

## **Special considerations in exodontics**

The extraction of primary teeth is an integral part of any dental practice that includes children. Fear, the main deterrent to seeking dental care, reaches its maximum in a child anticipating any form of oral surgery. For this reason alone it is very desirable that the dentist who has successfully carried (lie youngster through many previous experiences (the first visit to the dental office, dental x-ray examinations, prophylaxis, and operative procedures) be the person to perform the extraction. Whenever possible, the child should be iik. Tined several days in advance that he or she has an appointment for a tooth extraction. If this is not done, he or she will be apprehensive of every visit to the dental office. Baldwin has indicated that a period of 4 to 7 days' prior notice in impending surgery is adequate for children, and that such a period of advance warning is a deterrent to adverse psychological reactions.

Recognition of an abnormality and diagnosis of the condition is a prerequisite to the correct resolution of any oral surgical problem. Good dental radiographs, therefore, are of prime importance before any surgery is undertaken. They are also essential for protection against medicolegal action.

The most frequent oral surgical problem in children is the extraction of one or more carious teeth. Good radiographs will determine if the roots of the primary molars are still fully formed and encircle the developing tooth bud. If so extra (sue must be taken to separate the roots and prevent dislodgment of tin siieeedaneous tooth. If a carious tooth whose roots are partially resorbed is to be extracted, the radiographs will denote the areas of resorption and potential areas of root fracture.

Dentists frequently see children when they are in pain from a tooth-ahce. II this is the case, the offending tooth is generally easy to identify because of its mobility and sensitivity to percussion. Lymphadenopathy often exists along with soft tissue swelling and reddening around the affected area. Radiographs are essential as part of the diagnosis and should be retained as a permanent record.

The use of antibiotics in children needing dental extractions is an important consideration. A good rule to follow is if the dental abscess is well resolved and a

fistulous tract established, and if the patient is asymptomatic and in good general health, an antibiotic is not mandatory. If, however, there is pain or fever or periapical swelling and adenopathy, and the infection apparently has not reached its maximum limit, or if the child has a chronic debilitating condition such as congenital heart disease, proper antibiotic therapy should be instituted.

One of the tenets of good surgery is profound anesthesia. Inasmuch as good operative dentistry is based on the same premise, the dentist should be able to provide this quite readily. In some cases, especially with the very young child, extraction of teeth is best performed under general anesthesia. It should be pointed out that the decision to perform more complex operations, such as frenectomies, removal of impacted teeth, and the like, will depend entirely on the dentist's training and feeling of competency. He or she should, however, be able to diagnose these conditions, understand their implications, relate them to the parent, and render acceptable judgments as to when surgery should take place.

In all procedures with children, slow, smooth, and graceful movements as opposed to fast, jerky, and awkward movements are the most desirable. This is particularly true during extractions. Not only will such actions be conducive to good patient management, but they also will minimize breaking the roots of primary teeth, which are frequently thin and fragile. If a root should be fractured, it is advisable to be cautious in removing the root tips, so that the permanent tooth bud will not be jeopardized. Frequently, the better part of valor is to leave the embedded root tip and let it be exfoliated or resorbed. In such a case, the parent should be advised that the root tip remains. This should be recorded in the patient's chart, and the area should be rechecked at periodic intervals.

Young children seldom have any problems with healing of extraction sites postoperatively. So-called dry sockets are rarely encountered. Some discomfort, however, may be experienced when the local anesthetic wears off. It is a good procedure to have children bite on a gauze pack for at least 2 hours following surgery. In addition, the child should keep his or her head elevated and avoid eating or drinking for several hours. Soft diets are recommended for the first day, avoiding

such foods as peanuts and popcorn so that food debris will not be trapped in the sockets. The prevention of lip biting can be a problem, but with the use of short-acting anesthetic agents and an appropriate warning to the child and the parent, trauma to the cheeks and lips should be infrequent.

#### **REMOVAL OF TEETH FOR CHILDREN**

The management of a child who must undergo dental extractions is based on (1) age and maturity, (2) past medical dental experiences that might influence behavior, (3) physical status, and (4) the length of time and amount of manipulation necessary to accomplish the surgery.

The age and maturity of the child often determine the type of anesthesia best suited for the intended procedure. Children below the age of reason generally are best managed under general anesthesia, since a slight amount of discomfort is always associated with the administration of a local anesthetic. During the extraction the child will experience pressures and noises associated with the necessary instrumentation. If these phenomena cannot be explained to the child, he will become anxious and rebellious. For these reasons general anesthesia is often used for the very young patient.

Good rapport must be established between the dentist and the pediatric patient. The dentist should be friendly but firm. Short, simple explanations of the sensations the child will experience should be made. At the time of needle insertion he is told that he will feel a little "stick," and during injection of the solution he is told that he will feel pressure. Forces that the child will experience during the extraction can be demonstrated by pushing gently but firmly on his shoulders. The child is told that he will feel the pushing in the area of surgery, just as he felt it on his shoulders. It should be pointed out that pushing is the only sensation that will be felt. At no time should the word "pain" be mentioned.

The child should be verbally reprimanded for unwarranted actions. During and at the end of the procedure he should be praised for his cooperation. Speaking to the child in a friendly, understanding manner throughout the procedure will greatly enhance the efficacy of "verbal anesthesia."

Scheduling the pediatric patient in the morning is desirable. At this time he is less likely to be tired and difficult to manage. Delays should be eliminated as much as possible between the time the child enters the office and the initiation of treatment. Delays allow only for the development of apprehension. Premedication with a sedative is indicated if the child appears apprehensive. Such premedication will be helpful with the administration of a local as well as a general anesthetic. A sedative is indicated also if a lengthy procedure such as removal of supernumerary teeth is planned. A child will tend to become restless and unmanageable during prolonged procedures.

At no time should the child be allowed to see the instruments necessary for anesthesia and surgery. A Mayo stand is placed behind the chair, and the instruments brought to the mouth from behind and below to keep them out of the child's visual field. Small syringes and extraction forceps are available that can be more easily hidden, but they are by no means necessary for the successful management of the pediatric patient. One example regarding the advisability of keeping instruments out of the child's view involves a youngster who became hysterical at the sight of a suture needle after having sat quietly throughout multiple extractions. On questioning the patient it was discovered that during the previous year the child had lacerated his scalp, which required suturing. The child associated the needle with the pain experienced during the suture of his scalp and related it to the current operation.

In general, the removal of deciduous teeth is not difficult; it is facilitated by the elasticity of young bone and the resorption of the root structure. There are two type of forceps: British-styled forceps and American-style pediatric upper and lower forceps. These forceps are universal for upper and lower jaws. These forceps reduce size more easily allows placement in the smaller oral cavity of the child patient; the smaller pediatric forceps are more easily concealed by the operator's hand; the smaller working ends (breaks) more closely adapt to the anatomy of the ptimary teeth. If children's forceps are not available, deciduous teeth can be removed with the forceps used for the removal of their succedaneous analogues. However, the "cow-horn" forceps is not used for the extraction of lower deciduous molars because the sharp beaks of this forceps could cause damage to the unerupted promolar teeth.

### **Simple extraction of the teeth.**

During extraction the dentist should be placed in the position in which he or she can easily controlled the instrumentation, have good visual access to the surgical site, and control the child head. The nondominant hand of the dentist is then placed in the patients's mouth. The role of nondominant hand is to help control the patient's head; to support the jaw being treated; to help retract the cheek, lips, and tongue for the surgical field; and to palpate the alveolar process and adjacent teeth during the extraction. For simple extraction of the primary molars the thumb and forefinger are placed to support alveolus as well as the position of the forceps. Reflect the cuff from the tooth before inserting the forceps into the tooth to be removed. First, the forceps are applied, second are inserted, fixated up to the neck of tooth in an apical direction and luxation. Hold the beak of the forceps parallel to the long axis of the tooth. Make the first force in extracting a primary tooth in an apical direction. This will ensure good forceps seating and prevent slippage of the beaks. Hold the beak of the forceps parallel to the long axis of the tooth. For luxation of anterior teeth, use labio-lingual movement with a slight rotation and final incisal delivery of the tooth. The maxillary and mandibular six anterior teeth are removed by luxation to the labial side –because of the lingual position of the permanent teeth, followed by mesial rotation, and then pressure in the direction of removal. Because of the lingual position of the erupting permanent incisor teeth, little can be gained by placing lingual pressure on these teeth. Take care to use the proper size forceps in order to prevent luxation of the adjacent teeth. For luxation of posterior teeth, such as the maxillary premolars and molars, make the initial movement in the palatal direction, and make the second movement in the buccal direction. Continue this motion with very slight rotation and occasionally a slight lingual displacement until the tooth can be delivered out of its socket.

The technique and tools for the extraction of young teeth are the same as for primary teeth except that larger forceps are required. Before dismissing the child, make sure the child holds the gauze tightly under pressure and the gauze has attained hemostasis.

Adequate radiographs are invaluable for the removal of any deciduous tooth. The presence and position of the permanent successor must be established as well as

the status of the root formation of the deciduous tooth that is to be removed. Many times the resorption of the deciduous root is unequal (horizontal or vertical resorption are present), leaving a long, thin root portion. If a root is fractured during the extraction, it should be removed by the judicious use of root exolevers or a small curet. The Potts elevators also are valuable here. Care must be exercised not to injure the crown of the permanent tooth or its surrounding bony support. If the removal of the deciduous root tip jeopardizes the permanent tooth, it is better to leave the root tip intact. It will resorb or can be removed at a later date without jeopardy to the permanent tooth.

Occasionally the radiograph will demonstrate that the permanent premolar is wedged tightly between the bell-shaped roots of the deciduous tooth. This occurs most often in a deeply carious tooth of a young patient in which no deciduous root resorption has occurred. Care must be taken that the succedaneous tooth is not removed with the deciduous tooth because of the viselike grip of the roots.

If the radiograph shows this condition, the deciduous crown should be sectioned into a mesial and a distal half before a forceps is placed on the tooth to remove the two portions separately. If at any time a permanent tooth is removed during the extraction of a deciduous tooth, it should be replaced in the alveolar bone with as little handling as possible and with the operator's making sure that the buccal aspect of the tooth is placed on the buccal side of the alveolus.

**Special surgical problem.** *Neonatal and natal teeth.* Teeth that are present at birth are natal teeth. Teeth that emerge through the gingival during the first month of life are neonatal. Some of these teeth are supernumerary (5%), and almost all appear in the mandible, however, they may occur in the other parts of the jaws. Enamel dysplasia is commonly described in association with natal and neonatal teeth and in many instances they come in pairs. Neonatal teeth can produce ulceration of the tongue, lingual frenum (Riga-Fede disease), or the mother's nipple during breastfeeding. Most prematurely erupted teeth (immature type) are hypermobile because of the limited root development. Some teeth may be mobile to the extent that there is danger of displacement of the tooth and possible aspiration, in which case the removal

of the tooth is indicated. In exceptionally rare cases in which the sharp incisal edge of the tooth may cause laceration of the lingual surface of the tongue, the tooth may have to be removed. Usually one recommends waiting until the child is at least 8 to 10 days old in order to prevent hemorrhage due to hyperprothrombinemia. During that time incisal edge may be rounded with a dental stone or diamond bur to obtain a smooth incisal edge and prevent ulceration of adjacent soft tissues. The preferable approach, however, is to leave the tooth in place and to explain to the parents the desirability of maintaining this tooth on the mouth because of its importance in the growth and uncomplicated eruption of the adjacent teeth. Within a relatively short time the prematurely erupted tooth will become stabilized, and the other teeth in the arch will erupt. The delay can be precluded, if necessary, by providing the infant with vitamin K.

Eruption of teeth during the neonatal period presents less of a problem. These teeth can usually be maintained even though root development is limited.

A retained natal or neonatal tooth may cause difficulty for a mother who wishes to breast-feed her infant. If breast-feeding is too painful for the mother initially, the use of a breast pump and storing the milk are recommended. However, the infant may be conditioned not to “bite” during suckling in a relatively short time if the mother persists with breast-feeding. It seems that the infant senses the mother’s discomfort and learns to avoid causing it. For surgical technique local anesthetic (1:100 000 xylocaine) using a self aspirating syringe with a 30-gauge extra short needle. Inject very slowly and use only one-eighth of a carpule. Remove the tooth using pediatric forceps for anterior teeth. Suture only if bleeding is not controlled after 2 minutes of pressure with gauze.

*Root of primary molars.* Roots of primary molars sometimes partially encircle the crown of a developing bicuspid. For extraction, anesthetize with 1:100 000 xylocaine. If the fracture of one of the roots is anticipated, intraligamentary anesthesia may be used as reinforcement for hemostasis. Buccolingual bisection of the molar crown can be done using a surgical fissure bur. Make sure that the bur does not perforate the crown tip of the underlying developing bicuspid. Split the crown using a straight elevator.

First, extract the section of the tooth that appears to be more resistant to fracture using molar forceps. Elevate the remaining section by inserting the elevator into the pulp chamber, and very carefully lift the remaining tooth section. If bleeding persists for more than 5 minutes after surgery, suture the area.

*Atypical Root Resorption of Primary Roots.* Atypical root resorption presents the possibility of fracture of the roots. To ensure success one must have adequate radiographs, and the use of intraligamentary anesthesia may be advisable as an adjunct to secure better hemostasis.

When a primary molar is involved because of a distal or mesial eruption of the bicuspid, follow the same extraction criteria as for primary molars whose roots partially encircle developing cuspids. If a root fractures, try to elevate the fractured root only when visible and easily accessible. If the developing permanent tooth is very close to the fractured root, do not attempt to elevate the root. Unless a specific infectious condition of the root tip occurs after surgery, retrieval of this tip is unnecessary. Root tips left in the jaws because of the atypical root resorption or because of accidental fracture during extraction that are not easily accessible to the operator should be left in situ; most of them will be resorbed with time. Parents should be advised of the situation. Root tips left in the jaw should be recorded on the patient's chart. In very young patients tooth diaceration and enamel hypoplasia of the succedaneous tooth can easily be the end result of excessive surgical manipulation.

When a root tip becomes infected, a fistula usually develops. Removal of the root tip is then necessary. Removal can be achieved either by the use of elevators and small root tip forceps and/or the use of a buccal mucoperiosteal flap, the removal of a small portion of bone, and creation of an anchorage point for the elevator.

*Ankylosis of Primary Molars.* Ankylosis is usually caused by a fusion of cementum and alveolar bone, with obliteration of the periodontal membrane. Teeth that are in infraocclusion by as much as 4 mm usually have extensive osteoid tissue at the furcation area with minimal osteoclastic activity. However, the fusion of the bone with dentine need not occur along the periphery of an ankylosed tooth. Sometimes only a



small area actual fusion of bone to dentine is found in a tooth that is clinically and radiographically diagnosed as ankylosed. Clinically, when a tooth fails to erupt and is submerged below the occlusal plane, it is considered an ankylosed tooth. Radiographically, ankylosis can be diagnosed by a partial or complete absence of the periodontal membrane. However, if the ankylosis is very small, this will not be evident in the radiographs. Ankylosed molars are frequently associated with congenital absence of the bicuspid. An ankylosed tooth without a succedaneous tooth can remain in function for more than 20 years. If the tooth is only slightly submerged, the crown may be extended vertically by the fabrication of the stainless steel crown or the occlusal posterior composite to re-establish acceptable occlusion.

**Technique of removal.** Use appropriate local anesthesia and intraligament anesthesia as an adjunct for better hemostasis of the area. Some of the ankylosed teeth can easily be removed with forceps, if only a small area of the root is ankylosed or ankylosed area has already been reabsorbed. If forceps delivery is unsuccessful, bisect the crown with a taper fissure surgical bur through the furcation. Then elevate the two sections with elevators. In some cases buccal mucoperiosteal flap may be necessary before surgical removal of the bone. Extract the ankylosed root may be with an elevator, or dissect it out using a surgical bur. After the tooth is removed, irrigate the wound site with warm saline, and approximate the margins with sutures.

The removal of ankylosed teeth is sometimes difficult and frustrating. It is difficult to know when the entire tooth has been removed. The best approach is to remove as much tooth structure as possible with minimal sacrifice of alveolar bone. In the presence of an underlying tooth bud, it is important to make sure that all the ankylosed root is removed, since ankylosed roots may inhibit the normal eruption of the bicuspid. However, quite often the bicuspid crown will lie directly beneath the bifurcation area of the ankylosed root.

*Ankylosed Permanent Teeth.* When orthodontic forces are insufficient to bring a submerged or impacted permanent tooth into occlusion, it must be assumed that the tooth is ankylosed. The surgical management for ankylosed teeth follows.

For corticotomy and orthodontic guidance, lift two lingual and buccal mucoperiosteal flaps. Remove bone through the buccal or lingual plate with a chisel or a surgical bur. Attempt to move the tooth using light forces, which ensure that the tooth is loosened slightly. Using acid-etch techniques, attach a bracket to the submerged tooth, and apply a light force against a labial arch previously designed the tooth to its proper position.

Dental osteotomy is designed to release the ankylosed tooth from the surrounding alveolar bone. Lift a buccal mucoperiosteal flap and if necessary, lift a lingual mucoperiosteal flap. Make bone cuts until the whole tooth is released. In order to maintain the dental-alveolar segment vitality, the lingual or buccal mucosa must remain attached. Bring the teeth manually to its proper alignment in the arch, and stabilize it.

Both corticectomy and segmental osteotomy procedures are usually performed in anterior teeth. When planning this approach the likelihood of adjacent tooth injury must be considered when sectioning buccal bone. Through radiographic analysis closure of roots to the ankylosed tooth roots should be discerned. If this is the case, segmental osteotomy should not be considered. Before treating ankylosed permanent teeth surgically, conduct thorough growth and development assessments.

#### **SELECTION OF ANESTHESIA FOR EXODONTICS**

The types of anesthesia available for exodontics are (1) regional or local anesthesia, (2) local anesthesia with heavy sedation or supplementation by light general anesthetic agents, and (3) general anesthesia induced intravenously or by inhalation.

Factors that determine choice of anesthesia are (1) age and physical status of the patient, (2) infection, (3) trismus, (4) emotional status of the patient, (5) nature and duration of the procedure, (6) allergies, (7) wishes of the patient, and (8) training and office equipment of the operator.

As stated previously, the very young patient is best managed under general anesthesia, usually of the inhalation type or in combination with small doses of intravenous barbiturates. The pediatric patient metabolizes barbiturates poorly and requires reduced dosages. Older patients are more likely to have systemic diseases that

complicate the use of general anesthesia. The geriatric patient is often managed with local anesthesia, with judicious use of sedatives, when necessary, to relieve apprehension.

In the presence of infection, local anesthesia is not always profound. If local anesthesia is used, a nerve block is most effective and allows injection of the anesthetic solution in a noninfected area. Under no circumstances is a local anesthetic solution injected into or through an area of cellulitis. This serves only to spread the infection, with possible serious consequences. General anesthesia is often indicated in the presence of acute infection, except when the overall systemic condition of the patient precludes its use or the patient is in a toxic condition and dehydrated because of the infection. After the toxic manifestations have decreased and the patient is well hydrated, a general anesthetic may be given and the tooth removed. Before removal of any tooth .during an acute infection, adequate blood levels of antibiotics should be obtained.

Trismus, the inability of the patient to open his mouth, may make the administration of a local anesthetic by the usual route difficult. Extraoral nerve blocks usually can be given. When the nerve block has alleviated the pain, the patient may be able to open the mouth so that the necessary extraction can be accomplished. Ethyl chloride sprayed on the skin overlying the muscles in spasm may enable the patient to open the mouth sufficiently to allow the surgeon to administer a local anesthetic and to perform the extraction. Care must be taken not to freeze the tissue with the ethyl chloride spray. General anesthesia, if deep enough to obtain muscle relaxation, is valuable when the trismus is caused by infection or trauma. When ankylosis of the temporomandibular joint is present, anesthesia can be accomplished by extraoral blocks or by performing a tracheostomy and administering a general anesthetic. If a general anesthetic is given to a patient with this condition, a tracheostomy is performed so that a patent airway can be maintained. Although adequate anesthesia can be obtained, this type of patient still presents many problems because of the inaccessibility of the teeth to be extracted.

The emotional status of the patient may determine the selection of anesthesia. Some people have a phobia regarding injections within the mouth. Because of the recent advances in general anesthesia, it is comparable in safety to local anesthesia. For this reason patients of this type are better managed under general anesthesia. If the apprehensive patient must be treated under local anesthesia, sedation is necessary. The patient should receive a sedative at bedtime the night before surgery and again 1 hour prior to surgery. Intravenous sedation can be given at the time of

*Clinical examination* consists of visual evaluation (color, swelling, and condition of tooth and surrounding structures), palpation and percussion, instrumentation, and vitality tests. The tooth in question is examined closely. In addition, adjacent teeth and surrounding structures are examined carefully for problems that may be pertinent. The overhanging margin of the restoration on the next tooth that will fracture on extraction, osteoradionecrosis in the underlying jaw, or a fractured jaw under the loose tooth in a patient who has come from a barroom fight should not be overlooked. A clinical survey of the general health status of the fully clothed patient in the dental chair also is a necessary art in the successful dental practice.

*Radiographic examination* is necessary, both preoperatively and postoperatively. Many conditions that could not be diagnosed otherwise are thus revealed, such as the curved root, the large cyst, a new abscess, or carious exposure of the pulp on an adjacent tooth that was not present on radiographs made several years earlier. The man whose jaw was fractured in the fight will sue when he becomes sober, claiming the jaw was fractured during the extraction, unless a preoperative radiographic record exists. A postoperative radiograph is equally important for clinical evaluation as well as for record purposes. It might be necessary to prove that a fracture received by the patient convalescing in a nightclub was not sustained during the extraction. With better radiographic procedures and protection, there is negligible radiation associated with these radiographs. However, because of current emphasis on reduction of radiation exposure, routine postoperative radiographs are not made when

clinical evidence, of normal extraction is present. Children and pregnant women are not given postoperative radiographs after uncomplicated procedures.

*Blood pressure determination* in the dental office has provided a service to the dentist in making him or her aware of the patient's hypertension and to \*'---- «\*M»nt who often is not aware of his hyperten-agnosis and management. Some tests, such as urinalysis, can be done in a well-equipped office, but most tests are done in a laboratory. Tests for bleeding are not done accurately in the office. If such tests are indicated, they should be done in a laboratory, in the hospital, or in the physician's office. Although such tests are expensive and time consuming, there should be no hesitancy in ordering them if they are indicated.

Screening tests for diabetes and hemoglobin level are available from commercial firms in the form of treated paper strips. A service is performed if every dental patient is screened yearly, particularly if he does not obtain a yearly physical examination, since unknown cases of diabetes and anemia are thereby discovered in the dental office and referred to the physician for treatment.

#### INDICATIONS AND CONTRAINDICATIONS FOR EXTRACTION

**Indications.** Any tooth that is not useful in the total dental mechanism is considered for removal. Indication for tooth extractions for children are much the same as for adult patients:

1. Unrestorable caries; apical disease; fractures of the crown and roots; prolonged retention of the primary teeth because of improper root resorption or ankylosis, and supernumerary teeth.
2. Pulp pathologic conditions, either acute or chronic, in a tooth that is not amenable to endodontic therapy condemns the tooth. A tooth that is not restorable by dental procedures can be considered in this category, even if a pulp pathologic condition is not demonstrable.
3. Periodontal disease, acute or chronic, that is not amenable to treatment may be cause for extraction.

4. Traumatic effects on the tooth or alveolus sometimes are beyond repair. Many teeth in the line of jaw fracture are removed to treat the fractured bone.
5. Impacted or supernumerary teeth often do not take their place in the line of occlusion.
6. Prosthetic considerations may require the removal of one or many teeth for design or stability of the prosthesis.
7. Esthetic considerations at times transcend purely functional factors.
8. There may be a pathologic condition in surrounding bone that involves the tooth, or treatment of the pathologic condition may require removal of the tooth. Examples are cysts, osteomyelitis, tumors, and bone necrosis.
9. Esthetic considerations at times transcend purely functional factors.
10. Teeth "in line of fire" of planned therapeutic radiation to a nearby area are removed so that a supervening osteoradionecrosis of the bone will not be complicated by radiation caries or by necrosing pulps and their sequelae.

**Contraindications.** Few conditions are absolute contraindications for extraction of teeth. Teeth have been removed in the presence of all types of complications because of necessity. In these situations much more preparation of the patient is necessary to prevent serious damage or death or to obtain healing of the local wound. For example, the injection of a local anesthetic, let alone the extraction of a tooth, can cause instant death in a patient in an Addisonian crisis. Surgical intervention of any kind, including exodontics, may activate systemic or local disease. Therefore a list of relative contraindications is given. In some instances these conditions become absolute contraindications.

**LOCAL CONTRAINDICATIONS.** Local contraindications are associated mainly with infection and, to a lesser extent, with malignant disease.

1. Acute infection with an uncontrolled cellulitis must be controlled so that it does not spread further. The patient may exhibit a toxemia, which brings complicating systemic factors into consideration. The tooth that caused the infection is of

secondary importance at the moment; however, to better control the infection, the tooth is removed as soon as such removal does not endanger the life of the patient. Before antibiotics became available the tooth was never removed until the infection had become localized, the pus was drained, and the infection had subsided to a chronic state. This sequence of events took much longer than the present method of removing the tooth as soon as an adequate blood level of a specific antibiotic had brought systemic factors under control.

2. Acute pericoronitis is managed more conservatively than other local infections because of the mixed bacteriologic flora found in the area, the fact that the third molar area has more direct access to the deep fascial planes of the neck, and the fact that removal of this tooth is a complicated procedure involving ossisection.

3. Acute infectious stomatitis is a labile, debilitating, and painful disease, which is complicated by intercurrent exodontics.

4. Malignant disease disturbed by the extraction of a tooth embedded in the growth will react with exacerbated growth and nonhealing of the local wound.

5. Irradiated jaws may develop an acute radio-osteomyelitis after extraction because of a lack of blood supply. The condition is severely painful and may terminate fatally.

**SYSTEMIC CONTRAINDICATIONS.** Any systemic disease or malfunction can complicate or be complicated by an extraction. These conditions are too numerous to list. Some of the more frequently encountered relative contraindications are as follows:

1. Uncontrolled diabetes mellitus is characterized by infection of the wound and absence of normal healing.

2. Cardiac disease, such as coronary artery disease, hypertension, and cardiac decompensation, can complicate exodontia. Management may require the help of a physician. Usually a postinfarction patient is not subjected to oral surgery within 6 months of his infarction.

Blood dyscrasias include simple as well as more serious anemias, hemorrhagic diseases such as hemophilia, and the leukemias. Preparation for extraction varies considerably with underlying factors.

4. Debilitating diseases of any kind make patients poor risks for further traumatic insults.

5. Addison's disease or any steroid deficiency is extremely dangerous. The patient who has been treated for any disease with steroid therapy, even though the disease is conquered and the patient has not taken steroids for a year, may not have sufficient adrenal cortex secretion to withstand the stress of an extraction without taking additional steroids.

6. Fever of unexplained origin is rarely cured and often is worsened by extraction. One possibility is an undiagnosed subacute bacterial endocarditis, a condition that would be complicated considerably by an extraction.

7. Nephritis requiring treatment can create a formidable problem in preparing the patient for exodontics.

8. Pregnancy without complications presents no great problem. Precautions should be taken to guard against low oxygen tension in general anesthesia or in extreme fright. Obstetricians hold varied opinions regarding the timing of extractions, but they usually prefer that necessary extractions be done in the second trimester. Menstruation is not a contraindication, although elective exodontia is not done during the period because of less nervous stability and greater tendency toward hemorrhage of all tissues.

9. Senility is a relative contraindication that requires greater care in overcoming a poor physiologic response to surgery and a prolonged negative nitrogen balance.

10. Psychoses and neuroses reflect a nervous instability that complicates exodontics.

*Systemic conditions: influence on surgical procedures.* A complete medical history should be obtained from the patient before surgical procedure are performed. There are few medical conditions that present special problems, but these are not necessary contraindications to minor surgery. Children are exposed to



a myriad of infection diseases that, although usually not serious, do produce periods of high fever, malaise, dehydration and discomfort. These infections include measles, mumps, chickenpox, influenza, and whooping cough. If a child is known to have been exposed to one of these diseases, or if at the time of a dental appointment any of the early signs or symptoms of such a condition are present, dental treatment should be delayed unless a true emergency exists. Then it is wise to consult the child's pediatrician or family physician.

*Rheumatic fever and congenital heart deformities.* A patient who has any type of congenital heart deformity or a history of rheumatic fever requires special attention before and after surgical treatment. Penicillin remains the drug of choice for most patients. For those suspected to be allergic to penicillin, erythromycin is the drug of choice. However, since the philosophy of prophylaxis for bacterial endocarditis is constantly changing and new antibiotics continue to be developed, specific recommendations may be revised frequently.

*Renal disease.* Patients with end-stage renal disease being treated by dialysis or kidney transplants are growing in number and may present specific dental problems. If one is to properly manage their dental care, keeping current with medical management is essential.

*Hemophilia.* Surgical procedure, when necessary for young hemophiliac patient, may present a grave situation. Such procedure should always be performed in a hospital, under the direction of well-qualified oral surgeons and hematologists.

Much progress has been made in the diagnosis and treatment of the various types and degrees of hemophilia, but a child patient who is faced with a dental extraction remains in a serious situation. Proper dental care to prevent the need for an extraction is the best treatment.

Primary teeth commonly exfoliate without significant hemorrhaging. However, the sharp margins of incompletely resorbed roots may lacerate the enveloping gingiva, thereby inducing hemorrhaging. This bleeding can usually be controlled by local measures subsequent to the atraumatic extraction of remaining tooth. The bleeding can be often stopped by direct finger and gauze pressure that is maintained

for several minutes. The direct topical application of hemostatic agents, such as bovine thrombin or Avitene, may be advantageous in initiating hemostasis. An intraoral bandage of Stomadhesive may be placed directly from the oral environment.

Should the child with hemophilia sustain oral trauma, or if oral surgical procedures are anticipated in which there may be excessive bleeding the following modalities of therapy are suggested: Hemorrhaging associated with laceration of oral mucous membranes will usually respond to a single dose of factor concentrate that raises the level of factor to 50% of normal. The administration of ACA at the time of infusion and continued administration until epithelialization is complete will usually eliminate the need for subsequent infusion of factor concentrates. Laceration that require suturing may necessitate repeated dosages of factor replacement in which a level of at least 25% of normal is maintained ACA should be administered at the time of final initial factors infusion and continued until the wound is well healed. When the extraction of primary or permanent teeth is planned, factor VIII is generally infused to a level of 100% of normal and a loading dose of ACA is administered. A maintenance dosage of ACA is maintained postsurgically for 7 to 10 days. The extraction of the teeth should begin within 1 hour after infusion and should be completed as atraumatically as possible. Adjunctive local measures to control hemorrhaging should be considered. Apart from direct pressure, packing the apical third of the socket with Avitene or oxidized cellulose material impregnated with buffered bovine thrombin may be helpful. In general, the use of sutures should be avoided if possible.

The patient must be given very specific and thorough instructions for postoperative home care. This should include a strict diet for the first 2 weeks – for example, during the first 72 hours a clear, liquid diet is necessary. Dairy products should be discouraged, since they can leave a film residue. For the next week, a soft, pureed diet is recommended. After 10 days, the patient may begin to consume a more normal diet.

*Leukemia.* The oral manifestation of leukemia in children may often be the first indication of the disease as well as the child complaint of the patient. The role of the dentist in maintaining oral hygiene and preventing oral infection may be of primary importance in maintaining the parent's comfort and proper nutritional needs. Proper use of mouthwash, customized toothbrushing technique, oral prophylaxis, and effective caries will do much to promote the child's comfort and to prevent infection.

#### **THE OFFICE AND EQUIPMENT**

The chief difference between the office devoted solely to oral surgery and the one designed for general practice is the lack of fixed equipment around the chair in the former. In the exodontist's office the space on the left of the chair, usually occupied by the dental unit and cuspidor, is left vacant so that the assistant can stand there. The patient either expectorates into a sterilized stainless steel basin that is held in the lap or held by the nurse, or a suction machine is used. If suction is used, it is more powerful than that produced by the average dental unit and often is central suction produced by a large compressor located in another room or area. If bone burs are used, a high-speed handpiece attached to an engine or more often to a source of compressed gas is employed. A general anesthesia machine is brought near the chair after the patient is seated. Instead of a bracket table in front of the patient where its contents are in view, a Mayo stand is placed behind the chair.

Little change is necessary to adapt the general office for exodontics, provided that several basic considerations are included in the design. The cuspidor on the unit can be pushed back so that the assistant can work on the side of the patient opposite the operator. A good light on the unit will suffice for exodontics. If suction on the unit is inadequate and central suction is not available in the building, a mobile suction machine can be purchased. A Mayo stand should be available behind the chair so that the bracket table is not used. The sink need not be larger than the conventional size, but it should have knee controls. No sink in a dental office should have hand controls. Floor pedals are difficult to clean under, and elbow controls sometimes get in the way.

Adequate storage space should be available for the sterile armamentarium, either out of sight in the room or in a nearby area. A place should be surgery to augment sedatives already administered. Any patient who receives a sedative should be accompanied by a responsible adult. The surgeon is responsible for the patient while the latter is under the influence of the drug. Under no circumstances should a sedated patient be allowed to drive an automobile.

The nature of the procedure and the duration of time necessary to accomplish the exodontic procedure can govern the choice of anesthetic agent. In general, procedures requiring more than 30 minutes are better managed under local anesthesia with premedication or by admitting the patient to a hospital where adequate recovery facilities are available. With prolonged general anesthesia a prolonged recovery time is necessary.

All patients should be questioned with regard to drug allergies. Patients having a possible history of allergy to local anesthetics should be questioned as to the type of reaction experienced and referred to an allergist for evaluation. Patients who have a history of allergic reaction to procaine often are not allergic to lidocaine because of the different chemical configuration of the drug. Although lidocaine has a low incidence of allergic reactions, reactions to this drug have been reported. Infrequently, adverse reactions to barbiturates are found. Most of these are not true allergic reactions but are failures of the patients to respond to the drug in the normal fashion. Nausea, vomiting, or changes in the psyche are common reactions. In any office in which drugs are administered, an emergency tray should be immediately available with the proper drugs necessary for treatment of allergic reactions. The treatment of these reactions will be described later in this chapter.

#### **REMOVAL OF TEETH UNDER GENERAL ANESTHESIA**

Organization and teamwork are essential when using general anesthesia. An efficient team is composed of three or four members: the surgeon, the anesthetist, the assistant, whose duty is to use the suction apparatus and retract tissues, and sometimes an instrument nurse whose duty is to pass instruments or wield the mallet if a chisel technique is used. Every member of the team must know the technique

and anticipate the needs of the surgeon and the patient. Unnecessary acts should be avoided. Each motion should be smooth and purposeful.

All instruments that may be needed for a procedure should be available so that a member of the team does not have to break scrub to get an instrument. The instruments should be on a tray and always grouped in the same fashion, with the most frequently used instruments in the most accessible position.

The general anesthetics most frequently used are inhalation alone, barbiturates alone, barbiturates with oxygen and nitrous oxide in combination with a more potent agent such as halothane (Fluothane). In addition, a local anesthetic is sometimes administered for vasoconstriction and to decrease the amount of barbiturate used in lengthy procedures.

A mouth prop is inserted immediately prior to induction of the anesthesia. Two types of mouth props are used—either a solid rubber bite block or a ratchet-type prop. If the latter is used, it is inserted in a closed position, and the patient is instructed to close on the mouth prop to hold it in position. After induction the mouth prop is adjusted to the degree of opening desired.

Immediately after induction a mouth pack is positioned. The pack is placed in such manner as to hold the tongue and soft tissues of the floor of the mouth anteriorly to maintain an airway. Care must be taken not to place the pack so far posteriorly that the oropharynx is stimulated. When an inhalation anesthesia is used, an airtight pack is more important so that anesthesia may be maintained by use of a nasal mask. Extra sponges may be added over the pack to absorb secretions and blood. With general anesthesia, more bleeding is experienced because of the lack of vasoconstrictive agents.

The surgical team should be ready to work as soon as the patient is anesthetized. One should not lose 2 or 3 precious minutes by not being prepared. The mouth prop is opened immediately and the mouth pack placed. The tooth is extracted and the socket compressed and covered with a gauze sponge. The mouth pack is removed and the mouth suctioned. The mouth prop is closed but left in place until the patient

responds. The patient is transferred to a mobile chair or table and moved to a recovery room where he is watched carefully by an attendant.

During longer procedures a gauze sponge is placed over the mouth pack and changed as necessary. The assistant retracts and suctions in the most dependent position of the mouth, not necessarily in a socket. A careful, efficient, unhurried technique is developed. Efficiency comes from precise instrumentation with few instrument changes. One should accomplish all that is to be done with a given instrument before the instrument is exchanged for another (for example, curet around all teeth that are to be extracted before picking up forceps). In multiple extractions the maxillary teeth are removed in one quadrant first, and the necessary alveoloplasty there is finished and sutured. A gauze sponge is then placed over this wound to help control hemorrhage. The mandibular teeth are removed in the opposing quadrant. After completion of surgery in this area a new gauze sponge is placed over the wound before the mouth prop is shifted so that extractions can be done in the two remaining quadrants. Frequently, when a series of teeth are being extracted, as each posterior tooth is removed, the socket is covered with a sponge to help control hemorrhage while the next anterior tooth is removed.

A powerful suction apparatus is necessary. The greatest hazard when operating under general anesthesia comes from allowing blood, secretions, and debris to collect within the mouth. If these materials are allowed to descend, the larynx can be irritated and a laryngospasm caused, a lung abscess can be formed, or nausea and vomiting may follow entrance of these materials into the stomach. The average suction available in a dental unit is inadequate. Two types of suction tips should be available. A tonsillar suction tip is best adapted for handling a large volume of fluid efficiently, but it is too bulky to allow for suctioning within a socket. A neurosurgical suction tip will enter a small area.

It is helpful to have two suction tips on the table in case debris clogs one of the tips. The art of exodontics is never one of force. This is particularly true when operating on a patient under general anesthesia. Because of the loss of subjective symptoms in the patient, it becomes easy for the novice to 'apply great force with an

exolever or to retract soft tissue carelessly. Meticulous surgery when using general anesthesia is important so that the postoperative healing will not be a painful experience for the patient.

#### **REMOVAL OF TEETH IN THE HOSPITAL**

Hospitalization of patients for exodontic procedures should always be considered when medical management of the patient may be a problem or the postoperative course may necessitate special care.

Before a patient is admitted to a hospital, arrangements must be made with the admitting office so that a bed will be available. The operating room secretary is also called so that an operating room can be reserved for the procedure.

The dental staff of the hospital is obligated to observe the basic rules of the hospital and the American Hospital Association. Although it is not the object of this text to outline hospital procedure, some basic rules should be noted. A patient who will undergo general anesthesia must have a physical examination, which includes a history. All patients admitted to a hospital should have routine laboratory tests. These usually consist of a hematocrit (HCT), a white blood cell count (WBC), a differential white count, and a urinalysis. A chest radiograph and serological tests may be required by some hospitals. Patients older than 45 years of age often are examined by an electrocardiogram (ECG) if general anesthesia is to be used. The dentist must write the necessary orders and an admission note, which includes the reason for the admission and the contemplated procedure. A dental history and oral examination should also be included in the dentist's note.

The dentist should check with the operating room personnel to be sure that all instruments necessary for the procedure will be available. In many hospitals the dentist must provide certain instruments.

In the operating room, sterile precautions are employed. The surgeon is expected to scrub and to wear a cap, gown, mask, and gloves.

The area around the patient's mouth should be prepared with an antiseptic solution to remove surface contaminants. If a single extraction or a minor procedure is to be performed, the simple placement of sterile towels to isolate the mouth is all the

draping necessary. For multiple extractions or more extensive procedures, sterile sheets should be added so that the entire patient is covered to guard against contamination.

On completion of surgery a description of the operative procedure is dictated so that it may be added to the patient's chart. This note should include the following: date; names of the patient, surgeon, assistant, and anesthetist; type of anesthesia and agents used; surgical procedure and how it was accomplished; any complications (such as extensive hemorrhage); and condition of the patient at completion of surgery.

New orders are written, since preoperative orders are usually cancelled by the operating room procedure. Orders suggested by the consulting physician have to be rewritten to be given. Routine postoperative orders include patient's ambulatory status (bed rest until recovered, then up and about), hot or cold applications for swelling, antibiotics if needed for infections, diet, and an order for an analgesic and a hypnotic, if needed. Daily progress notes are entered by the dentist.

At the time of the patient's discharge from the hospital, a discharge summary of one paragraph is written, including reason for admission, surgical procedure, postsurgical course, and condition on discharge.

#### **COMPLICATIONS OF EXODONTICS**

Complications arise from errors in judgment, misuse of instruments, exertion of extreme force, and failure to obtain proper visualization prior to acting. The old adage "To do good, you must see good" is apropos to exodontics, and one might add "Do well what you see." • Because of the anatomy of the maxillary antrum and its proximity to the maxillary premolar and molar roots, the antrum should always be considered when extracting teeth in this area. Extreme force applied to upper molars can result in removal of the molar tooth along with the entire maxillary alveolar process and the floor of the antrum. The first, second, and third molars, along with the tuberosity, have been removed in one segment because of improper use of force in the maxilla. If during an extraction the surgeon feels large segments of bone



moving with the tooth when pressure is applied, the forceps should be set aside and a flap raised. If judicious removal of part of the alveolar bone allows the tooth to be removed, then the remaining bone, which is attached to the periosteum, may be retained, and it will heal. This will minimize the bony defect. If the bone cannot be removed from the tooth, the mucosa should be incised and reflected so that the mucosa will not tear as the tooth and bone are removed. A laceration is much more difficult to repair than a well-planned incision.

Large antral perforations resulting from exodontics should be closed at the time of the extraction. The bone in the area should be smoothed with a rongeur or bone file. The mucoperiosteal flap, is returned to position, and a watertight closure should be accomplished without putting undue pressure on the flap. If this cannot be done, the flap should be freed by means of an incision extending vertically into the mucobuccal fold and the mucosa of the flap undermined to allow it to advance over the defect.

When the antrum is entered during exodontics, the patient should be made aware of the situation and asked to not blow the nose postoperatively and also to refrain if possible from coughing or sneezing. Antibiotics and vasoconstrictive nose drops are prescribed to guard against infection of the sinus and to allow for emptying of the fluid that will collect within the sinus.

Occasionally, buccal roots of premolars and molars are pushed laterally through the wall of the maxilla and lie above the attachment of the buccinator muscle. When the operator uses root exo-levers in this area, a finger of the left hand should be held against the buccal plate so that he or she can be aware of any movement of the root in this direction. If the root is dislodged into these tissues, a small incision is made in the mucosa inferior to the root tip and the root tip is removed with a small hemostat or similar instrument.

The infratemporal space lies directly posterior and superior to the tuberosity of the maxilla. Within this space lie many important neurovascular structures. In the elevation of third molars or third molar root tips and in the removal of supernumerary molars, care must be taken not to dislodge them posteriorly. If an

object is to be removed from the infratemporal space, adequate visualization and careful dissection are necessary. The incision should include the entire tuberosity and extend posteriorly to the anterior pillar of the fauces. Blind dissection and groping for objects in this area can be complicated by massive hemorrhage or nerve damage.

In the third molar region of the mandible, the lingual surface of the mandible curves laterally, close to the apices of this tooth. Therefore it is not difficult to dislodge a root tip inferiorly into this space when the lingual plate is fractured. When a root tip is displaced in this area, a finger should be placed inferior to the root tip (in the mouth) to stabilize the tip against the lingual plate of the mandible. Access to this area is gained by making a mucoperiosteal flap on the lingual side of the mandible and extending anteriorly enough that the tissues can be retracted lingually for good vision.

Recovery of a root tip in the mandibular canal is principally a problem of access and vision. Usually it is difficult to remove bone overlying the canal from within the depths of the wound, which is usually the third molar socket. Access may be gained by removal of bone from the buccal plate and by careful removal of bone that overlies the canal. If one of the vascular components of the canal has been injured, it may be necessary to pack the socket with gauze, allowing 10 minutes for control of the hemorrhage. If hemorrhage cannot be controlled in this manner, the injured vessel should be severed completely and allowed to retract into the canal. At this time the socket is again packed, and hemorrhage control is usually accomplished.

#### **POSTEXODONTIC COMPLICATIONS**

*Postoperative hemorrhage* is the most common complication after exodontics. If the patient calls from home to report that hemorrhage has started again, he should be advised first to clear the mouth of any blood clots with a gauze sponge and then rinse the mouth with warm salt water. If a gauze sponge is not available, the patient uses a tea bag that has been placed cold to soften the tea leaves. The patient is advised to bite (not chew) on the pad or tea bag for 20 minutes. If bleeding persists at the end of this period, the patient should be seen by the dentist.

In cases of persistent hemorrhage, gauze sponges and hemostatic agents such as Gelfoam, topical thrombin, oxidized cellulose, and Avitene may be helpful for the local control of hemorrhage in addition to an adequate armamentarium.

The patient is seated and a local anesthetic administered. The clot that has formed within the socket is removed. Next, the area of hemorrhage is located. If the hemorrhage is coming from a bone bleeder within the socket, the dull side of a curet is used to burnish the bone in the area of hemorrhage. If generalized bone bleeding is present, the socket is packed with a hemostatic agent such as Gelfoam soaked in thrombin, and a purse-string suture is applied to hold the hemostatic agent in place. The patient is asked to bite on a moist gauze sponge. If the hemorrhage is from the surrounding soft tissue, a tension suture is placed to apply pressure to the area.

In patients with advanced periodontal disease, postoperative bleeding will occur if granulation tissue is allowed to remain after removal of the affected teeth. At the time of surgery a few minutes spent removing the granulation tissue and suturing the alveolar mucosa will assure good hemorrhage control.

Infection can occur as a postoperative complication. Treatment of such infection is managed by using the general principles.

*Dry socket* (localized osteitis) is one of the most perplexing postoperative complications. The etiology of the dry socket is unknown, but the following factors increase the incidence of this painful post-extraction sequela: trauma, infection, decreased vascular supply of the surrounding bone, and general systemic condition.

To treat a septic alveolus properly, one must understand the physiology of bone repair. If the loss of the primary blood clot results from a sclerotic condition of the alveolar walls and the absence of nutrient vessels, then the resulting denuded bone surface must be viewed as any other denuded bone surface, and the dentist must rely on nature's methods of bone repair for ultimate recovery and not employ any other methods that would disturb the healing process.

A septic alveolus is a denuded bone surface. Nature abhors denuded bone and responds to repair it. Behind this denuded and traumatized surface an immediate

mechanism is set up to physiologically correct the defect. All denuded bone becomes necrotic and must be removed before it can be replaced by normal bone. During this period the contiguous region behind the alveolus is defended -against invasion of pyogenic organisms within the septic alveolus, provided nothing is done to break through or violate this wall until the repair mechanism is ready to replace the nonvital structure. This process usually takes 2 to 3 weeks, depending on the regenerative capacity of the individual.

With the completion of this cycle the nonvital alveolar wall is sequestered molecularly or en masse, and immediately behind it is a defensive and regenerative layer of juvenile connective tissue that ultimately fills the void and undergoes osseous replacement. During this period, treatment should be directed only to maintenance of wound hygiene, with employment of antiseptic, analgesic dressings within the alveolus of sufficient potency to keep the patient comfortable. Nature must do the repairing. Curettage is contraindicated and will not only delay physiological healing and repair but may also permit invasion of infection into and beyond the area of defense immediately behind the denuded alveolus.

Prevention, of course, is the best treatment. To this end, atraumatic surgery, avoidance of contamination, and maintenance of a good level of general health are important.

When a dry socket does develop, treatment should be palliative. The socket is gently irrigated with warm normal saline solution to remove all debris. After the socket has been carefully dried, it is lightly dressed with 1/4-inch plain gauze saturated with an obtundent paste, such as equal parts of thymol iodide powder and benzocaine crystals dissolved in eugenol. The dressing may be changed as necessary until pain has subsided and granulation tissue has covered the walls of the socket.

Fracture of the slender roots is common, especially when the premolar teeth have projected into the bifurcation of the molars and have caused uneven resorption. Fractured roots should be removed, provided that damage to the permanent bud can

be avoided. Fine double-end apexolevers and mosquito hemostat can be used judiciously in removing these roots, or for grasping small fragments.

*Aspiration of foreign object.* During operation in the oral cavity there is an ever-present danger of the patient's aspiration some object, such as a tooth, a small gauze sponge, dental prosthesis, small dental instruments that may produce partial or complete obstruction of the airway or, if small enough, might pass through the larynx and trachea and lodge in a bronchial tube. During exodontics, due to the common practice of treating the child patient in a reclining position, poor visibility as a result of smaller opening into the oral cavity and the proportionately larger tongue of the child and increased likelihood of unexpected movements by the child patient teeth are sometimes inadvertently displaced into the oropharynx, larynx, trachea, and esophagus. Teeth in these positions can present serious problems that could be avoided by simple precautions. A gauze screen should always be placed to block off the oropharynx from the mouth. This is true whether the exodontic procedure is performed under general or under local anesthesia.

Teeth displaced into the oropharynx present no problem, provided they can be retrieved before they descend into the deeper structures. When a tooth is displaced in the oropharynx while the patient is under local anesthesia, the patient is instructed to hold perfectly still and not swallow or take a breath until the tooth can be retrieved. If this occurs under , general anesthesia, everything stops until the tooth is retrieved. The assistant should be cautioned not to move the retractor or suction tip because any movement may cause the loss of the tooth into the larynx or esophagus. When a tooth is displaced in the posterior portion of the mouth, the natural reflex of the patient is to cough or swallow. In the majority of cases the patient will swallow, carrying the tooth into the esophagus. Regardless of the patient's reactions, radiographs should be taken to determine the exact location of the tooth. If the tooth is found to be in the gastrointestinal tract, a high bulk diet should be prescribed, and the patient should contact the dentist if any gastrointestinal symptoms occur. Usually the tooth will be passed without incident.

In coughing, the patient can either cough up the foreign body or it will be lodged in the larynx or aspirated into the tracheobronchial tree. The abdominal thrust procedure should be used to dislodge large objects from this area. In the case of teeth in the larynx, a laryngeal spasm may occur, blocking the exchange of air. The tooth may be removed by means of a laryngoscope and a Magill forceps. If the tooth cannot be removed quickly, an airway must be established. This can be accomplished by a cricothyroidotomy through the triangularly shaped cricothyroid membrane and into the trachea. The cricothyroid membrane is located between the thyroid cartilage (Adam's apple), which is the largest of the tracheal cartilages, and the cricoid cartilage, which is the next inferior tracheal cartilage. The assistant should be cautioned not to move the retractor or suction tip because any movement may cause the loss of the tooth into the larynx or esophagus.

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laryngeal spasm is broken. Teeth aspirated into the tracheobronchial tree present a serious problem. The removal of teeth in this position can be accomplished only by someone trained in methods of bronchoscopy. The patient may cough continuously, and cyanosis may occur. Oxygen should be given until the patient can be transferred to an area where a radiograph of the chest and direct bronchoscopy can be accomplished. The aspiration of teeth and other debris during dental operations has been associated with a high incidence of lung abscesses.

Under all circumstances a radiograph of the chest and possibly of the abdomen must be taken to establish the exact location of any tooth that is displaced.

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