they tend to last longer.

The first step is to develop the ability to determine whether or not an instrument is optimally sharp. Experienced providers can determine when their instruments are getting dull by the feel of the instrument against the tooth. A beginning technician, however, has not developed a sense for what a

sharp instrument feels like; therefore, additional methods for determining sharpness must be learned. Sharpness can be evaluated visually and tactilely in one of the following ways.

### Tactile test

One of the best ways to physically test instrument sharpness is by applying the cutting edge to be tested against an acrylic or plastic rod. Special acrylic testing sticks have been designed for this purpose and are available from instrument manufacturers. Place the instrument's cutting edge against the surface of the testing stick at the same angle used to implement a working stroke against a tooth surface. If the edge is sharp, it will bite into the plastic surface when light pressure is applied. If the instrument tends to drag, slide, or grate across the surface, it is not sharp. Evaluate the entire length of the cutting edge for dullness. A cotton-tipped applicator, a disposable evacuation tip, or a toothbrush handle can serve the same purpose if a commercial testing stick is not available. Commercial testing sticks and toothbrush handles are made of materials that can be sterilized and included on each tray setup so that instruments can be tested during treatment procedures.

One physical method that should *never* be used to test instrument sharpness is to apply the edge to a fingernail. This technique was used many years ago prior to our rigorous infection control standards in use today, and it violates every aseptic technique and should never be used.

### Visual test

Another way to detect a dull cutting edge is to examine it under direct light. Hold the instrument so that the cutting edge faces a strong light source. A sharp cutting edge is a line that has length but no thickness. Since this is a line and not a surface, it will not reflect light. As shown in figure 3-1, a dull surface reflects light so that a white area or a bright light line is visible where the cutting edge should be. If the cutting edge is truly sharp, there should not be a flat surface or bevel at the junction of the facial and lateral surfaces. Only a thin, dark line will be visible where these two surfaces meet when the instrument is correctly sharpened (fig. 3-1). This evaluation method is difficult to master; however, with practice, it can be accomplished quickly and is the preferred method for determining optimum instrument sharpness.

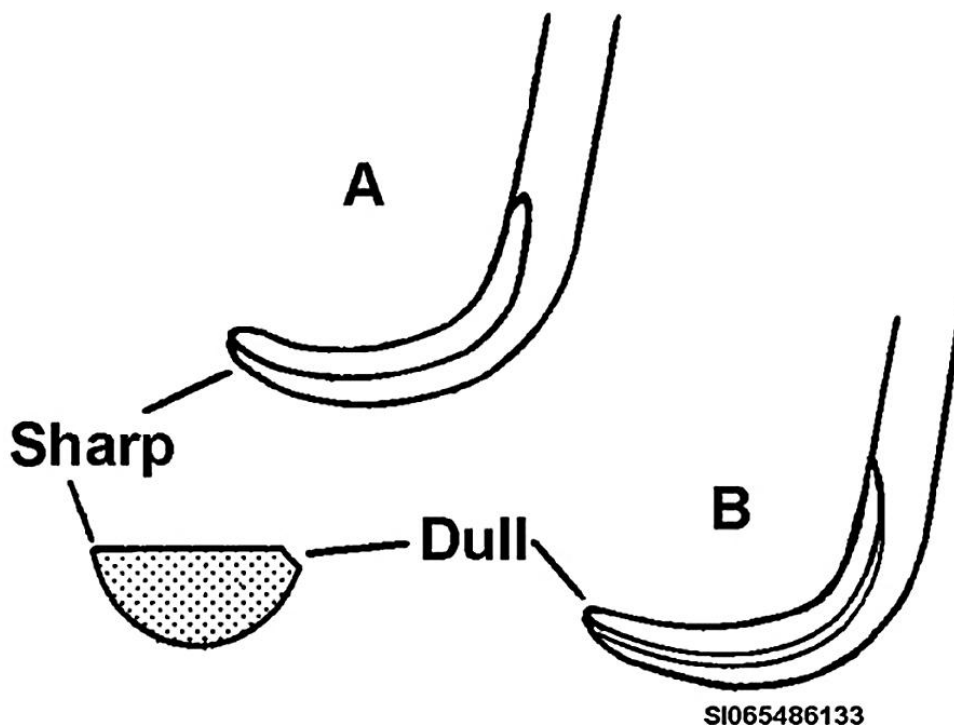


Figure 3-1. Visual test for instrument sharpness.

## Techniques

The methods for sharpening instruments vary according to the type of sharpening device used. The basic methods are manual and mechanical. When you use manual sharpening methods, you sharpen an instrument with flat, grooved, cylinder, and tapering cylinder stones that can be either stationary or handheld. Another method of manual sharpening is to use an instrument known as a Neivert whittler (fig. 3-2). When you use mechanical methods, you use either smaller cylindrical or conical stones mounted on slow-speed handpieces (referred to as rotary stones) or flat or rounded stones mounted on electric sharpeners.

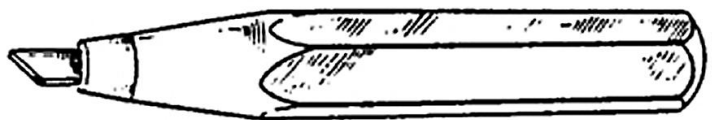


Figure 3-2. Neivert whittler sharpening instrument.

Manual instrument sharpening has the advantage that it can be performed anywhere in the dental clinic where there is adequate light and a good working surface. Manual sharpening also allows you to control the exact speed and pressure to sharpen an instrument so that there is no unnecessary loss of instrument surface due to over sharpening. This technique is recommended for routine sharpening of instruments.

Mechanical instrument sharpening is best suited for quickly sharpening very dull instruments. The technician must be proficient in this technique or instruments can be ruined quickly.

### *Manual sharpening of instruments*

Manual sharpening procedures are the methods of choice so blades are not reduced unnecessarily by rapid cutting mounted stones. The following are three methods used in manual sharpening:

1. Hold the instrument stationary while moving the stone against it.
2. Hold the stone stationary and move the instrument blade across the surface of the stone.
3. Use the handheld Neivert whittler.

The Neivert whittler's working end consists of five razor-sharp edges and a rounded burnishing edge of tungsten carbide. It is used to sharpen straight and curved blades, including those of dental instruments, scissors, and knives. The Neivert whittler is particularly useful for sharpening the face of a curved scaler or curette.

Manual hand sharpening is a very practical approach to instrument sharpening because it can be accomplished easily during patient treatment. It requires commonly available, inexpensive equipment and is easily mastered by beginning technicians.

### *Mechanical sharpening of instruments*

Mechanical devices are effective and easy to use; when used properly they provide consistent, precision sharpening. The two types of mechanical sharpening devices used in dental clinics include rotary mounted stones such as composition stone and electric sharpeners.

#### *Rotary stones*

When you use a small, mandrel-mounted cylinder or cone-shaped stone in a slow-speed handpiece, this is referred to as rotary instrument sharpening. You must carefully control the speed of metal removal and the proper instrument/stone adaptation with this method. If done properly and with concern for preserving the original instrument design, this and other mechanical sharpening methods are timesaving approaches, and useful for instruments that require a lot of sharpening or recontouring. Disadvantages to mechanical sharpening include but are not limited to the following:

- Inconsistent results due to variations in speed and difficulty of stabilization of instrument and stone.
- Excess reduction of instrument during shorter periods of use; less conservation of instruments than by manual methods.
- Excessive frictional heat could affect the temper of the steel.
- Cost effectiveness; straight handpieces, multiple mandrel mounted stones and the necessity of needing each of these in every scaling kit negate the cost effectiveness and practicality of rotary sharpening.
- Always wear protective eyewear when using mechanical sharpening techniques due to the risk of flying metal, abrasive particles, and other debris.

#### *Electric sharpeners*

Follow the principles for preserving instrument designs that apply to hand-sharpening techniques when using a sharpening machine. The main difference is that the sharpening stone is mechanically rotated (rotary wheel) or moved back and forth (reciprocating honing) while the instrument blade is applied to it. The amount of metal that can be removed with the electric sharpeners depends on the amount of pressure applied and the length of time the blade is in contact with the sharpening stone. These machines can be timesavers if you are skilled in placing the blade against the stone at the correct angle and if the instrument requires a lot of recontouring. If you are inexperienced or unfamiliar with the instrument design, you can ruin instruments much more quickly with this technique than with a manual technique. Once again, there are numerous disadvantages to using mechanical sharpening methods. The need for special equipment and the frequency of sharpening limits your ability to sharpen during patient treatment. This method is more useful when a special time has been allotted specifically for instrument sharpening.

#### **Sharpening stones**

The type of stone you select will depend on the method you will use, the instrument to be sharpened, and your preference. Proper use and care of sharpening stones is necessary to achieve the desired results.

#### *Selection and use*

Sharpening stones are available in various shapes, colors, compositions, and abrasiveness (fig. 3-3). Sharpening stones are quarried from natural mineral deposits or produced artificially. In either case, the surface of the stone is made up of abrasive crystals that are harder than the metal of the instrument to be sharpened. Coarse stones have larger particles and cut more rapidly. They are used on instruments that are very dull. Finer stones with smaller crystals cut more slowly and are reserved for final sharpening to produce a finer edge and for sharpening instruments that are only slightly dull. Arkansas oilstones are natural abrasive stones that vary in color and crystalline size. The Arkansas stones are quarried from natural mineral deposits, are average-to-fine grained, and they are mildly abrasive. India, carborundum, Ruby, ceramic, and the diamond hone are examples of artificial stones. The India stone is fine to medium in abrasiveness. The carborundum and Ruby stones are coarse artificial stones that are produced by impregnating nonmetallic substances with abrasive particles. These man-made stones can be useful if a lot of recontouring is needed because they grind a surface more quickly than the Arkansas stone.

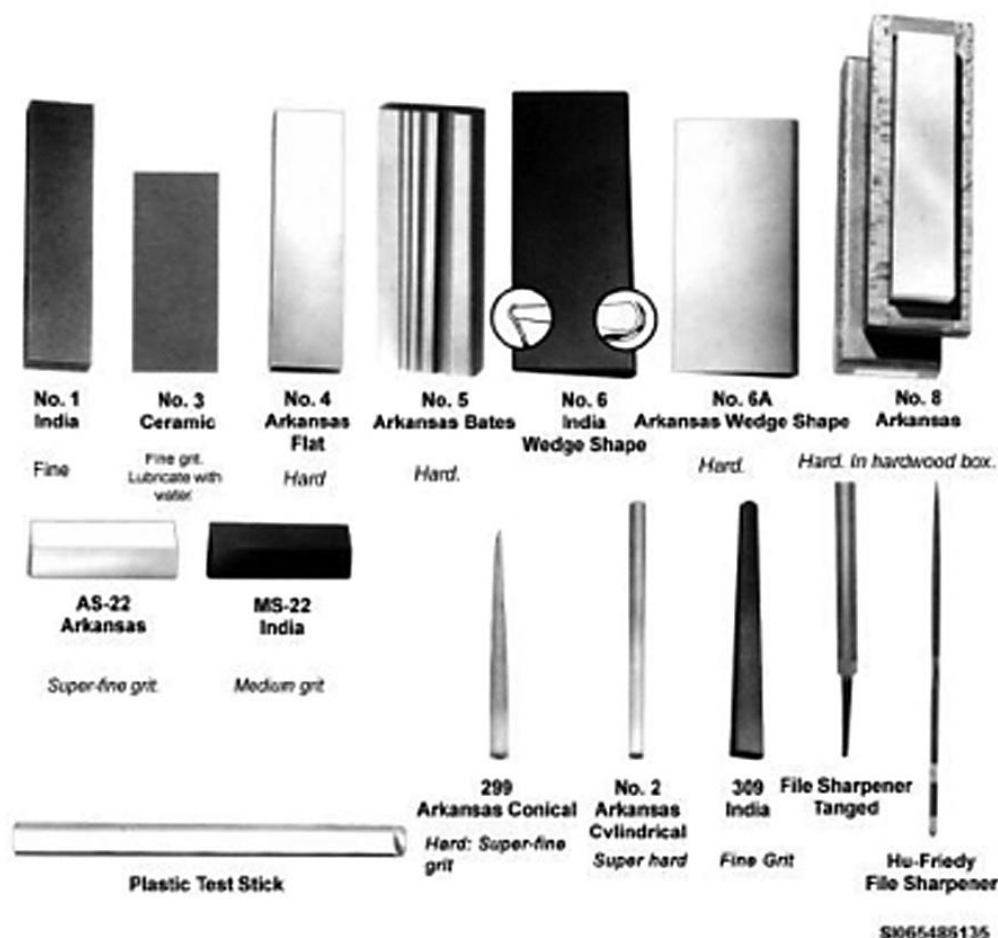


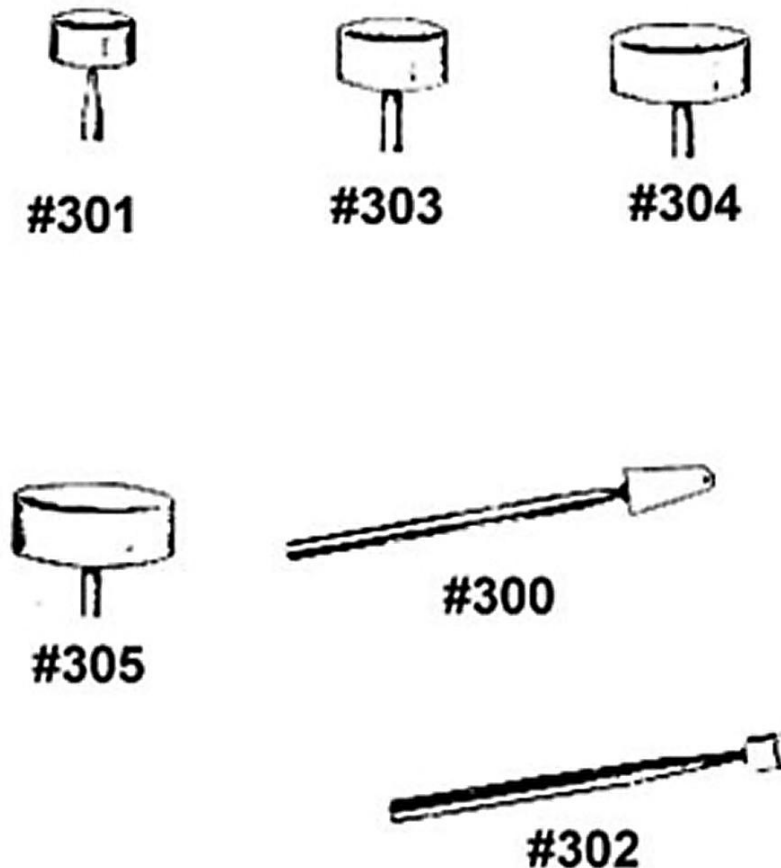
Figure 3-3. Types of sharpening stones (Courtesy of Hu-Friedy Mfg. Co. LLC).

The shape and size of the sharpening stone depends on how the stone will be used and your preference. Mandrel-mounted rotary stones are small, straight, or tapered cylindrical stones of various diameters designed to fit the various sizes of the instrument blades (fig. 3-4). Mandrel-mounted stones are designed for use in slow-speed handpieces. They are cylindrical, conical, or disc shaped. These stones are generally not recommended for routine use because they are difficult to control precisely and can ruin the shape of the instrument. They also tend to wear the instrument down quickly, and can generate quite a bit of friction heat, which can affect the temper of the instrument. Handheld stones are also available in a variety of sizes and shapes. Some stones are conical, cylindrical, or tanged shapes. Flat rectangular stones are used to sharpen the lateral surfaces of instruments. The grooved stones are particularly useful for sharpening instruments with curved or disc-shaped cutting edges. The grooves in the stone are rounded and of different sizes to conform to various instruments. Large conical or tapered cylinder stones are used to sharpen the facial surfaces of instruments.

The quality of a cutting edge is determined by the fineness of the stone with which it is sharpened. A hard Arkansas oilstone can produce a high-quality cutting edge while not grinding away the metal surface of the instrument as fast as a coarser stone. In addition, when using a hard-type stone, there is no possibility of catching the point of the instrument in it which would ruin both the stone and instrument. Therefore, a hard Arkansas oilstone is preferred to other sharpening stones for routine sharpening of instruments that are well maintained.

## COMPOSITION STONES FOR THE HANDPIECE

*Coarse. Made of white  
aluminum oxide.*



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Figure 3-4. Rotary stones (Courtesy of Hu-Friedy Mfg. Co. LLC).

### *Care of sharpening stones*

Before sharpening instruments, lightly coat the Arkansas and India stones with a light-weight oil (use sterile oil when sharpening during patient treatment and thoroughly wipe the blade clean prior to insertion back into the patient's mouth). The purpose of the oil is to prevent metal filings from the sharpening procedure from becoming embedded in the surface of the stone. The oil also has a lubricating effect, reducing the heat produced during sharpening and enhancing your ability to implement smooth, even strokes over the stone's surface.

Other types of sharpening stones can require the use of water as a lubricant or no lubricant at all. Water is used for Ruby, carborundum, and ceramic stones. During use, prevent grooving of the stone



by using its entire surface equally. A stone loses its efficiency and accuracy if it becomes grooved or hollowed.

Always clean a stone after using to remove metal filings and any oil that may have been used. Most stones can be submerged in an ultrasonic cleaner or scrubbed with soap and hot water to clean them.

After cleaning, wrap and sterilize the stone using a method of sterilization compatible with the stone. Always consult and follow the manufacturer's instructions of all stones to ensure proper use, maintenance, and sterilization.

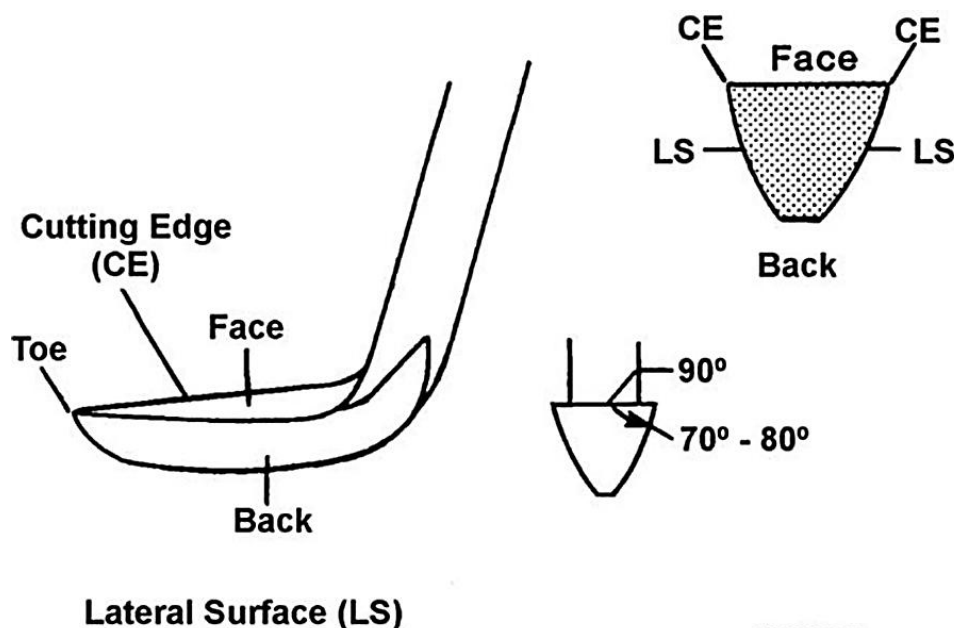
### Relevance of instrument design to sharpening techniques

Each type of instrument has specific design characteristics that must be preserved during sharpening. You must understand exactly how these design principles affect the use of each type of instrument so that the sharpening techniques you use preserve the original contour of the instrument.

The types of instruments used most frequently for scaling are the sickle scalers, universal curettes, and area specific curettes. Other periodontal instruments, such as chisels, hoes, files, and knives, also require sharpening.

#### *Sickle scalers*

There are actually two different blade designs for sickle scalers—straight and curved blades. In figure 3-5, the straight-blade design side view shows that two cutting edges of this sickle form a gentle arc that converges in a sharp tip. Both cutting edges are used, so both must be sharpened. The pointed tip of the sickle scaler provides access beneath tight contact areas. A significant design feature of the straight sickle blade is the squared-off back of the blade, which you can see in the cross-sectional view of figure 3-5.



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Figure 3-5. Straight sickle scaler design.

The design characteristics of the curved sickle blade are shown in figure 3-6. The facial surface of the instrument forms a slight curve as it extends from the shank of the instrument to the pointed tip. The lateral surfaces of this sickle are flat and converge at the pointed back, as shown in the cross-sectional view of figure 3-6. You can see the differences in the back design by comparing the cross-sectional views of these two sickle scalers.

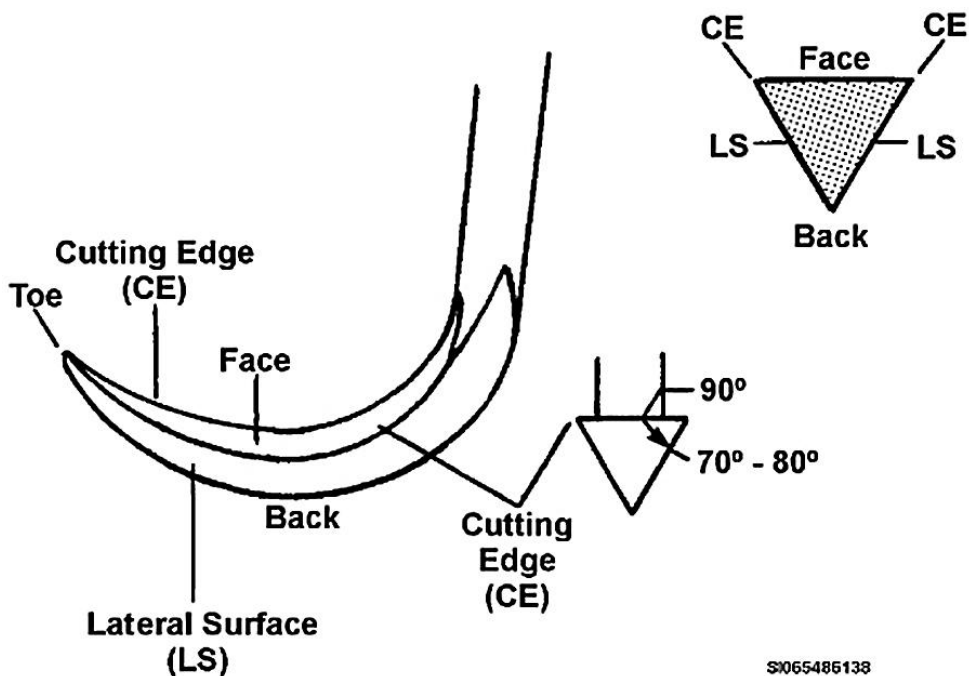


Figure 3-6. Curved sickle scaler design.

In both blade designs, the internal angle formed between the face of the blade and the lateral surface is 70° to 80°. When properly applied, the sharpening stone will form a complementary angle of 100° to 110° with the face of the sickle blade.

#### *Universal curettes*

Figure 3-7 shows the design characteristics of the universal curette. The side view of the universal curette blade shows two parallel cutting edges, both of which are used during scaling. The two cutting edges converge in a rounded toe. It is important to maintain a rounded toe during the sharpening procedure because this is a design feature to minimize soft tissue trauma from extension of the toe away from the tooth in a narrow pocket and permit access to the base of the sulcus or pocket. Failure to maintain this design could result in trauma to the soft tissues when the curette is not adapted properly against the tooth surface.

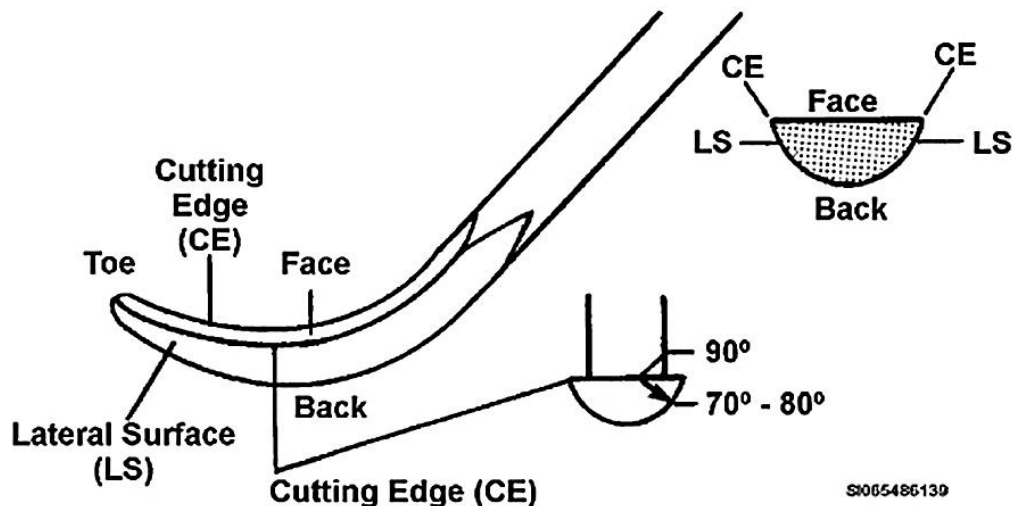


Figure 3-7. Design characteristics of the universal curette.

Another important characteristic of the universal curette is that the lateral surfaces are curved, rather than flat, and form a rounded back surface. A cross-sectional view of the universal curette looks like a half circle. This is the second design feature that allows this instrument to navigate in tight pockets without damaging the adjacent soft tissues. The rounded back must be preserved during sharpening. The cross-sectional view of the universal curette shows that the facial surface of the blade forms a  $90^\circ$  angle with the shank of the instrument. The internal angle of the universal curette blade is the same as that of the sickle scaler— $70^\circ$  to  $80^\circ$ . When properly applied, the sharpening stone will form a complementary angle of  $100^\circ$  to  $110^\circ$  with the face of the blade (fig. 3-8). If the curette is dull, there will be a gap between the face of the blade and surface of the stone (fig. 3-9).

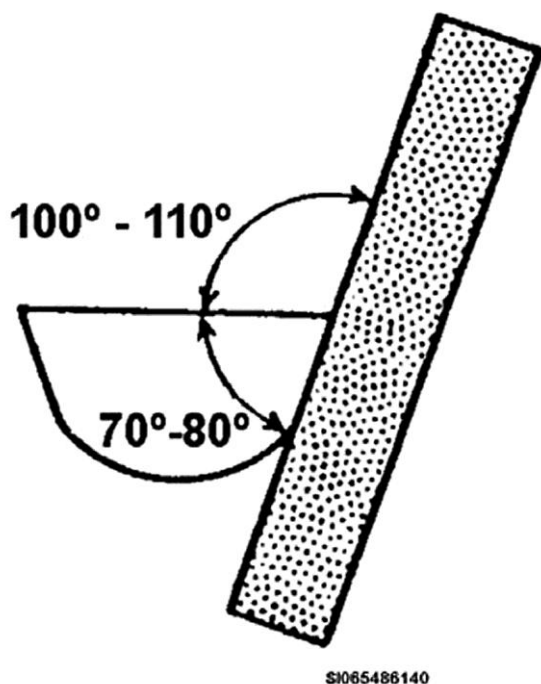


Figure 3-8. Internal instrument angle of  $70^\circ$  to  $80^\circ$  and complementary angle of  $100^\circ$  to  $110^\circ$ .

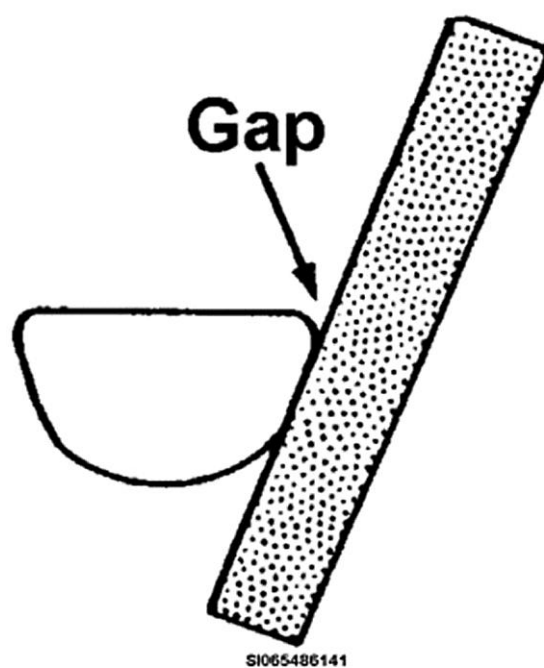


Figure 3-9. A gap formed between the face of the blade and stone.

If curettes are sharpened so that the cutting edge is less than  $70^\circ$ , the fine edge created dulls easily (fig. 3-10). Cutting edges sharpened at more than  $80^\circ$  require the application of heavy lateral pressure to remove deposits.

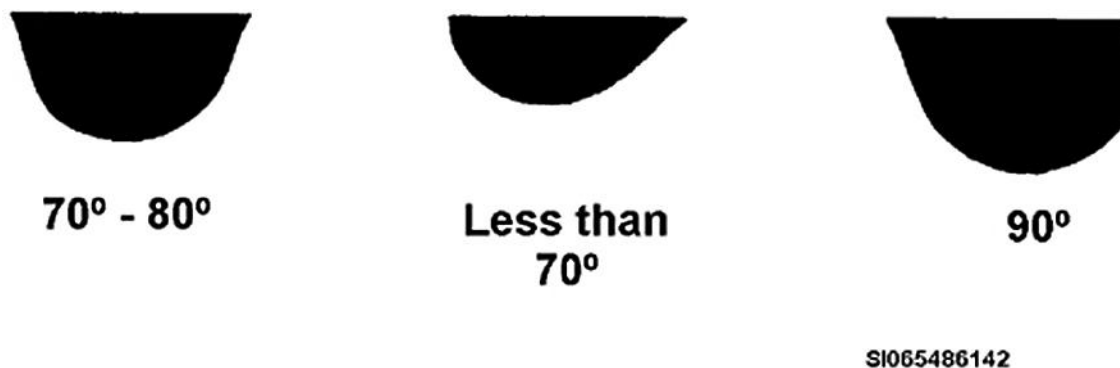


Figure 3-10. Comparison of properly and improperly sharpened instruments with angles of  $70^\circ$  to  $80^\circ$ .

### *Area specific curettes*

The design features for the Gracey curette are the same as those of the universal curette with two notable exceptions. The blade is slightly offset at an angle of about  $60^{\circ}$  to  $70^{\circ}$  from the terminal shank of the instrument so that the two cutting edges are not parallel to each other (fig. 3-11). Instead, one cutting edge appears lower than the other when the instrument is held so that the last bend in the shank, or terminal shank, is perpendicular to the floor (fig. 3-12). The terminal shank extends from the working end to the bend nearest the working end, also referred to as the last bend in the shank (fig. 3-13). The terminal shank is important for proper instrument adaptation to the tooth. Only the lower cutting edge is used during periodontal procedures; therefore, only sharpen this cutting edge on a Gracey curette. Other design characteristics of a curette blade, described earlier for the universal curette, such as rounded back, rounded toe, and internal angle of  $70^{\circ}$  to  $80^{\circ}$ , are also present on a Gracey curette.

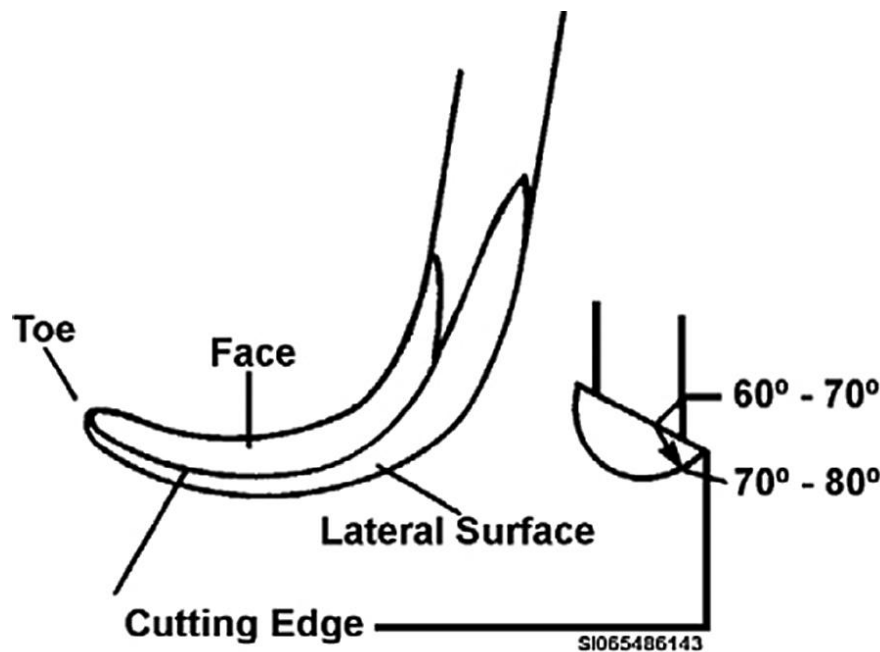


Figure 3-11. Design features of area specific curettes.

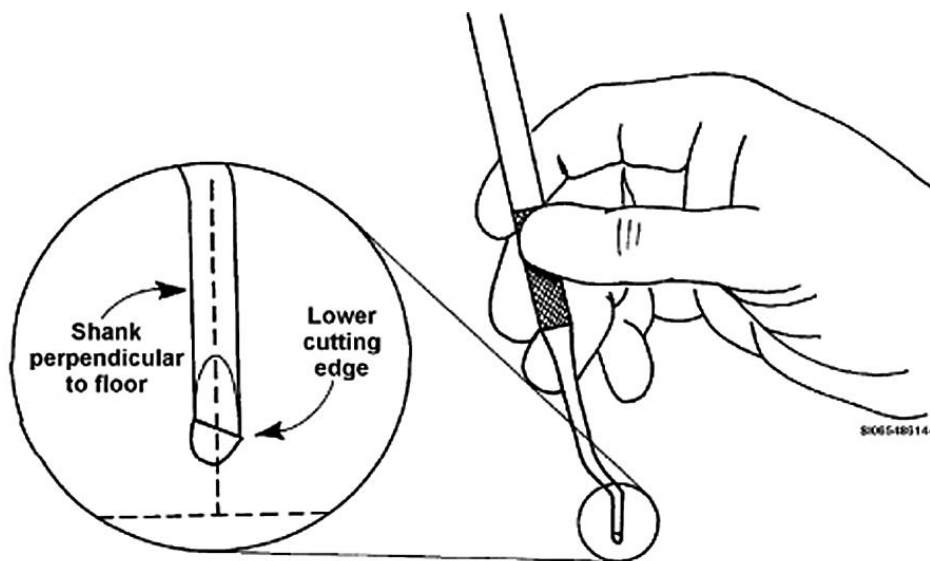


Figure 3-12. Determining the cutting edge of area specific curettes.

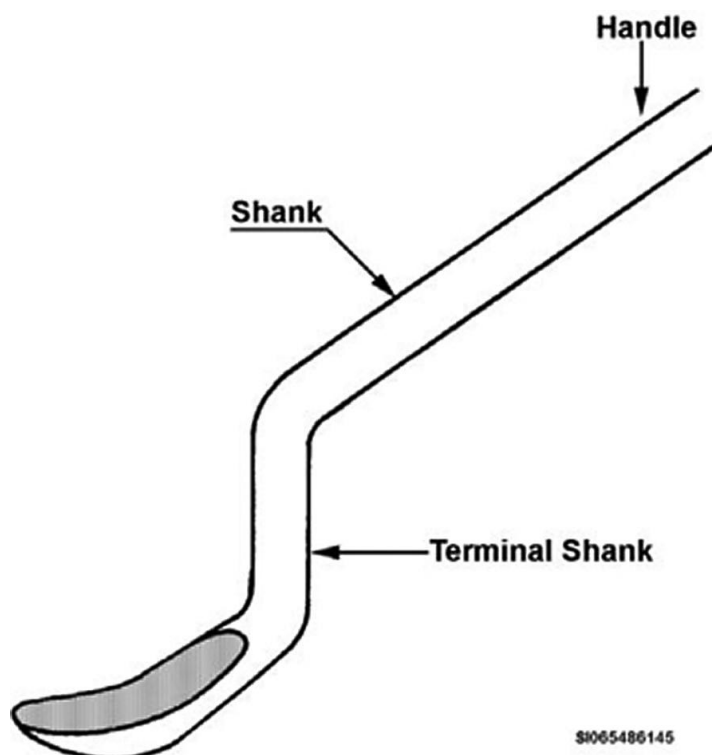


Figure 3-13. Identifying the terminal shank.

### Sharpening lateral versus facial surfaces

Sharp cutting edges can be created in one of two ways—grinding the facial surface or grinding the lateral surfaces. In one approach, you sharpen the cutting edges by applying a cylinder- or cone-shaped stone to the facial surface of the blade, thus sharpening both sides of the blade simultaneously. In the second approach, you sharpen each cutting edge individually by applying a flat stone to each lateral surface. Both methods provide a fine cutting edge when properly implemented. The major advantage of sharpening the facial surface is that it is less time consuming because both cutting edges of the blade are sharpened simultaneously. However, this method is only suitable for scalers and universal curettes (two cutting edges vs. one for Gracey's).

In the past, grinding away the facial surface was not recommended because it was believed that reducing the depth of the blade decreased the strength of the instrument more quickly than grinding the lateral surfaces. However, research has shown that there is no difference in instrument strength when facial sharpening was compared to lateral sharpening. It was also noted that both methods result in significant reductions in instrument strength when the size of the instrument blade had been reduced by 20 percent or more. Therefore, exercise caution when using instruments that have been sharpened beyond this point because reduced strength could result in the tip of the blade breaking if it is applied with much force against heavy or tenacious calculus deposits, restorative materials, or tight contact areas. Removal of broken instrument tips, especially from subgingival areas, can be an arduous task and an unpleasant experience for both the patient and provider. You can prevent this situation from occurring by inspecting instrument blades and exercising good judgment in their use.

### 220. Sharpening techniques

You will need to know how to sharpen instruments using several different techniques. These techniques include the stationary stone-moving instrument, moving stone-stationary instrument, grooved stone, hand cone, and the Neivert whittler. Some of these sharpening techniques can be used on all instruments, while others are suited to only certain instrument designs. Whatever sharpening technique you use, you will need to make some preparations before you begin sharpening.

The sharpening methods just mentioned can be used wherever an adequate light source and working surface are available. Select the sharpening stones needed for the technique you plan to use. You'll also need to gather all supplies (i.e., gauze squares, a testing stick, a cotton-tipped applicator, and a lubricant such as water or light-grade oil) dependent on the type of stone selected. Use only sterile supplies for instrument sharpening. Resterilize after use on contaminated instruments. If all instruments are resharpenered at one designated time—either before or after being sterilized—the same sterile stone and testing stick can be used for the entire batch and resterilized for later use.

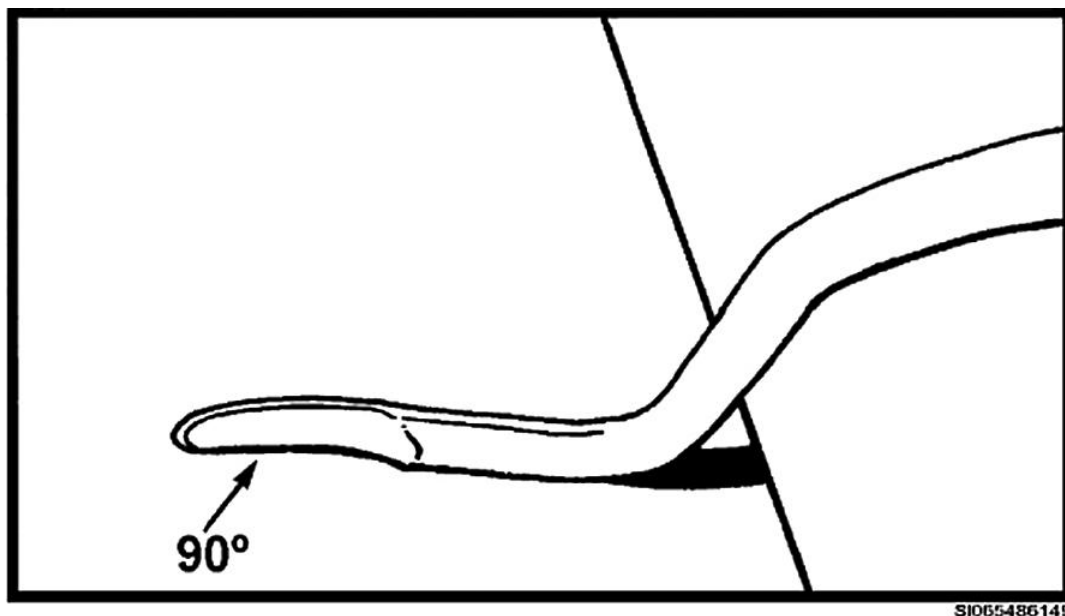
When scaling and root planning are to be performed, include a sterile stone and testing stick on each tray setup because frequent resharpenering during treatment will be necessary. Apply a light coating of oil or water to the stone with the cotton-tipped applicator. Follow the manufacturer's instructions regarding the choice of lubricant. Use the sterile gauze sponge to remove the oil and metal sludge from the sharpening stone and the instruments. To facilitate cleaning and asepsis, moisten the sterile gauze squares with an appropriate surface disinfectant solution.

### **Stationary flat stone-moving instrument technique**

When using this approach to instrument sharpening, perform the technique as described. Select and lubricate the stone with oil or water as appropriate. Place the stone on a flat surface. Hold the instrument with a modified pen grasp, with the third and fourth fingers providing support for the hand on the surface of the table. Grasp and stabilize the stone with the fingers of the other hand. Wear gloves during sharpening procedures for maximal asepsis and your protection.

### **Universal curettes**

When sharpening a universal curette, place the instrument near the top of the stone so that the face forms a 90° angle with the stone's surface (fig. 3-14). Then rotate the instrument handle slightly away from yourself until the angle between the face and the stone is 100° to 110° (fig. 3-15). This is the correct angle for sharpening all curettes and sickle scalers. This angle complements the internal angle of the instrument (70° to 80°) so that the original design of the blade is maintained during sharpening. It's important to maintain this angle for the entire length of the sharpening stroke. Until you become experienced at identifying the correct angulation, it may be helpful to continue to place the instrument first so that the 90° angle is formed and then open it up slightly another 10° to 20°.



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Figure 3-14. Facial surface of a curette at 90° angle to a stationary stone.

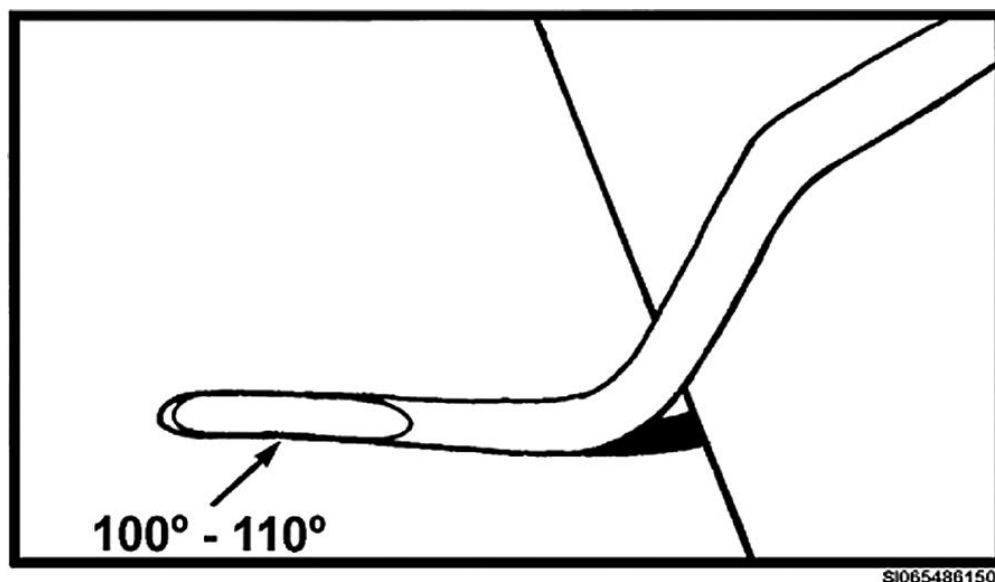
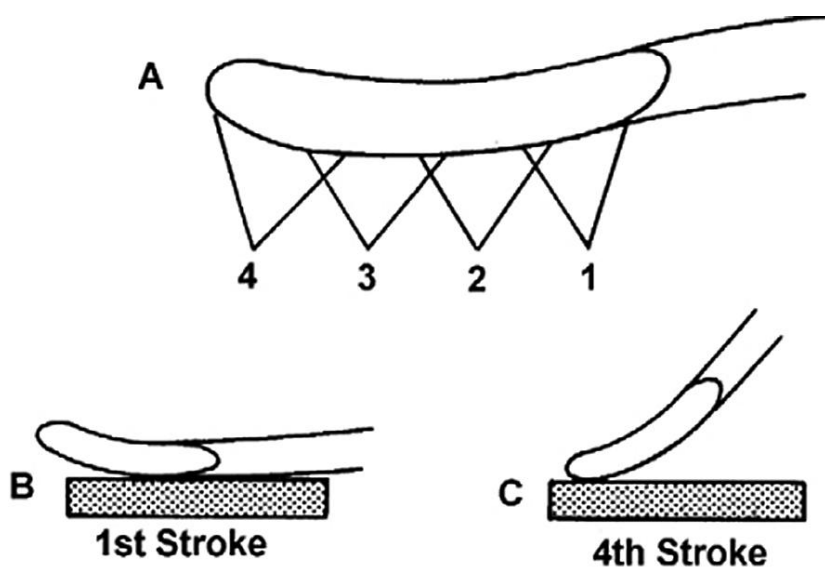


Figure 3-15. Angle between the face and stone opened to 100° to 110°.

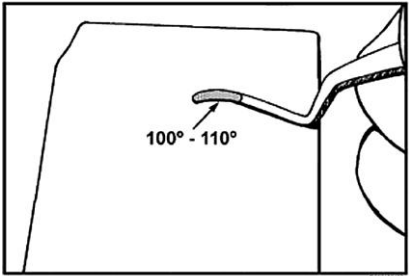
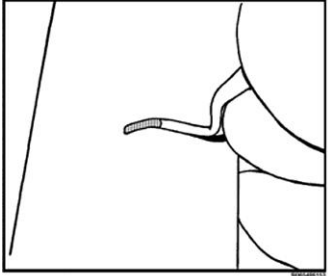
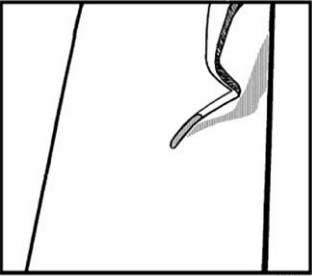
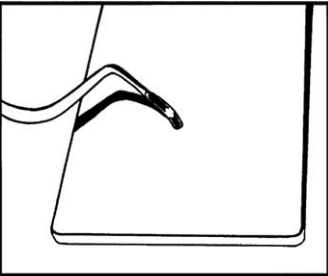
After the correct angle has been established, begin the stroke with the heel of the blade adapted to the stone. As you pull the instrument toward you, rotate the instrument blade toward the toe so that the entire blade is sharpened during each complete stroke. Figure 3-16 shows that four different adaptations of the instrument to the stone may be necessary to ensure that the entire cutting edge has been sharpened. Move the entire hand and arm as a single unit toward you while rotating the wrist. At the end of the stroke, rotate around the entire toe of the blade so that its curvature is maintained. Failure to grind the toe surface evenly may result in a toe that is flattened or pointed instead of curved.



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Figure 3-16. Sharpening the entire blade with four different adaptations.

The steps involved in a single stroke are described in the following table.

STEP	PROCEDURE	ILLUSTRATION
1	Begin the stationary stone-moving instrument stroke at the top of the stone with the heel of the blade in contact with the stone at 100° to 110° angle.	 <p data-bbox="1011 615 1206 636">Figure 3-17. Step 1.</p>
2	Pull the instrument forward across the stone, rotating the blade towards the middle of the cutting edge.	 <p data-bbox="1011 961 1206 982">Figure 3-18. Step 2.</p>
3	Lift the back (heel) of the cutting edge towards the end of the stroke so that the toe is kept in contact with the stone.	 <p data-bbox="1011 1304 1206 1325">Figure 3-19. Step 3.</p>
4	Round the entire toe off at the end of the stroke so that a sharp point is not created. Use less pressure at the toe, since it is not a cutting edge. Lift the back (heel) of the cutting edge towards the end of the stroke so that the toe is kept in contact with the stone.	 <p data-bbox="1011 1646 1206 1667">Figure 3-20. Step 4.</p>

Several light strokes may be necessary to sharpen the entire cutting edge. After one cutting edge of the curette has been sharpened, sharpen the other cutting edge in the same way. You may need to reposition the stone at the edge of the table to enable the sharpening of the opposite cutting edge, as shown in figure 3-21. After sharpening, inspect the blade carefully to ensure that the original design has been preserved.



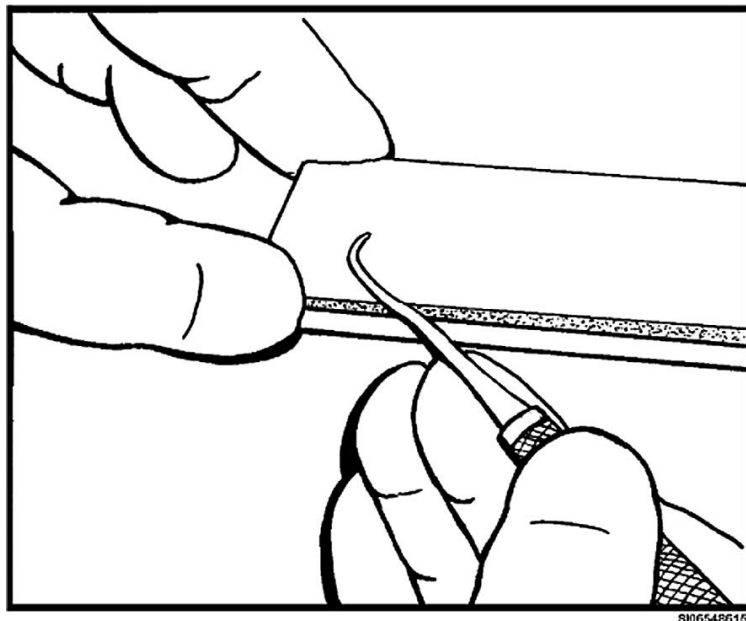


Figure 3-21. Sharpening the opposite edge of the universal curette.

### ***Gracey curettes***

Gracey curettes are sharpened in the same way with only a few exceptions. The primary exception is that only one cutting edge of the Gracey curette should be sharpened. First, identify the lower cutting edge. Since the face of the Gracey is not perpendicular to the shank, align the facial surface at a  $90^\circ$  angle to the stone, and then open the angle to the proper sharpening angle of  $100^\circ$  to  $110^\circ$ .

### ***Sickle scalers***

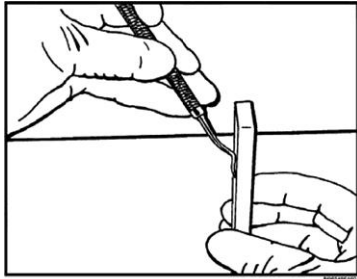

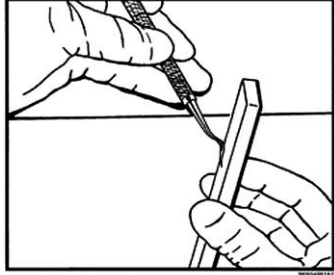
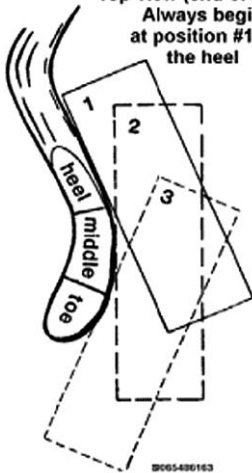
Sickle scalers can be easily sharpened by the stationary flat stone-moving instrument method. The same principles of instrument placement and angulation apply. The only major difference is that, because the lateral surfaces of this instrument are flatter and straighter than those of the curette, there is not as much rotation of the blade from heel to toe during each stroke. Stop the stroke at the tip of the instrument so that the sharp point is maintained. Repeat the sharpening strokes until the cutting edge is sharp, and then reposition the instrument to sharpen the opposite cutting edge.

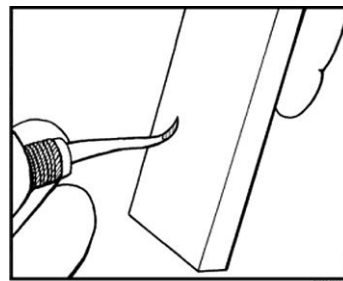
### **Moving stone-stationary instrument technique**

Another method of instrument sharpening involves holding an instrument stationary in one hand and moving the stone across its lateral surfaces with your other hand. This is an excellent method for sharpening periodontal curettes and sickle scalers.

Begin by establishing a stable work surface, such as a table or countertop, and a good light source. Select and lubricate the stone with oil or water as appropriate. Identify the terminal shank of the periodontal instrument, which is always the part of the shank closest to the working end. Then, determine the instrument's cutting edge and if it is straight or curved. Look at the toe or tip of the instrument to determine if it is rounded or pointed.

Hold the instrument firmly in a palm grasp with your nondominant hand (left hand if you are right-handed or in your right hand if left-handed). Brace your hand against the top edge of the counter or table so that the instrument blade extends over the edge of the table with the toe pointing toward you. Position the instrument so that the terminal shank is perpendicular to the work surface and the facial surface parallel to the floor.

STEP	PROCEDURE	ILLUSTRATION
1	Grasp the lower portion of the sharpening stone with your other hand. Brace the hand holding the instrument against a table or countertop. Face of the instrument is parallel to the floor.	 <p data-bbox="883 548 1386 594">Figure 3-22. Moving stone-stationary instrument, step 1.</p>
2	Adapt the surface of the stone to the cutting edge of the instrument at a 90° angle.	 <p data-bbox="883 915 1386 961">Figure 3-23. Moving stone-stationary instrument, step 2.</p>
3	Continue the process of adapting the surface of the stone by rotating the top of the stone slightly away from the instrument until the correct angle of 100° to 110° is formed between the stone and the facial surface.	 <p data-bbox="883 1283 1386 1329">Figure 3-24. Moving stone-stationary instrument, step 3.</p>
4	Apply short downward strokes (1/2 to 1 inch) to the cutting edge of the blade, being careful to maintain the stone at the same angle during each stroke. If recontouring or the instrument is very dull, apply pressure on both the up and down strokes, however ensure the finishing strokes are applied using down strokes only to avoid the formation of a wire edge.	<p data-bbox="1057 1352 1273 1434">Top view (end of stone) Always begin at position #1 at the heel</p>  <p data-bbox="883 1864 1386 1911">Figure 3-25. Moving stone-stationary instrument, step 4</p>

STEP	PROCEDURE	ILLUSTRATION
5	Apply sharpening strokes to the heel of the instrument, and then, rotate the stone slightly until the entire cutting edge has been sharpened.	Refer to Figure 3-25. Rotation of the sharpening stone, step 5.
6	A separate stroke is needed to maintain the rounded toe of the curette. The stone should be adapted so that a 45° angle is formed between the bottom half of the stone and the back of the facial surface. Short down strokes should be applied around the curvature of the toe.	 <p>Figure 3-26. Placement of the sharpening stone, step 6.</p>

Applying pressure to both the upstroke and the down stroke with this technique could create wire edges. To remove the wire edges, place a cylinder- or tapered-shaped sharpening stone squarely against the facial surface of the curette (fig. 3-27). Stabilize the instrument and apply light, even pressure to the facial surface while the stone is rotated in a counterclockwise direction, such as heel to toe. Only grind the facial surface if wire edges are detected because excessive grinding both here and on lateral surfaces could reduce the instrument size and strength unnecessarily.

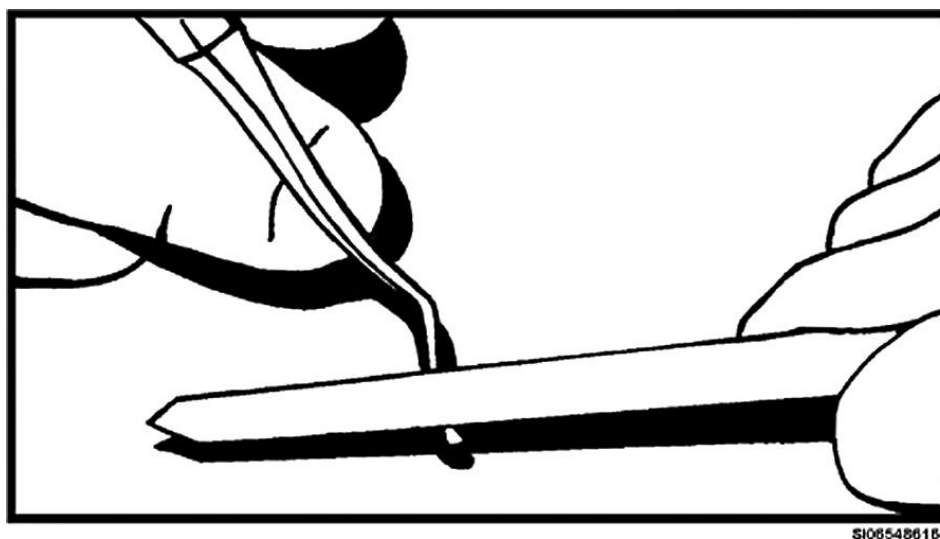


Figure 3-27. Apply a tapered cylindrical stone to the facial surface of the curette to remove wire edges.

Periodically test the instruments you're sharpening for sharpness. After sharpening, remove the metal sludge from both the instrument blade and the stone with sterile gauze squares.

### Other manual techniques

Other manual techniques you will use are the grooved stone, hand cone, and Neivert whittler.

#### *Grooved stone*

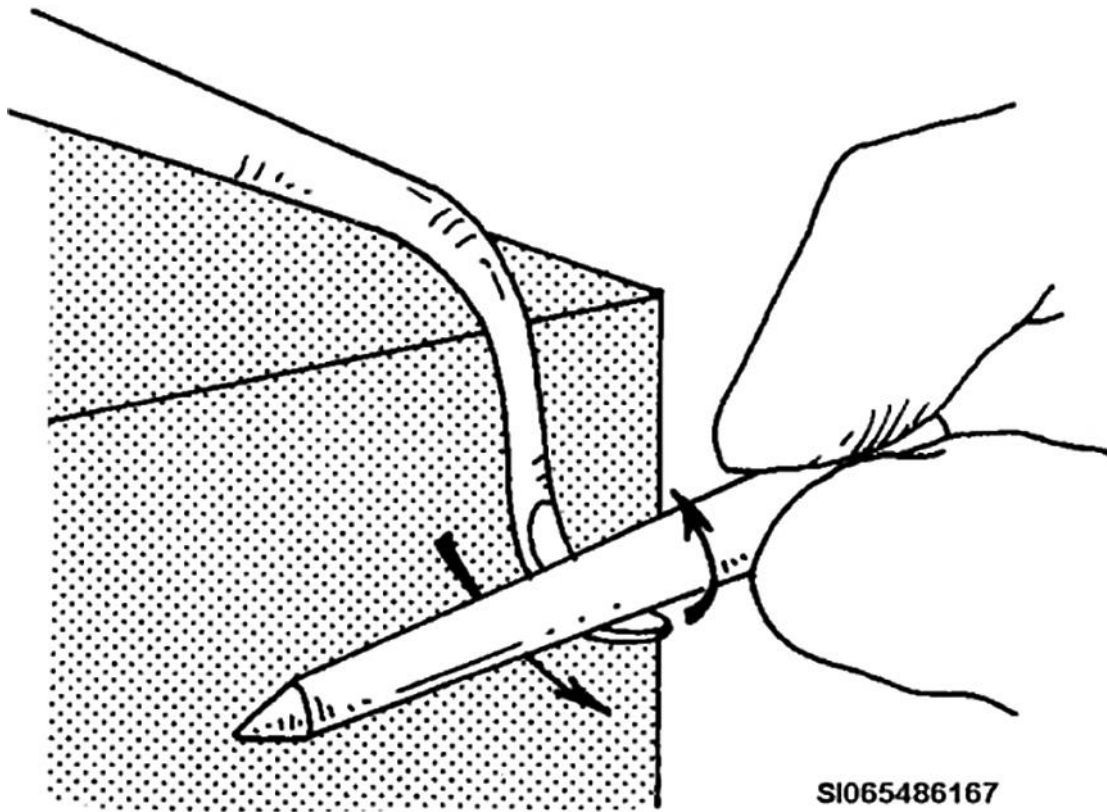
Curved and disc-shaped cutting edges can be sharpened with the grooved stone. Since the grooves in the stone are rounded and of different sizes, be sure to use a groove of the proper size. To sharpen the instrument, place the working end at the proper angle in the groove and draw the instrument away from the cutting edge. When you check these instruments for sharpness, make sure that the curved or disc working edge is smooth and perfectly shaped.

### ***Hand cone***

This technique uses handheld stones that are tapered or straight cone-shaped, or rectangular with rounded edges. Remember that this method is used only for sickle scalers and universal curettes.

Use the following steps to hold the instrument and stone:

- Hold the instrument to be sharpened in your nondominant hand. Use the palm-thumb grasp, grasping the instrument firmly.
- Turn the blade of the instrument toward yourself with the face of the blade positioned upward.
- Place the instrument over the edge of the table or countertop and stabilize your arms.
- With a firm grasp of the sharpening cone in your dominant hand, position the appropriate diameter of the cone to fit the curvature of the surface to be sharpened (fig. 3-28).



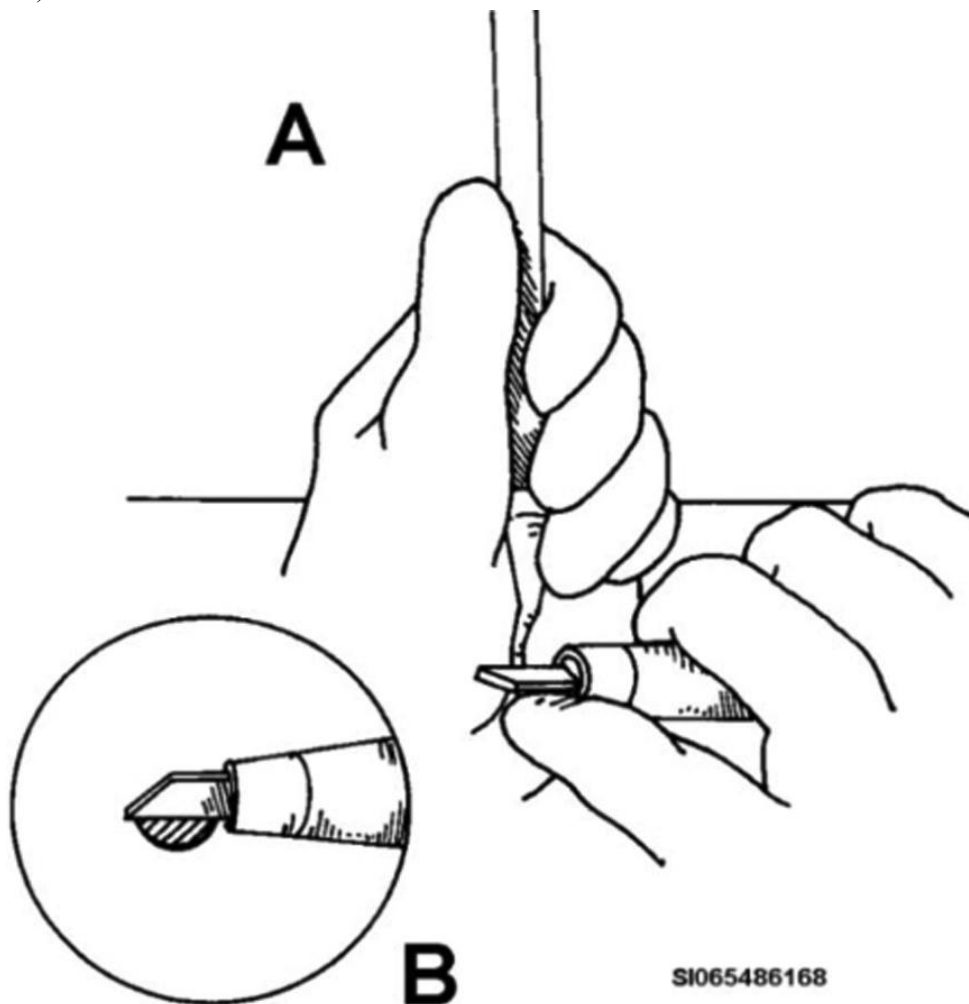
**Figure 3-28. Hand-sharpening with cylindrical stone. Use a counterclockwise rotation of the stone starting at the heel of the instrument face and moving towards the tip or toe of the instrument.**

- Position the stone straight across the face of the instrument and apply even pressure to both cutting edges so that they are evenly sharpened simultaneously.
- Rotate the stone counterclockwise over the instrument with even, firm pressure.
- Continue rotation of the stone upward (as in a circle) when approaching the end of the instrument to prevent tapering off and reshaping the curvature of the tip.
- Periodically test for sharpness and continue sharpening if necessary.

### ***Neivert whittler***

The Neivert whittler is not a sharpening stone. It is a metal instrument constructed of tungsten carbide. Stability and control are most important when using the Neivert whittler to sharpen instruments. Use the following steps when using the Neivert whittler:

- Hold the instrument to be sharpened in your nondominant hand.
- Place the instrument across your palm and grasp it with all of your fingers and thumb (fig. 3-29).



**Figure 3-29. Sharpening an instrument with a Neivert whittler.**

- Turn the surface to be sharpened towards you. Hold the Neivert whittler in your dominant hand with a palm grasp.
- Stabilize your arms, between your wrists and elbows on the edge of a solid table or countertop.
- Place your thumb (dominant hand) under the handle next to the working end and, simultaneously, rest your thumb on your other hand below the instrument (fig. 3-29).
- Place the blade of the sharpener straight across the face of the instrument.
- Draw the Neivert whittler edge across the length of the face with a moderate, even pressure to produce evenly sharpened cutting edges.
- As you approach the tip or toe of the instrument, continue in an upward motion to prevent tapering off and reshaping the curvature of the tip or toe.

After a few applications, test for sharpness and continue sharpening if necessary. Once the instrument is sharpened, hone the lateral surfaces of the blade next to the cutting edges.

## Self-Test Questions

After you complete these questions, you may check your answers at the end of the unit.

### 219. Periodontal scaling instruments

1. List the five advantages to using sharp instruments for scaling and root planning procedures.
2. Why do periodontal instruments need continual sharpening during scaling and root planning procedures?
3. What is the first step in learning how to sharpen instruments?
4. How can an experienced provider determine if instruments are getting dull?
5. Briefly explain the tactile test for instrument sharpness.
6. What is one physical method you should never use to test instrument sharpness? Explain why.
7. How is the visual test for instrument sharpening performed?
8. What sharpening method uses flat, grooved, cylinder, and tapering cylinder stones that can be either stationary or handheld?
9. List the three ways in which manual instrument sharpening can be done.
10. What are the ways in which mechanical sharpening can be done?
11. What sharpening method uses smaller cylindrical or conical stones mounted on slow-speed handpieces?
12. What must you carefully control when sharpening instruments with rotary stones?

13. How is the sharpening stone moved with electric sharpeners?
14. Which stone is a natural abrasive stone quarried from natural mineral deposits and mildly abrasive?
15. What determines the quality of a cutting edge?
16. Which stones must be lightly coated with a light-weight oil before sharpening instruments? Why?
17. What type of lubricant is used for Ruby, carborundum, and ceramic stones?
18. Briefly explain how to clean a stone after use to remove metal filings and oil.
19. What should be done with a stone after use and cleaning?
20. Why is it important to understand the design of an instrument when sharpening it?
21. Describe the design features of universal curettes that must be maintained during instrument sharpening.
22. What happens if the cutting edge of the curette is less than 70° or more than 80°?
23. What are the two notable exceptions of the Gracey curette when compared to the design of the universal curette?
24. Briefly explain the two approaches to creating sharp cutting edges.
25. Why should you exercise caution when using instruments that have been sharpened beyond 20 percent?

26. How can removal of broken instrument tips from subgingival areas be prevented?

### **220. Sharpening techniques**

1. What items are needed for sharpening instruments?
2. What should be included on each tray setup if scaling and root planning are to be performed?
3. Explain how the instrument is held when using the stationary flat stone-moving instrument technique.
4. Explain how to establish the correct angle for sharpening all curettes and sickle scalers.
5. Briefly describe the sharpening stroke after the correct angle is established.
6. Why are four different adaptations of the instrument to the stone necessary?
7. How should you move your hand during the instrument stroke?
8. Why is it necessary to rotate around the entire toe of the blade at the end of the stroke?
9. What is different when sharpening Gracey curettes?
10. When using the moving stone-stationary instrument sharpening technique, which surface of the instrument do you move the stone across?
11. Briefly explain how to hold and position an instrument.
12. Explain how to adapt the stone to the cutting edge of the instrument.



13. What type of strokes are applied to the cutting edge of the blade?
14. Describe the separate stroke needed to maintain the rounded toe of the curette.
15. What type of instruments can be sharpened with the grooved stone?
16. Briefly describe how to sharpen instruments using the grooved stone.
17. How is the instrument held and positioned for hand-cone sharpening?
18. How is the stone held and used to sharpen instruments with a hand cone?
19. What items are the most important when using the Neivert whittler to sharpen instruments?
20. Explain how to hold the Neivert whittler to sharpen instruments.
21. Describe how to sharpen instruments with the blade of the Neivert whittler.

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### **Answers to Self-Test Questions**

#### **219**

1. Enhances operator sensitivity; reduces amount of pressure exerted, thereby reducing heavy handedness of the operator; increases control of the instrument; reduces the number of strokes to remove a deposit, resulting in decreased amount of time to complete the procedure and the likelihood of stripping the root surface; and increases overall effectiveness on nonsurgical therapy by efficiently fracturing the deposits from the tooth surface.
2. Depending on the condition of the root surfaces, 20 to 40 strokes may be needed just to plane one surface. After 10 to 12 scaling strokes the cutting edge is no longer optimally sharp and the effectiveness of scaling, root planning or curettage is significantly reduced.
3. To develop the ability to determine whether or not an instrument is optimally sharp.
4. By the feel of the instrument against the tooth.
5. Place the instrument's cutting edge against the surface of an acrylic or plastic rod at the same angle used to implement a working stroke against the tooth surface. If the edge is sharp, it will bite into the plastic surface when light pressure is applied. If the instrument tends to drag, slide, or grate across the surface, it is not sharp.

6. To apply the edge to a fingernail; it's a violation of aseptic techniques.
7. Examine the instrument with the cutting edge facing a strong light source. A sharp edge forms a line with length but no thickness and will not reflect light. Only a thin, dark line will be visible. A dull surface reflects light so that a white area or a bright light line will be visible where the cutting edge should be.
8. Manual.
9. Hold the instrument stationary while moving the stone against it, stabilize the stone and move the instrument blade across the surface of the stone, use the hand-held Neivert whittler instrument.
10. Using rotary stones or electric sharpeners.
11. Mechanical.
12. The speed of metal removal and the proper instrument/stone adaptation.
13. Mechanically rotated (rotary wheel) or moved back and forth (reciprocating honing).
14. Arkansas oilstone.
15. The fineness of the stone with which it is sharpened.
16. Arkansas and India. To prevent metal filings from the sharpening procedure from becoming embedded in the surface of the stone and as a lubricating effect, it reduces the heat produced during sharpening, and enhances your ability to implement smooth, even strokes over the stone's surface.
17. Water.
18. Most stones can be submerged in the ultrasonic cleaner or scrubbed with soap and hot water to clean them.
19. Wrap and sterilize the stone using a method of sterilization compatible with the stone.
20. To preserve the original contour of the instrument.
21. Two parallel cutting edges, both are used during scaling. The two cutting edges converge in a rounded toe. Curved lateral surfaces that form a rounded back surface. Same 70 to 80° internal angle, with complementary angle of 100 to 110° formed with sharpening stone.
22. Less than 70° creates a fine edge that dulls easily. More than 80° requires application of heavy lateral pressure to remove deposits.
23. The blade of the Gracey curette is slightly offset at an angle of about 60 to 70° from the shank of the instrument, so that the two cutting edges are not parallel to each other. Instead, one cutting edge appears lower than the other when the instrument is held so that the terminal shank is perpendicular to the floor. Only the lower cutting edge is used during periodontal procedures, therefore, only this cutting edge should be sharpened on a Gracey curette.
24. Sharp cutting edges can be created in one of two ways—grinding the facial surface or grinding the lateral surfaces. In one approach, you sharpen the cutting edges by applying a cylinder- or cone-shaped stone to the facial surface of the blade, thus sharpening both sides of the blade simultaneously. In the second approach, you sharpen each cutting edge individually by applying a flat stone to each lateral surface.
25. Reduced strength could result in the tip of the blade breaking if it is applied with much force against heavy or tenacious calculus deposits, restorative materials, or tight contact areas.
26. By inspecting instrument blades and exercising good judgment in their use.

**220**

1. Sharpening stones, gauze squares, a testing stick, a cotton-tipped applicator, and a lubricant, such as water or light-grade oil.
2. A sterile stone and testing stick.
3. Hold the instrument with a modified pen grasp, with the third and fourth fingers providing support for the hand on the surface of the table.
4. Place the instrument near the top of the stone so that the face forms a 90° angle with the stone's surface. Then rotate the instrument handle slightly away from yourself until the angle between the face and the stone is 100 to 110°.
5. Begin the stroke with the heel of the blade adapted to the stone. Rotate the instrument blade toward the toe as the instrument is pulled toward you so that the entire blade is sharpened during each complete stroke.
6. To ensure that the entire cutting edge has been sharpened.
7. Move the entire hand and arm as a single unit toward you while rotating the wrist.

8. So that the curvature of the toe is maintained. Failure to grind the toe surface evenly may result in a toe that is flattened or pointed instead of curved.
9. Only one cutting edge of the Gracey curette should be sharpened.
10. Lateral.
11. Hold the instrument firmly in a palm grasp with your nondominant hand. Brace your hand against the top edge of a counter or table so that the instrument blade extends over the edge of the table with the toe pointing toward you. Position the instrument so that the terminal shank is perpendicular to the work surface and the facial surface parallel to the floor.
12. First, adapt the stone at a 90° angle to the cutting edge. Then, rotate the top of the stone slightly away from the instrument until the correct angle of 100 to 110° is formed between the stone and the facial surface.
13. Short downward strokes (1/2 to 1 inch).
14. Adapt the stone so that a 45° angle is formed between the bottom half of the stone and the back of the facial surface. Apply short down strokes around the curvature of the toe.
15. Instruments with curved and disc-shaped cutting edges.
16. Select a groove of the proper size. Place the working end at the proper angle in the groove and draw the instrument away from the cutting edge.
17. Hold the instrument in your nondominant hand using the palm-thumb grasp that places the instrument across the palm with your fingers and thumb grasping the instrument firmly. Turn the blade of the instrument toward yourself with the face of the blade positioned upward. Place the instrument over the edge of the table or countertop and stabilize your arms.
18. Hold the stone in your dominant hand with a firm grasp of the sharpening cone. Position the stone straight across the face of the instrument and apply even pressure to both cutting edges so that they are evenly sharpened simultaneously. Rotate the stone counterclockwise over the instrument with even, firm pressure. Continue rotation of the stone upward (as in a circle) when approaching the end of the instrument to prevent tapering off and reshaping the curvature of the tip.
19. Stability and control.
20. Hold the instrument to be sharpened in your nondominant hand. Place the instrument across your palm and grasp it with all of your fingers and thumb. Turn the surface to be sharpened towards you. Hold the Neivert whittler in your dominant hand with a palm grasp. Stabilize your arms, between your wrists and elbows on the edge of a solid table or countertop. Place your thumb (dominant hand) under the handle next to the working end and, simultaneously, rest your thumb on your other hand below the instrument.
21. Place the blade of the sharpener straight across the face of the instrument. Draw the Neivert whittler edge across the length of the face with a moderate, even pressure to produce evenly sharpened cutting edges. As you approach the tip or toe of the instrument, continue in an upward motion to prevent tapering off and reshaping the curvature of the tip or toe.

**Complete the unit review exercises before going to the next unit.**

## Unit Review Exercises

**Note to Student:** Consider all choices carefully, select the *best* answer to each question, and *circle* the corresponding letter. When you have completed all unit review exercises, transfer your answers to the Field-Scoring Answer Sheet.

**Do not return your answer sheet to the Air Force Career Development Academy (AFCDA).**

97. (219) When using the visual test for sharpness, a sharp instrument will
- form a thin, dark line where the facial and lateral surfaces meet.
  - have a bevel at the junction of the facial and lateral surfaces.
  - form a white area or a bright line at the cutting edge.
  - have thickness but no length.
98. (219) Mechanical instrument sharpening is *best* suited for
- preventing overshaping.
  - routine sharpening of instruments.
  - reducing the loss of instrument surface.
  - quickly sharpening very dull instruments.
99. (219) Which instrument has two parallel cutting edges that converge in a rounded toe?
- Area specific sickle scaler.
  - Straight sickle scaler.
  - Curved sickle scaler.
  - Universal curette.
100. (220) When using the *stationary flat stone-moving instrument technique*, which step is *not* involved in a single stroke?
- Pull the instrument forward across the stone, rotating the blade towards the middle of the cutting edge.
  - Lift the back (heel) of the cutting edge towards the end of the stroke so the toe is kept in contact with the stone.
  - Pull the instrument forward across the stone, rotating the blade away from the cutting edge.
  - Round the entire tow off at the end of the stone so that a sharp point is not created.

## Glossary of Terms

**apicoectomy**—removal of the tooth root apex and the surrounding infectious debris.

**biangle**—having two angles.

**buccal**—facial surface of posterior teeth, or pertaining to the cheek.

**carpule**—a glass cartridge containing a sterile solution of a drug, as for local anesthetic, which is loaded into a special syringe for injection.

**edentulous**—without teeth.

**furcation**—anatomical area of multi-rooted teeth where the roots divide.

**gingivectomy**—excision of a portion of the gingival to reduce sulcular pockets.

**gingivoplasty**—the surgical recontouring or reshaping of the gingiva for the achievement of physiologic form.

**ostectomy**—removal of bone.

**osteoplasty**—reshaping or remodeling of bone.

**radiolucent**—pertaining to or designating a tissue or material that is partly or wholly nonresistant to the passage of x-rays.

**radiopaque**—pertaining to or designating a tissue or material that is resistant to the passage of x-rays.

**transillumination**—the act of causing light to show through an organ or part as a means of diagnosis. the inspection of an organ or part by means of a strong light made to pass through certain areas.

**triturate**—mixing of silver alloy with mercury to produce an amalgam.

**Abbreviations and Acronyms**

<b>AF</b>	Air Force
<b>AFDRAP</b>	AF Dental Readiness Assurance Program
<b>ANUG</b>	acute necrotizing ulcerative gingivitis
<b>BDS</b>	basic diagnostic setup
<b>cc</b>	cubic centimeters
<b>DD</b>	Department of Defense (pertaining to forms)
<b>DRMO</b>	Defense Reutilization and Marketing Office
<b>DTR</b>	dental treatment room
<b>EBA</b>	ethoxy benzoic acid
<b>ECG</b>	electrocardiogram
<b>GMT</b>	gingival margin trimmers
<b>H-type</b>	Hedstrom
<b>IV</b>	intravenous
<b>K-type</b>	Kerr
<b>mm</b>	millimeter
<b>PPE</b>	personal protective equipment
<b>SF</b>	Standard Form
<b>SSN</b>	Social Security number
<b>TMS</b>	Threaded Mate System

## **Student Notes**

**AFSC 4Y051B**

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