

# Diseases of the Ear, Nose, and Throat

## Chapter Outline

### DISEASES OF THE EAR, NOSE, AND THROAT

#### THE EAR: ANATOMY AND PHYSIOLOGY

#### DIAGNOSTIC PROCEDURES IN DISORDERS OF THE EAR

#### INFECTIONS OF THE OUTER AND MIDDLE EAR

Otitis Externa (Swimmer's Ear)

Otitis Media

#### DISORDERS OF THE INNER EAR

Tinnitus

Vertigo

Hearing Loss

#### THE NOSE: ANATOMY AND PHYSIOLOGY

#### DIAGNOSTIC PROCEDURE IN DISORDERS OF THE NOSE

#### DISEASES OF THE NOSE

Coryza (Common Cold)

Allergic Rhinitis (Hay Fever)

Sinusitis (Rhinosinusitis)

Epistaxis (Nosebleed)

*(Outline continued on next page)*

## LEARNING OBJECTIVES

Upon completion of this chapter, you should be able to

- describe the basic anatomy and physiology of the ears, nose, and throat;
- explain diagnostic procedures and treatments used for diseases of the ears, nose, and throat;
- classify common diseases of the ears, nose, and throat by their signs, symptoms, and treatment.

**DISEASES OF THE EAR, NOSE, AND THROAT**

*(continued)*

**THE THROAT: ANATOMY AND PHYSIOLOGY**

**DIAGNOSTIC PROCEDURES IN DISORDERS  
OF THE THROAT**

Acute Pharyngitis (Sore Throat)

Obstructive Sleep Apnea (OSA)

**QUESTIONS FOR STUDY AND REVIEW**

## DISEASES OF THE EAR, NOSE, AND THROAT

The ears, nose, and throat are adjacent to one another anatomically, similar in histologic structure, and subject to many of the same diseases. Diseases, injuries, and abnormalities of the ear, nose, and throat (ENT) are the special field of the otorhinolaryngologist. This chapter briefly surveys the more common disorders to which these parts of the body are subject. If you encounter unfamiliar terms, look them up in the Glossary or the Index.

## THE EAR

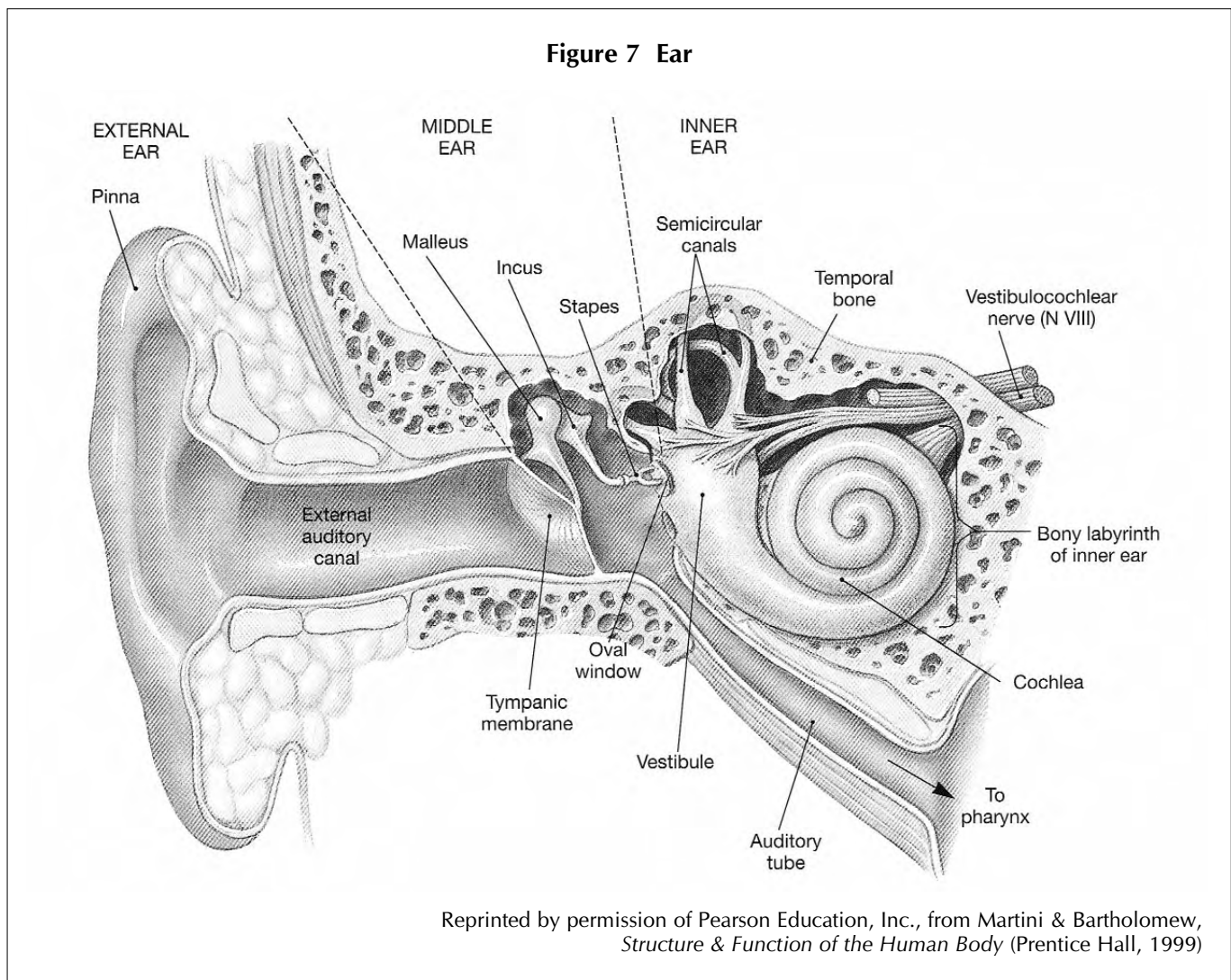
### ANATOMY AND PHYSIOLOGY

Each ear has three parts (See Figure 7):

1. The **outer ear**, consisting of the pinna (the cartilaginous appendage on either side of the head, which collects sound waves like a funnel) and the external auditory meatus (a tube that conducts sound waves from the pinna to the middle ear). The meatus is lined with skin that secretes cerumen (earwax), a mildly antimicrobial substance that traps dust and other particulate foreign material.

2. The **middle ear**, a cavity in the temporal bone separated from the external auditory meatus by the tympanic membrane, which vibrates in response to sound waves and imparts the vibration to a series of very small bones (malleus, incus, and stapes), which in turn transmit them to the inner ear.

3. The **inner ear**, consisting of the cochlea (an organ shaped like a snail shell, in which sound vibrations are converted to nerve impulses to be sent through the eighth cranial, or vestibulocochlear,



nerve) and the vestibular system (the organ of balance, containing minute position sensors in a fluid medium, which send information about head position to the balance center in the brain, also through the eighth cranial nerve).

The middle ear communicates with the pharynx by a minute passage called the auditory (eustachian) tube, which serves to equalize air pressure between the middle ear and the atmosphere (see box). It also communicates with epithelium-lined air cells within the skull, called mastoid air cells.

The auditory tube between the middle ear and the pharynx was discovered by Bartolomeo Eustachio (1524-1574), an Italian anatomist who also made important studies of the heart, the kidney, and the nervous system.

It has been suggested that when William Shakespeare wrote *Hamlet*, he had in mind the then recent discovery of this passage. In Act I, Scene 5, the ghost of Hamlet's father tells Hamlet how he was murdered by his brother Claudius, who poured "juice of cursed hebona . . . in the porches of my ears."

According to *Nomina Anatomica* (NA) and *Terminologia Anatomica* (TA), the name of this tube is *tuba auditoria* (or *auditiva*), usually rendered *auditory tube* in English.

Many health professionals nonetheless cling to the traditional name, **eustachian tube**, and most of them pronounce it with the soft French *ch* sound (as in champagne) rather than the more appropriate hard Italian *ch* (as in Chianti).

## DIAGNOSTIC PROCEDURES IN DISORDERS OF THE EAR

### Inspection and palpation of the pinna.

**Otосcopy:** Inspection of the external auditory meatus and tympanic membrane with an otoscope, an instrument that directs light into the ear through a conical speculum, and is equipped with a magnify-

ing lens; mobility of the tympanic membrane can be assessed when the subject swallows or performs the Valsalva maneuver (or when, in children, the examiner blows a puff of air into the ear with a rubber bulb attached to the otoscope).

**Measurements of hearing:** (1) simple tests with ticking watch or tuning fork; (2) audiography, a precise measurement of the faintest loudness (in decibels) that the subject can hear, each being ear tested separately at each of several pitches (for example, 250, 500, 1000, 2000, 3000, 4000, 6000, and 8000 Hz); this can be performed by a technician with carefully calibrated testing equipment, or by automated machinery activated by the subject; (3) more elaborate testing of the subject's ability to discriminate spoken words.

**Weber test:** A vibrating tuning fork placed firmly against a bony surface of the head at the midline sends vibrations through the bones of the skull. These should be heard equally in the two ears; if there is hearing loss due to blockage of the external auditory meatus or to injury or disease of the middle ear, the tone of the fork will be heard louder in the affected ear; in hearing loss due to damage to the inner ear or acoustic nerve, however, the tone will be heard louder in the more normal ear.

**Rinne test:** The sound of a vibrating tuning fork positioned so that the tines are near the pinna (air conduction) should be heard by the subject even after the sound sensed when the shank of the tuning fork is placed on the mastoid process behind the ear (bone conduction) can no longer be heard; when bone conduction is heard longer than air conduction in an ear with reduced hearing, the hearing loss is due to obstruction of the meatus or disease of the middle ear.

**Tympanocentesis:** Puncture of the tympanic membrane and withdrawal of fluid from the middle ear for examination, including culture.

**Pneumotympanometry:** Assessment of the mobility of the tympanic membrane by applying pressure to its outer surface with a device fitting tightly in the external meatus.

## INFECTIONS OF THE OUTER AND MIDDLE EAR

### Otitis Externa (Swimmer's Ear)

Infection of the external auditory meatus.

**Causes:** Infection with bacteria (*Proteus*, *Pseudomonas*) and sometimes fungi (*Aspergillus*). Predisposing causes include water exposure (swimming, showering), excessive cerumen, mechanical trauma (probing with paperclip), foreign body (cotton, pencil eraser), diabetes mellitus, and immune compromise.

**History:** Earache, itching in the external auditory meatus, purulent discharge. Hearing loss if the meatus is occluded by swelling or exudate.

**Physical Examination:** Redness and swelling of the meatus, sometimes with complete occlusion; purulent exudate, perhaps with excessive cerumen or foreign body visible. Tenderness on manipulation of the pinna.

**Course:** Generally benign, but in diabetes mellitus and AIDS an external ear infection may resist conservative treatment and become chronic, perhaps invading the skull or brain, with resulting neurologic damage.

**Treatment:** After gentle cleansing and removal of any foreign material, cerumen, or exudate, topical antibiotics (ear drops), often with hydrocortisone to combat local inflammation, are instilled several times a day. Sometimes a gauze wick is inserted to facilitate penetration of ear drops when edema of the meatus is extreme. In invasive infections, intravenous antibiotics and even surgery may be required.

### Otitis Media

Bacterial infection of the middle ear and adjoining mastoid air cells.

**Cause:** Infection by *Streptococcus pneumoniae*, *Haemophilus influenzae*, *Streptococcus pyogenes*, and other bacteria. Otitis media commonly occurs as a sequel to a viral upper respiratory infection. Obstruction of the auditory tube by edema leads to pressure changes within the middle ear and secretion of mucus and serous fluid, which becomes infected by bacteria already present in the tissues. Otitis media is often bilateral. It is commoner in infants and small children than in adolescents and adults, accounting for one-third of all pediatric office visits.

**History:** Pain and pressure in one or both ears, hearing loss, sometimes fever.

**Physical Examination:** Redness of the tympanic membrane, sometimes with formation of bullae. Immobility of the tympanic membrane, reflecting malfunction of the auditory tube. Occasionally bulging of the membrane. If spontaneous rupture occurs, blood or purulent exudate in the external auditory meatus.

**Course:** It is estimated that 20-80% of all cases of otitis media will resolve spontaneously without treatment. When there is fever or severe pain, antibiotic treatment is usually prescribed because of the risk of serious complications in a few patients. Neglect of the infection, its failure to respond to standard initial treatment, or a series of recurrent infections can lead to chronic otitis media, typically due to different organisms (*Proteus*, *Pseudomonas*, staphylococci) than acute infection. Complications of chronic otitis media include spontaneous rupture of the tympanic membrane, with chronic purulent drainage; destruction of the bones within the middle ear that transmit sound; invasion of mastoid air cells (mastoiditis), skull bones, and even the central nervous system by infection; formation of cholesteatoma, a benign but locally invasive growth of the tympanic membrane caused by prolonged negative pressure (partial vacuum) in the middle ear. Chronic otitis media can lead to permanent conductive hearing loss and, in small children, speech defects because of inability to hear speech sounds properly.

**Treatment:** In the absence of fever and severe pain in patients over age 2, analgesics and observation are preferred to antibiotic treatment. For selected patients, systemic antibiotics (amoxicillin with or without clavulanic acid, erythromycin, trimethoprim-sulfamethoxazole), decongestants, analgesics. If tympanic membrane rupture threatens, myringotomy (surgical puncture of the membrane, with release of pus). In children with recurrent or refractory infections, polyethylene tubes may be placed in the tympanic membrane(s) to aerate the middle ear(s) and allow for escape of purulent secretion. Cholesteatoma and mastoiditis are treated surgically. Chronic perforation of the tympanic membrane requires surgical repair (tympanoplasty).

## DISORDERS OF THE INNER EAR

### Tinnitus

Perception of abnormal sounds in the ear(s) or head. When pulsatile (simultaneous with heart-beat), it may result from vascular disease (arterial stenosis, aneurysm). Tinnitus is generally a humming or squealing noise heard constantly or intermittently in one or both ears, especially at night when external sounds are at a minimum. It is generally due to degenerative disease of the inner ear, and frequently accompanies sensorineural hearing loss (discussed below). Common causes are excessive noise exposure and certain medicines. Aspirin and other salicylates at higher doses cause tinnitus lasting only as long as they remain in the body. Other drugs (certain antibiotics) can cause permanent tinnitus. Treatment of tinnitus is generally unsatisfactory but includes masking with other sounds (music, "static" on a radio).

### Vertigo

A sense of motion (spinning, falling, floor tipping) when no such motion is occurring.

**Causes:** Labyrinthitis, often following respiratory infection and hence often called viral. Degenerative changes in the balance-sensing mechanism of the inner ear. Increased pressure within the endolymphatic sac (Ménière disease). Vascular or neoplastic disease of the inner ear or temporal lobe of the cerebral cortex. Diplopia, head injury, multiple sclerosis, drugs, alcohol.

**History:** A feeling of spinning or falling to one side, or a sense that the floor is tipping or rotating, coming on suddenly, often with head movement, and lasting seconds, minutes, hours, days, weeks, or months. When severe, vertigo may make it impossible for the patient to stand or walk, and may be accompanied by nausea and vomiting. There may also be tinnitus and hearing loss.

**Physical Examination:** May be essentially normal. The Romberg test (patient standing with eyes closed) may indicate inability to maintain equilibrium. Eyes may show nystagmus.

**Treatment:** May be limited to treatment of the underlying cause. In Ménière disease, salt restriction and diuretic therapy may help by reducing the pressure of the endolymph. Medicines such as meclizine and dimenhydrinate may diminish or abolish vertigo

temporarily. In some cases of positional vertigo, head manipulation can reduce symptoms by promoting reorientation of the balance mechanism.

### Hearing Loss

Reduction, often permanent, in the acuity of hearing in one or both ears. Hearing loss is divided into three types depending on the location of the abnormality.

**Conductive hearing loss** due to disease or abnormality in the outer or middle ear: cerumen impaction, otitis media with effusion, hardening of the tympanic membrane (otosclerosis), injury or disease of the ossicles.

**Sensory hearing loss** due to disease of the cochlea: acoustic trauma, ototoxicity (aminoglycosides, loop diuretics, cisplatin), aging.

**Neural hearing loss** due to eighth nerve lesions or cerebrovascular disease.

Hearing loss is assessed by audiometry and the Weber and Rinne tests. Treatment is that of the underlying cause, if possible.

Generally no treatment is effective.

## THE NOSE

### ANATOMY AND PHYSIOLOGY

The external nose is supported by a framework of cartilage and covered by skin. The nostrils (anterior nares) open into paired passages lined with mucous membrane, which is rich in serous and mucous glands and blood vessels. The lining membrane of these passages is closely attached to convoluted ridges of bone called turbinates (three on each side), which increase the surface area of membrane that is exposed to inspired air. Adjacent to the nasal passages, and communicating with them by narrow orifices, are the paranasal sinuses. These are cavities within the bones of the skull, somewhat variable in size and shape, and lined with mucosa like that of the nose. The nasal passages end at the choanae, or posterior nares, where they enter the nasopharynx, the uppermost part of the pharyngeal cavity. The nasal passages warm and moisturize inspired air, and the mucus film lining them traps particulate matter in the air.

## DIAGNOSTIC PROCEDURE IN DISORDERS OF THE NOSE

**Direct inspection with nasal speculum or rhinoscope.**

**Posterior rhinoscopy:** Inspection of posterior nares with angled mirror placed in the oropharynx.

**Nasal smear:** Examination of a stained smear of scrapings from the nasal mucosa for evidence of infection (neutrophilic leukocytes) or allergy (eosinophilic leukocytes).

**Culture** of nasal secretions to identify bacterial pathogens.

### Diseases of the Nose

#### Coryza (Common Cold)

A common, mild rhinitis caused by viruses.

**Causes:** Any of numerous viruses, which can be spread readily from person to person. Risk of catching cold may be heightened by exposure to severe winter weather (especially whole-body chilling), drying of indoor air by heating systems, or crowding indoors during the winter.

**History:** Headache, nasal stuffiness, runny nose, sneezing, throat irritation, malaise. Occasionally fever, chills, anorexia, and muscle aching.

**Physical Examination:** Erythema and edema of nasal mucosa. Temperature may be slightly elevated.

**Course:** Generally self-limited. Sometimes complicated by sinusitis, otitis media, pharyngitis, bronchitis.

**Treatment:** Purely symptomatic. Oral decongestants are moderately effective. Aspirin, acetaminophen, or ibuprofen relieve discomfort. Rest, fluids. Antihistamines do not decongest, antibiotics do not kill cold viruses, and nasal decongestant sprays cause rebound congestion worse than the disease.

#### Allergic Rhinitis (Hay Fever)

A recurrent, often seasonal, inflammation of the nasal mucous membrane caused by allergy to inhaled materials.

**Causes:** Sensitivity to pollens, grasses, mold spores, dust mites, animal dander, second-hand cigarette smoke, and other inhalant allergens.

**History:** Recurrent or constant nasal congestion and irritation, with copious watery discharge,

itching, sneezing (often many times in a row), and itching and watering of the eyes. Symptoms may occur consistently at certain seasons (spring, fall) or, especially when due to house dust, may be perennial.

**Physical Examination:** Watery, red eyes. Pale or bluish, markedly swollen nasal mucosa. Nasal polyps (massive overgrowths of chronically inflamed mucosa) may be present.

**Diagnostic Tests:** Nasal smear shows eosinophils. Skin testing or RAST (radioallergosorbent testing) can identify causative allergens.

**Treatment:** Decongestants, antihistamines, nasal corticosteroid spray. Avoidance of known allergens when possible. Use of air filters as appropriate. Continued administration of desensitizing antigens often markedly reduces symptoms.

#### Sinusitis (Rhinosinusitis)

Infection of one or more paranasal sinuses.

**Cause:** Involvement of the paranasal sinuses often occurs along with any type of rhinitis, including particularly the common cold. Swelling of the nasal mucosa leads to blockage of the sinus openings, with accumulation of secretions within the sinuses affected. Persons with allergic rhinitis may be subject to recurring episodes of sinusitis due to chronic blockage of sinus openings (ostia). Acute sinusitis is nearly always viral. Recurrent or persistent obstruction to sinus drainage can lead to chronic sinusitis with secondary bacterial infection.

**History:** Pressure or pain in one or more sinus cavities, often aggravated by bending forward. Pain may be manifested as a severe headache or may radiate into the teeth. Purulent or bloody nasal or postnasal discharge may be present. Occasionally fever, chills, and malaise.

**Physical Examination:** Edema and erythema of nasal mucosa. Purulent discharge in nasal passages or oropharynx (postnasal drip).

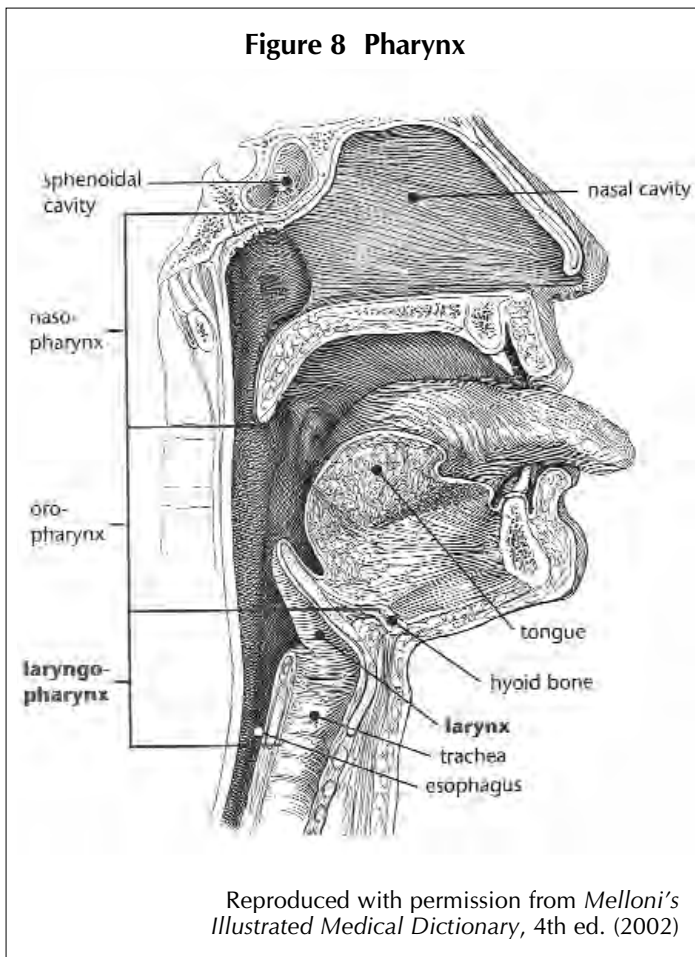
**Diagnostic Tests:** In chronic sinusitis, x-ray or other diagnostic imaging shows thickening of sinus membranes and often presence of fluid within cavities.

**Treatment:** Decongestant, analgesic. A short course of nasal decongestant spray may help to open and drain sinuses. Control of allergic component if present. When symptoms (severe, persistent pain) or clinical picture (fever, bloody discharge) suggests bacterial infection, an oral antibiotic (amoxicillin, trimethoprim-sulfamethoxazole) is

prescribed. Chronic sinusitis may respond to prolonged antibiotic therapy. Surgical procedures can be used to correct anatomic lesions predisposing to sinusitis, or to improve drainage of a chronically infected sinus.

### Epistaxis (Nosebleed)

Bleeding from the nose may be due to nasal trauma, irritation of the mucosa by dust or dry air, upper respiratory infection or allergic rhinitis, or coagulation defect. Treatment of acute nosebleed is by application of direct pressure and, if necessary, topical vasoconstrictor. If bleeding persists or recurs, cautery with silver nitrate or anterior nasal packing may be necessary. Rarely bleeding comes from the posterior nares (usually in middle-aged or elderly patients with hypertension or arteriosclerosis) and requires a posterior nasal pack. Prevention of further nosebleeds may include use of lubricating applications to the mucosa, humidification of air, and avoidance of dusts and other irritants.



## THE THROAT

### ANATOMY AND PHYSIOLOGY

The throat, or pharynx, is a cavity lined with mucous membrane that conducts air from the nose and mouth into the trachea, and food and drink from the mouth into the esophagus. It consists of three portions: the nasopharynx, on a level with the nasal passages and communicating with them; the oropharynx, on a level with the mouth and communicating with it; and the hypopharynx or laryngopharynx, which lies below the oropharynx and gives entry to the esophagus and the larynx. (See Figure 8.)

The tonsils and adenoids are masses of lymphoid tissue surrounding the zone between the mouth and the oropharynx. At the boundary between the oropharynx and the hypopharynx lies the epiglottis, a flexible valve that closes the respiratory passage during swallowing of food or drink.

The lining of the pharynx secretes mucus, which keeps the surface moist, traps inhaled particles, and supplements the saliva as a lubricant for food. Lymph glands in the front and back of the neck receive lymphatic drainage from the throat and adjacent structures.

### DIAGNOSTIC PROCEDURES IN DISORDERS OF THE THROAT

**Inspection** of the throat with a focused light, often with the aid of a tongue depressor (tongue blade) to press the tongue out of the field of vision.

**Palpation** of cervical lymph glands and of masses, swellings, or other structures within the throat.

**Throat culture** to identify bacterial pathogens.

**Strep screen** (faster than culture, but detects only group A beta-hemolytic streptococci).

**Biopsy** of masses or lesions suspected of being malignant.

**X-ray** or other imaging to identify foreign bodies, masses, or abnormalities of the airway due to injury or disease.

### Acute Pharyngitis (Sore Throat)

Acute inflammation of the throat due to infection.

**Cause:** Usually viruses, including the Epstein-Barr virus, which causes infectious mononucleosis (discussed in Chapter 3). Occasionally bacteria such



as *Streptococcus pneumoniae* and Group A beta-hemolytic *Streptococcus pyogenes* (“strep throat”), or fungi such as *Candida*. Infection with cold viruses may predispose to bacterial infection. Sore throat is more prevalent in cold weather.

**History:** Pain, irritation, or a sense of fullness or swelling in the throat, accentuated by swallowing and often radiating to the ears. Fever, painful glandular swelling in the neck.

**Physical Examination:** May be essentially normal. Fever is often present. Edema and erythema of the oropharynx, often involving the tonsils, soft palate, and uvula, occur in most bacterial and many viral throat infections. Severe infections, including streptococcal pharyngitis (strep throat) and infectious mononucleosis, cause formation of white or gray exudate (consisting of dead tissue, white blood cells, and bacteria) on pharyngeal walls and especially on the tonsils. A firmly adherent exudate is characteristic of *Candida* infection (thrush). The presence of vesicles or ulcers suggests viral infection (herpes simplex virus, coxsackievirus). Severe pain and swelling may cause a hollow or “hot potato” voice, and may make swallowing virtually impossible, so that the patient drools to avoid swallowing saliva, and becomes dehydrated from lack of fluid intake. Extreme swelling may compromise the airway. Cervical lymph glands may be swollen and tender. Some strains of beta-hemolytic streptococci cause a widespread red rash (scarlet fever, scarlatina).

**Diagnostic Tests:** Throat culture or strep screen may identify the causative organism. Blood studies (white blood cell count and differential, antistreptolysin O titer, heterophile antibodies) help to diagnose strep throat and infectious mononucleosis. Smears or scrapings of exudate can confirm presence of *Candida*.

**Course:** Viral sore throat runs its course within a week or two. Occasionally it becomes complicated by streptococcal infection, which may lead to acute rheumatic fever. It may also progress to otitis media, acute or chronic tonsillitis, or lower respiratory infection. Peritonsillar abscess (quinsy) is a severe bacterial infection developing above and behind one tonsil and causing extreme pain and swelling, with deviation of the uvula away from the affected side.

**Treatment:** Acute viral pharyngitis requires no treatment except analgesics, gargles, soothing lozenges, and perhaps a soft diet. Adrenal corticosteroid may be administered orally or by injection for severe pain and swelling. If streptococcal infection is

diagnosed, a 10-day course of an antibiotic known to be able to eradicate streptococci (such as penicillin V, erythromycin, or cephalexin) is mandatory. Candidal oropharyngitis (thrush) is treated with topical or systemic antifungal medicine. The treatment of peritonsillar abscess is surgical drainage.

### Obstructive Sleep Apnea (OSA)

A disorder in which breathing is repeatedly interrupted during sleep by intermittent obstruction of the airway.

**Cause:** Lax, excessively bulky, or malformed pharyngeal tissues (soft palate, uvula, and sometimes tonsils). Obesity, hypothyroidism, cigarette smoking, alcohol, and some medicines (particularly benzodiazepines) are predisposing factors. The swallowing reflex may be impaired during sleep. The condition is twice as common in men. Incidence increases with advancing age.

**History:** Loud snoring and recurrent episodes of apnea (respiratory arrest) during sleep followed by gasping inspiration with partial or complete arousal. The period of apnea may last for 10-120 seconds, and may be accompanied by sinus bradycardia or atrioventricular block.

**Physical Examination:** The shape and caliber of upper respiratory passages may be abnormal.

**Diagnostic Tests:** Polysomnography (continuous monitoring of heart rate, respiratory action and air flow, eye movements, and electroencephalogram during sleep), supplemented by recording of chin movements and arterial oxygen saturation.

**Course:** Nocturnal hypoxemia (deficiency of oxygen in blood) and shallow, non-refreshing sleep may lead to daytime lethargy, difficulties with memory and concentration, and even personality change and accident-proneness. About 15% of persons with OSA develop sustained pulmonary hypertension.

**Treatment:** Weight loss, smoking cessation, avoidance of alcohol and benzodiazepines. An appliance worn inside the mouth may reduce symptoms by holding the lower jaw in a forward position. The nightly use of continuous positive airway pressure (CPAP), which provides a steady flow of room air at low pressure through the nose to overcome intermittent upper respiratory obstruction, is often effective. Surgical trimming and reshaping of the uvula and soft palate can be performed by laser or radiofrequency ablation under local anesthesia. A more elaborate procedure is mandibular osteotomy with genioglossus muscle advancement.

### QUESTIONS FOR STUDY AND REVIEW

1. List and classify several reasons for hearing loss:

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2. List some common causes of nosebleed:

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3. Define or explain these terms:

- a. audiography \_\_\_\_\_  
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- b. auditory tube \_\_\_\_\_  
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- c. cerumen \_\_\_\_\_  
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- d. coryza \_\_\_\_\_  
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- e. epistaxis \_\_\_\_\_  
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- f. mastoiditis \_\_\_\_\_  
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- g. pharyngitis \_\_\_\_\_  
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- h. pinna \_\_\_\_\_  
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- i. vertigo \_\_\_\_\_  
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4. Point out some ways in which the ear, nose, and throat are related anatomically, physiologically, and with respect to diseases affecting two or more of them.

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5. Discuss the inappropriate treatment of viral respiratory infections with antibiotics. State some objections to this practice. What share of the blame would you assign to patients, pharmaceutical manufacturers, and physicians respectively?

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**CASE STUDY: YOU'RE THE DOCTOR**

Rashid Rahman is a 37-year-old computer programmer from Pakistan who has been in the United States for a year and a half as part of a cultural exchange program. He visits an urgent care clinic where you are on duty because of a "sinus infection."

1. Approximately one-third of adults queried report that they have had a sinus infection during the past year. What do you think is the likelihood that Mr. Rahman has bacterial rhinosinusitis requiring antibiotic treatment?

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The patient states that he began having nasal congestion and rhinorrhea yesterday, associated with pain and pressure in the frontal and maxillary areas. His nasal discharge is thick and yellow. He denies sore throat, cough, eye or ear symptoms, and fever. He sneezes often, sometimes four or five times in a row. He began taking pseudoephedrine and acetaminophen as soon as the symptoms appeared, but has had no relief yet. When closely questioned, he admits that his facial pain is really more of a stuffiness or pressure than a pain, and that it seems to wax and wane, being worst when he bends forward to tie or untie his shoes.

2. Which, if any, of these historical points favor a diagnosis of bacterial rhinosinusitis?

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Mr. Rahman gives a long history of recurrent sinus infections, for which he has had numerous x-ray examinations in his own country. He states that his infections invariably progress to the point of disabling pain and fever unless treated with an antibiotic, and he tells you which antibiotic consistently works for him. His general health is good. He does not smoke or drink alcohol and he takes no prescription medicines. He is allergic to cats and some plants but not to any foods or medicines.

3. Does this additional history change your view as to the likelihood of bacterial infection? How?

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On examination the patient appears alert, normally oriented, and in no distress. He is afebrile and his pulse and blood pressure are normal. His voice is somewhat nasal and he is breathing predominantly through his mouth, but there is no dyspnea, hoarseness, or cough. He sneezes repeatedly into a facial tissue during the consultation. The conjunctivae are slightly injected. Both nares show edema and pallor of the mucosa, with scant glairy secretion. There is slight tenderness to palpation above and below the eyes. The pharyngeal mucosa is normally hydrated and not injected. A thin postnasal discharge is evident on the posterior pharyngeal wall. The ear canals are clear and the tympanic membranes are not injected. The neck is supple, without masses. The lungs are clear to auscultation.

4. Do you now have grounds for agreeing with Mr. Rahman that he needs an antibiotic? Explain your rationale.

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You advise Mr. Rahman that his condition has not yet progressed to the point where antibiotic treatment is appropriate. In fact, there are indications (staccato sneezing, pale nasal mucous membranes, absence of fever, history of inhalant allergies) that his symptoms may be due partly or entirely to respiratory allergy. He vigorously resists the idea of allergic rhinitis, since he hasn't been around any animals or flowering plants. He also says that since he knows from prior experience that he will eventually need an antibiotic, and since he doesn't want to spend the time and money to make a second visit to the clinic, your clear medical duty is to prescribe an antibiotic now.

5. Will you agree? Why or why not?

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### SUGGESTIONS FOR ADDITIONAL LEARNING ACTIVITIES

1. Role-play a physician office visit with you as the doctor. Ask your patient (another student or family member) to choose a condition from this chapter and assume the history and symptoms of that condition. Ask relevant questions of your patient in order to elicit the information you need to formulate a differential diagnosis. Order lab tests by asking the patient to give you the results from those described in the chapter. If you order a lab test that isn't discussed, the patient should not tell you this but instead just say the results of that particular test were within normal limits. Make your final diagnosis and ask your patient to tell you if you were right.
2. Starting at the beginning of the chapter, make a list of all the anatomical terms that are discussed, including the structures of the ear, nose, and throat. Organize them down the left side of one or more sheets of paper, but don't number them. Label this list "A." Then starting with a separate sheet of paper but beginning at the back of the chapter and working in reverse, list all the diseases and symptoms that are associated with the ears, nose, and throat. Number the items in this list beginning with the number 1. Label this list "B." Starting with the first item on list A, write down the numbers of all the diseases or symptoms associated with that structure from list B. Continue through all the items on list A. When you are finished, make sure that you have used every number from list B.
3. You have been asked to be part of an expert panel on obstructive sleep apnea at the annual meeting of the American Academy of Otolaryngology–Head and Neck. You will give a 5-minute summary on the latest findings in the treatment of this condition. Use medical journals, the library, or the Internet for your research. Prior to your presentation, prepare questions on slips of paper and distribute them to your audience (class members, study group participants, or family members). After your presentation, "field" the planted questions. In the classroom, form multiple expert panels, three students to a group, assigning each panel a topic.