7 EYES, EARS, NOSE, AND THROAT PRIMARY CARE

CORE CONCEPTS

- Label the anatomy of eyes, ears, nose, and throat.
- Identify the most common EENT complaints.
- Explain the differences among illnesses with similar symptoms.
- Use diagnostic tools and procedures to perform an EENT assessment.

INTRODUCTION

In clinical or field environments, combat medics will examine patients with eye, ear, nose, and throat (EENT) complaints. These complaints are common, but it's important for combat medics to recognize RED FLAGS. Assessment of EENT conditions requires obtaining accurate vital signs, conducting thorough clinical observation, and taking appropriate patient histories. These actions may prevent a minor medical complaint from becoming a far more debilitating condition.

THE EYE

Anatomy and Physiology of the Eye

The eye consists of the numerous external and internal structures used for eye movement, vision, and protection (Figure 7-1). The conjunctiva is a mucous membrane that lines the eyelid and extends from the eyelid to the front of the eyeball, covering the anterior portion of the sclera. Lacrimal glands are located in the upper-outer aspect of each upper eyelid. Secretions from these glands prevent infections, moisten the eye, and drain through ducts located in the eyelids. Surface structures of the anterior portion of the eye protect and gather light. The sclera (white of the eye) is the tough layer that protects the inner structure of the eye and helps maintain its shape. It is connected to six muscles that allow the eye to look up, down, and side to side. The cornea is the tough, transparent, and colorless window that covers the pupil and iris. Injuries to the cornea may cause opacity and stop light rays from entering the eye.

Behind the external structures of the eye are the iris, pupil, lens, and retina. The iris is the colored circular muscle that lies between the cornea and the lens. The iris can constrict and dilate to control the amount of light that goes through the pupil to be refracted by the lens onto the retina. The pupil is the circular opening through the iris that allows light to pass to the lens and the retina. The lens is a circular structure filled with a jelly-like substance that is held in position by very small muscles known as ciliary muscles. Contraction of these muscles changes the shape of the lens, thus changing the amount of light refracting onto the retina. This results in the ability to see near and far objects. The retina is in the inner, posterior portion of the eye that contains photoreceptor cells called rods and cones (the vision receptors that allow us to see images). The retina is a continuation of the optic nerve, which transmits visual information to the brain.

Assessing Ocular Complaints

Ocular injuries are classified as penetrating or nonpenetrating and are common, despite protection from the bony orbit. An accurate history often helps the combat medic establish a possible cause for the eye problem. The following information should be gathered:

- If there is a history of injury, what was the mechanism of injury?
- Is the injury blunt or penetrating?
- Is there a foreign body injury (eg, glass from a motor vehicle accident)?
- Is there a thermal, chemical, or laser burn?
- Does the patient wear glasses or contact lenses?

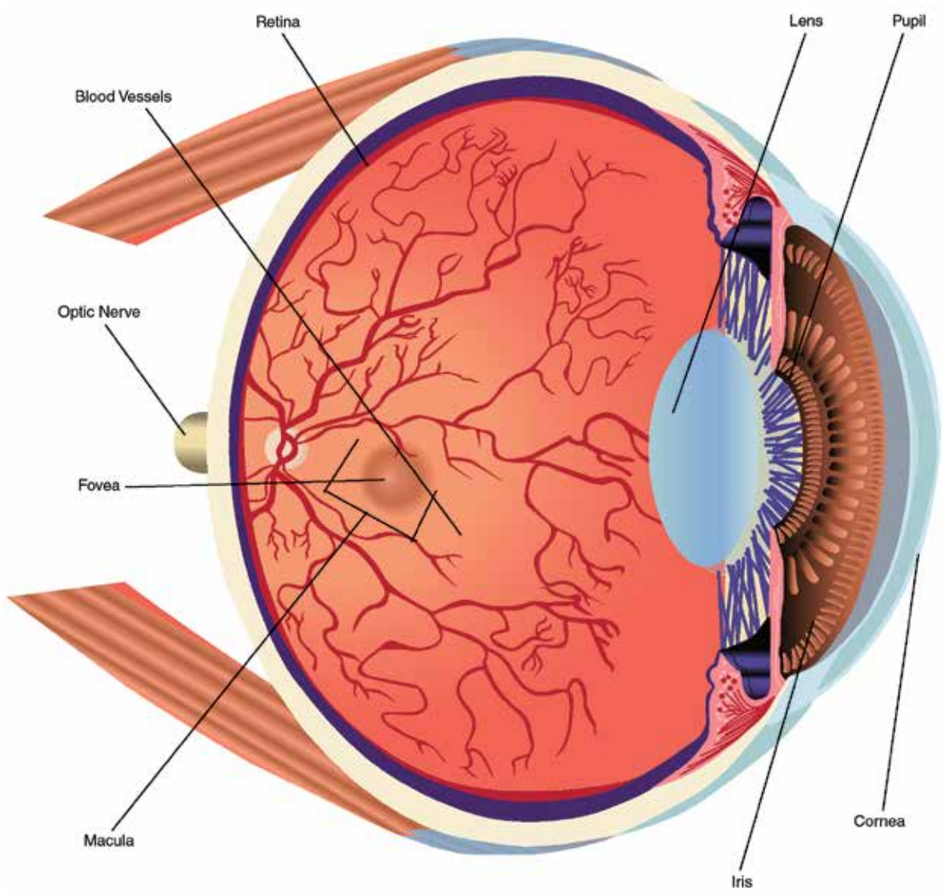

Figure 7-1. Anatomy of the eye.

Note: "Contact lenses will not be worn during basic training, field exercises, gas chamber exercises, deployments, or combat."[1]

Warning: Contact lenses will worsen chemical exposures of the eye and corneal injuries, such as corneal foreign bodies, laceration, ulcers, and infections.

- Is there a history of eye disease or previous eye trauma or surgery?
- Is there eye pain or vision loss? If there is vision loss, is it in one eye or both?

Warning: Vision loss, foreign body, photophobia, severe eye pain, or a history of trauma are RED FLAGS that demand immediate attention and action!

Exhibit 7-1. Patient History Information

Subjective assessments	Objective assessments	Additional vital signs (as needed)
• Age • Sex • Race • FDLMP • Chief complaint • OPQRSTI • SAMPLE	• Pulse • Respirations • Blood pressure • Temperature	• Pulse oximetry • End tidal CO_2 • Blood glucose monitoring

FDLMP: first day of last menstrual period
OPQRSTI: onset, provoking and palliative factors, quality, radiation and region, severity, timing, intervention
SAMPLE: signs and symptoms, allergies, medications, pertinent past medical and social history, last oral intake, events preceding the onset of the illness or injury

Physical Examination of the Eye

All physical exams begin with obtaining a history of the patient. Exhibit 7-1 identifies the data.

Assessing visual acuity is the most important step in evaluating ocular problems. The way you screen visual acuity will depend on the setting. All patients with eye complaints should undergo some type of visual acuity test. In the case of ocular burns, first flush the eyes. Once the mechanism of the burn has been eliminated, the visual acuity screening can take place. If you are in a clinic, use a standard Snellen eye chart (Figure 7-2). The Snellen visual acuity test measures distant vision by asking the patient to state the smallest readable letters from a standardized chart at a distance of 20 feet. Perform this test initially on all patients presenting with eye complaints (except for ocular burns). In children and the elderly, this test may be routinely performed to screen for any vision problems.

A gross vision examination is recommended when equipment, light, or space does not permit a standard screening. Test each eye individually by covering one with the patient's hand, being careful to avoid applying pressure to the eye. Complete the following four examinations in descending order based on the patient's ability:

1. Ask the patient to read or identify information on a near card. If a near card is not available, use any printed material you have available.
2. Ask the patient to count how many fingers you are holding up and record the farthest distance at which the fingers can be counted correctly (eg, 4 ft).

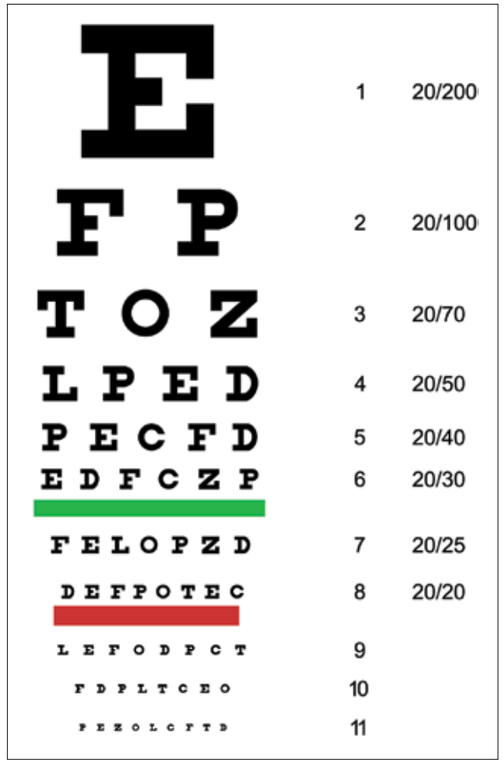

Figure 7-2. A Snellen chart—used to assess a person's visual acuity. Reproduced from Cho RI, Savitsky E. Ocular trauma. In: Savitsky E, Eastridge B, eds. *Combat Casualty Care, Lessons Learned from OEF and OIF*. Washington, DC: Department of the Army, Office of the Surgeon General, Borden Institute; 2012: 214, fig 9.

Figure 7-3. Anisocoria (unequal pupils).

3. If the patient is unable to count fingers, assess the patient's ability to detect hand motion 1 to 2 inches in front of the eye.
4. If the patient is unable to detect hand motion, turn off all the lights in the room, fully cover one of the patient's eyes, and test for light perception.

Distant vision visual acuity is recorded as a fraction in which the numerator indicates the distance from the chart (eg, 20 ft) and the denominator indicates the distance at which the normal eye can read the line. Thus, 20/200 means that a patient can read at 20 feet what the average person can read at 200 feet. Normal vision is considered 20/20. Most states require 20/40 vision to pass a driver's license test. Most printed materials are formatted at 20/40. The ability to read alarm clock numbers from 10 feet or headlines on a newspaper is equivalent to 20/80 vision. If a person can barely read the letters on a stop sign, they have 20/200 vision and are considered legally blind.

Abbreviate the left eye as OS (oculus sinister) and abbreviate the right eye as OD (oculus dexter). For example, to record visual acuity (V/A) in each eye separately, you might write, "V/A 20/20 OS, 20/40 OD uncorrected" (no corrective lenses). The abbreviation for both eyes is OU (oculus uterque). To report the same acuity in both eyes, you might write, "V/A 20/20 OU uncorrected." If a patient has corrective lenses, initially test acuity uncorrected, and then with the lenses. Remember that the patient may be wearing contact lenses. In that case, either have the patient remove the lenses or document that the visual acuity obtained is "corrected."

General examination techniques are used in the physical examination, including inspecting and palpating in adequate lighting. Avoid applying pressure to the globe during the examination. The objective portion of the examination will include use of the Snellen chart (if possible). To perform this test, position the patient 20 feet away from the chart, in a well-lit area. Test each eye individually by covering one eye with an opaque card or gauze. Do not apply pressure to the eye. Ask the patient to identify all of the letters beginning at the 20/20 vision level; if the patient can read that line, no further distance vision testing is required for that eye. If the patient cannot read the 20/20 line, determine the smallest line where the patient can identify more than half of the letters.

After testing the eyes individually, have the patient uncover both eyes and read the smallest line possible. If the patient has corrective lenses, either have the patient remove them or document that the visual acuity obtained is corrected. If the patient can remove the lenses, test without them initially, and then with them. Record the visual acuity.

Perform a physical examination of the eye, noting any drainage or bleeding. Then inspect the following:

- The eyelid's ability to open wide and close completely. Inspect lids for edema, discoloration, and foreign bodies. Observe the position of the lids in relationship to the eyeballs.
- Ask the patient to look upward as you pull the lower lid downward, then look down as you pull the upper lid upward. Observe the conjunctiva for erythema or **exudates**. A pink to dark pink color is normal. Note the color of the sclera (white is normal). Patients who have darker pigmented skin may have scattered areas of brown pigment as a normal finding, but note this observation.

- Note any irregularity in the shape of the pupils. Pupils should be equal, round, regular, and reactive to light (**PERRL**). Assess extraocular movement.

Note: Unequal pupil size (**anisocoria**) may be congenital or caused by local eye medication (Figure 7-3). Approximately 20% of people have minor or noticeable differences in pupil size, with normal reflexes.

Common Eye Complaints

Eye complaints must always be taken seriously because of the possibility of permanent effects on vision. All patients complaining of ocular issues must receive a consultation from a medical officer (MO).

Warning: Any patient presenting with severe eye pain or decreased visual acuity should be considered emergent and must see an MO immediately.

Conjunctivitis

The condition conjunctivitis, commonly referred to as "pink eye," is inflammation that is limited to the conjunctiva and may affect one or both eyes (Figure 7-4). Common causes of conjunctivitis are bacterial or viral infections, allergies, or chemical irritation. Most common signs and symptoms include the following:

- erythema,
- edema,
- a gritty sensation,
- burning,
- pain,
- itching, and
- a **purulent** discharge. The discharge can sometimes be severe enough to cause the eyelids to stick together and is commonly associated with a bacterial infection.

Figure 7-4. Allergic conjunctivitis. Photograph courtesy of Dr. David E. O'Brien, IV.

Exam for Conjunctivitis. All patients presenting with possible conjunctivitis must have a visual acuity test performed and be referred to an MO.

Treatment for Conjunctivitis. Treatment is based on patient history and presentation. Bacterial conjunctivitis is treated with antibiotic eye drops or ointments. Viral conjunctivitis may be treated with antiviral medication or symptomatically. Allergic conjunctivitis may have associated sneezing and watery discharge from the eyes. It may be treated with antihistamine medications to reduce symptoms. An MO may recommend the use of either a warm or cold compress (a moist washcloth or hand towel) to closed eyelids three or four times a day for swelling reduction and pain relief. Tell patients to avoid environmental allergens and not wear contact lenses, if possible.

Stye

A **hordeolum** (stye) is an inflammation of oil or sweat glands on the eyelid (Figure 7-5). Symptoms include erythema, edema, and pain. They are similar to a pimple, as they are raised and contain pus.

Exam for a Hordeolum. All patients presenting with a possible hordeolum must have a visual acuity test performed and be referred to an MO.

Treatment for a Hordeolum. Treatment includes warm wet compresses until the hordeolum drains,

Figure 7-5. Hordeolum (stye). Photograph by Andre Reimann. Reproduced from Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Stye02.jpg

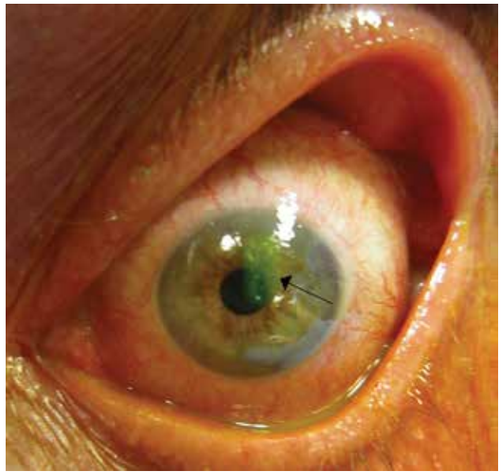

Figure 7-6. A corneal abrasion stained with fluorescein. Photograph by James Heilman, MD. Reproduced with permission from Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Human_cornea_with_abrasion_highlighted_by_fluorescein_staining.jpg

which generally reduces pain and swelling and allows healing to start. Topical antibacterial ointment may also be used. In severe cases the hordeolum will be incised and drained. Instruct patients to never squeeze a hordeolum, as it can spread infection and cause reoccurrences.

Corneal Abrasion

Corneal abrasions (Figure 7-6) are common eye trauma injuries caused by foreign bodies in the eye, scratches from fingernails or other objects, and improperly fitted or maintained contact lenses. Symptoms of a corneal abrasion include the following:

- sensation of a foreign body in the eye,
- light sensitivity,
- severe pain, and
- erythema.

Corneal abrasions are generally diagnosed with fluorescein dye and a Wood's lamp. The fluorescein dye settles in the scratches and causes them to glow green when exposed to the Wood's lamp black light (used in a military treatment facility) or a cobalt blue light (a small light used in a battalion aid station).

Exam for a Corneal Abrasion. All patients presenting with a possible corneal abrasion must have a visual acuity test performed and be referred to an MO. An MO may order a fluorescein stain exam.

Treatment for a Corneal Abrasion. Treatment includes antibiotic eye drops or ointment. This usually results in the abrasion healing within 24 to 48 hours. If healing has not occurred within 48 hours, refer the patient to an ophthalmologist to prevent complications. If an abrasion becomes infected, there will be white fluid at the wound site. Any abrasion with an infectious fluid is called a corneal ulcer. Depending on the size and location of an ulcer, a culture may be recommended so antibiotic coverage can be tailored accordingly.

Check on Learning

1. What medical condition is described as an inflammation of oil or sweat glands on the eyelid?
2. Is 20/15 vision better or worse than 20/20 vision?
3. Which structure in the eye has cone and rod cells?

THE EAR

Anatomy and Physiology of the Ear

The ear consists of numerous structures that function for hearing, balance, and spatial orientation. Figure 7-7 shows ear anatomy.

The external ear is composed of the auricle (or pinna), tragus, external auditory **meatus**, and external auditory canal (EAC). The auricle is shaped to collect sound waves and direct them toward the external auditory meatus (the opening to the EAC). The tragus is a nodule eminence that points backwards over the entrance to the external auditory canal. The external auditory canal extends from the external auditory meatus to the tympanic membrane. The EAC is the only skin-lined cul-de-sac in the body. It is warm, dark, and prone to being moist, making it an excellent environment for bacterial and fungal growth.

The middle ear is an air-filled cavity within the temporal bone of the skull. The middle ear is separated from the external ear by a thin, translucent membrane called the tympanic membrane (TM), or "eardrum." A healthy TM may be pearly gray to amber in color; redness usually indicates an infectious process. The TM contains three **ossicles** (small bones): the malleus (hammer), incus (anvil), and stapes (stirrup). Sound vibrations from the environment travel down the

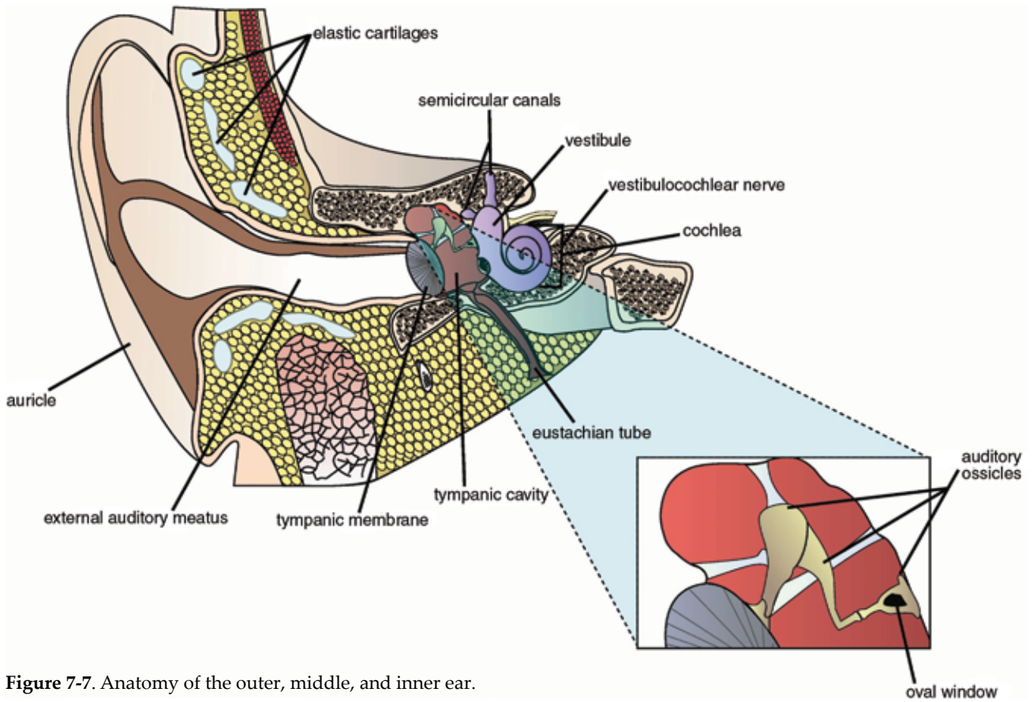

Figure 7-7. Anatomy of the outer, middle, and inner ear.

EAC, causing movement of the TM, and in turn, movement of the ossicles, continuing sound transfer to the semicircular canals and cochlea. Those vibrations are converted to electrical signals that are interpreted by the brain as sound.

The eustachian tube (middle ear tube) drains the middle ear to the nasal part of the pharynx (nasopharynx). It protects the eardrum from rupture by allowing air pressure in the middle ear to equalize with the air pressure outside of the ear. Upper respiratory infections commonly result in mucous buildup in the eustachian tube, as well as inflammation, which may cause hearing loss during the course of the infection and prevent the patient from being able to equalize pressure in their ears.

The inner ear is the membranous curved cavity inside the bony labyrinth that is involved in hearing and balance. The inner ear consists of the cochlea, which is the actual receptor for hearing. It is a coiled, cone-shaped structure that contains the organ of Corti (an organ with hair-like cells that move with sound waves). The vestibular nerve sends information for equilibrium from the semicircular canals and **otolith organs** to the brain. The semicircular canals send information in pitch, roll, and yaw; the otolith organs send information on linear acceleration.

Physical Examination of the Ear

All physical exams begin with obtaining a history of the patient. See Exhibit 7-1 for the required data.

Physical examination of the ear consists of inspection, palpation, and an otoscopic examination. Begin the examination by observing the outer ear for abnormalities such as edema, erythema, ecchymosis, rash, nodules, and **lesions**. Inspect the ear's size, shape, symmetry, landmarks, color, and position on the head. Palpate the auricle for tenderness and swelling. Perform an otoscopic examination as described in the following five steps:

1. Stabilize your examining hand against patient's head to prevent injury.
2. In adults, pull the auricle back and out. Consult with an MO before completing an otoscopic examination on a child.

Figure 7-8. Cerumen (earwax).

3. Hold the otoscope handle between your thumb and fingers while bracing that hand against the patient's face to stabilize the instrument. This technique will prevent any injury to the patient during unexpected movements.
4. Insert the speculum and observe the EAC.
   a. Examine the unaffected ear first.
   b. Use the largest speculum the ear canal will accommodate.
   c. Look for edema, erythema, lesions, narrowing of the EAC, discharge, foreign bodies, or presence of **cerumen** (earwax) (Figure 7-8).
5. Observe the TM.
   a. A normal TM should be translucent and pearly gray to amber in color.
   b. Look for perforations, air bubbles, scarring, fluid, erythema, exudate, bulging appearance, and the "**cone of light**."

Caution: If the TM is obscured by cerumen, if you suspect perforation, or if the auditory canal is filled with blood or discharge, DO NOT irrigate. Consult with an MO.

The **Valsalva maneuver** can be used on some patients to help raise or lower suspicion of fluid behind the tympanic membrane. An MO must train you on how and when to perform the Valsalva maneuver. The Valsalva maneuver is contraindicated for patients with any of the following conditions:

- severe coronary artery disease,
- recent heart attack,
- moderate to severe reduction in blood volume,
- chest wounds, and
- inability to hold their breath for the time needed to complete the maneuver (the Valsalva maneuver raises intrathoracic pressure).

To perform the maneuver, the patient should try to exhale air while keeping their mouth closed and nose pinched. This action forces air into the eustachian tube, which then travels to the middle ear and causes the TM to move. An examiner using an otoscope should see the TM move when the maneuver is performed. Movement of the TM is normal, whereas lack of movement could indicate a middle ear infection (otitis media), **eustachian tube dysfunction,** or defect of the ossicles.

Test the inner ear by evaluating the patient's hearing. Gross hearing testing begins when the patient responds or fails to respond to your questions. Complete hearing evaluations are performed by audiology services.

Common Complaints of the Ear

Warning: Fever of ≥ 100.4 °F and severe ear pain, any embedded foreign objects, history of trauma to the ear, or hearing loss are RED FLAGS. The patient must see an MO immediately!

Note: About 50% of earaches in adults are caused by dental problems.

Cerumen Impaction

Cerumen is a naturally occurring product of the EAC. Impaction is usually asymptomatic, but it can cause hearing loss, dizziness, and pain. Hearing loss is a primary symptom of impaction.

Exam for Cerumen Impaction. When cerumen is impacted, the TM cannot be seen during otoscopic examination. Refer patients with cerumen impaction to an MO.

Treatment for Cerumen Impaction. Irrigating the ear or using eardrops that will dissolve the earwax are effective ways to manage cerumen impaction. A combat medic, trained at the unit level by an MO, may perform an ear irrigation.

Otitis Externa

Note: If the patient has a temperature ≥ 100.4 °F, look for another cause of fever.

Otitis externa (OE), or "swimmer's ear," is inflammation or infection of the external auditory canal (Figure 7-9), commonly caused by bacteria, viruses, or in rare cases, fungi. Otitis externa can be precipitated by excessive moisture resulting from swimming, use of earplugs or hearing aids, and trauma to the ear canal. Signs and symptoms of OE include include the following:

Figure 7-9. A severe case of otitis externa. Photograph by James Heilman, MD. Reproduced with permission from Wikimedia Commons. https://commons.wikimedia.org/wiki/File:OtitisExterna10.JPG

- ear pain;
- canal swelling;
- foul smelling drainage;
- increasing pain on movement of the auricle and tragus, which may be severe; and
- low-grade fever.

Exam for Otitis Externa. Conduct an examination of the ear and obtain a thorough patient history. Patients with suspected OE must be referred to an MO for treatment.

Treatment for Otitis Externa. Management primarily involves administration of antibiotic and steroid eardrops. Irrigation of the ear canal is not recommended. A nonsteroidal anti-inflammatory drug, such as ibuprofen, will usually relieve pain.

Otitis Media

Otitis media (OM) (Figure 7-10) is a middle ear infection commonly caused by a virus or bacteria. A patient's chief complaints will be the following:

- ear pain,
- fever,
- congestion,
- cough, and
- hearing loss in the affected ear.

Figure 7-10. Otitis media with fluid behind the tympanic membrane. Photograph by Michael Hawke, MD. Reproduced with permission from Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Acute_Otitis_Media_Stage_of_Resolution.jpg

Acute otitis media is usually viral and self-limited. It normally accompanies an upper respiratory infection (**URI**). The patient will have ear congestion, and perhaps mild discomfort and popping. Symptoms resolve with resolution of the underlying URI.

If the middle ear (which is normally sterile) becomes contaminated with bacteria, infection can result in purulent exudate and increased pressure. An individual with bacterial acute OM has classic earache pain that is severe, continuous, and often accompanied by fever of 102 °F or more. Viral acute otitis media presents with less severe symptoms, but secondary bacterial OM often follows quickly.

Exam for Otitis Media. On otoscopy, the TM will be bulging and may look red. The "cone of light" will commonly be absent. This condition is typically unilateral (occurs in one ear). Refer patients with suspected OM to an MO for treatment.

Treatment for Otitis Media. Manage viral otitis media symptomatically. Bacterial infections require oral antibiotics and decongestants.

Common Trauma Complaints of the Ear

Tympanic Membrane Perforations

Tympanic membrane perforations (Figure 7-11) commonly occur secondary to blast injuries, especially when hearing protection is not being used. The vast majority of ruptured TMs will heal on their own, but refer all patients presenting with a TM rupture to an MO for evaluation and treatment.

Figure 7-11. Subtotal perforation of the right tympanic membrane from a previous severe acute otitis media. Photograph by Michael Hawke, MD. Reproduced with permission from Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Subtotal_Perforation_of_the_right_tympanic_membrane.tif

Skull Fractures and Soft Tissue Injuries

Skull fractures and soft tissue injuries of the auricle, tragus, or earlobe make up most other complaints of ear pain in trauma. One type of skull fracture that effects the ear is the basilar skull fracture. This type of skull fracture may present with "**Battle's sign"** (bruising behind the ear) (Figure 7-12) and raccoon eyes (bruising around the eyes). Patients who exhibit signs and symptoms of a possible basilar skull fracture should have the auditory canal inspected externally. These patients may also suffer from dizziness and **vertigo** (feeling off balance as though high in the air looking down) as well as **tinnitus** (ringing in the ears).

Warning: Placement of unsterile instruments inside the EAC can introduce bacteria into the cerebral spinal fluid, possibly resulting in a life-threatening infection.

Check on Learning

4. Valsalva maneuver is contraindicated in which patients or casualties?
5. What does TM stand for?
6. The eustachian tube runs from the back of the ear to the back of the _____.

Figure 7-12. A casualty displaying Battle's sign.

THE NOSE AND SINUSES

Anatomy and Physiology of the Nose and Sinuses

The nose is formed by bone and cartilage and covered with skin. The structures of the nose (Figure 7-13) facilitate respiration, moisten inhaled air, filter dust, and contribute to olfaction.

Nares are bilateral anterior openings of the nose. External and internal nares are lined with vascular mucous membranes thickly covered with small hairs, known as **cilia**, and mucous secretions.

The nasal bridge is formed by the frontal and maxillary bones. The nasal turbinates, also called nasal concha or conchae (plural), are shell-shaped networks of bones, vessels, and tissue within the nasal passageways. Their function is to increase surface contact time of inhaled air, resulting in humidification and warming. Paranasal sinuses are air-filled, paired extensions of the nasal cavity within the bones of the skull. These include the frontal, ethmoid, sphenoid, and maxillary sinuses (Figure 7-14).

Examination of the Nose and Sinuses

All physical exams begin with obtaining a history of the patient. See Exhibit 7-1 for the required data.

Once a subjective history has been obtained, inspect the external structure of the nose, observing the shape, size, symmetry, color, and presence of deformities or lesions. Palpate the external nose for tenderness, swelling, or masses. Inspect the frontal and maxillary sinus area for swelling and palpate the frontal and maxillary sinuses for tenderness. Only the maxillary and frontal sinuses are accessible to physical examination.

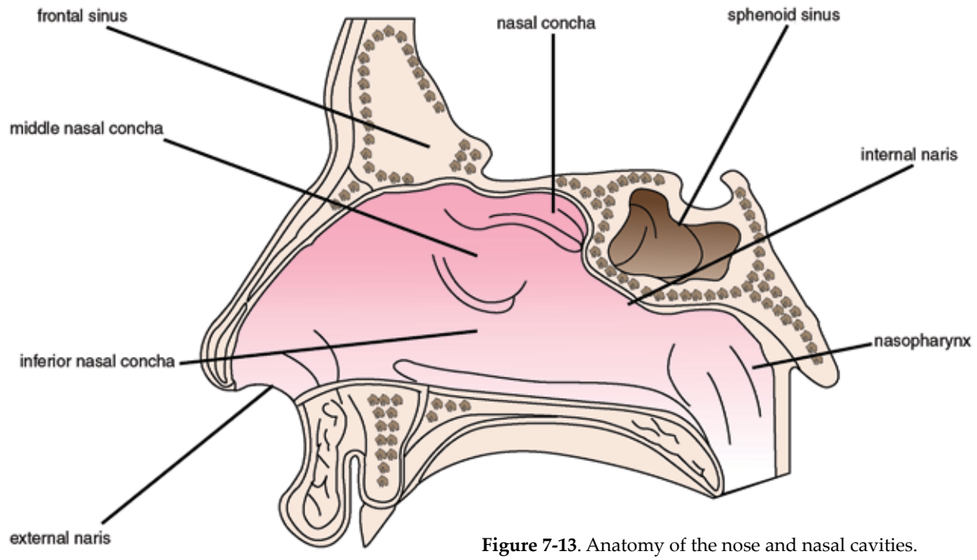

Figure 7-13. Anatomy of the nose and nasal cavities.

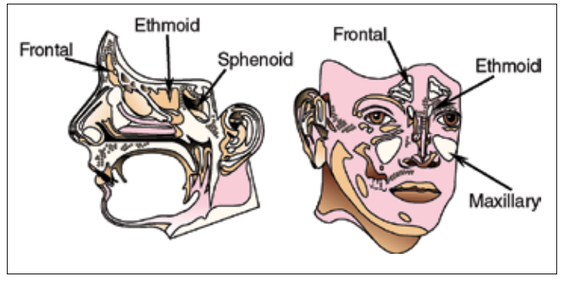

Figure 7-14. The sinuses. Note that frontal and sphenoid sinuses are not well developed in young children.

Warning: Fever of ≥ 100.4 °F, severe pain, visual changes, and mental or cognitive changes are sinus complaint RED FLAGS. The patient must see an MO immediately!

Common Complaints of the Nose and Sinuses

Epistaxis

A common complaint of the nose is **epistaxis** (nosebleed). Most nosebleeds occur in the front nasal passages. Some common causes of epistaxis include external trauma, nose picking, nasal infection from plucking nose hairs, vigorous nose blowing, and nasal mucosa drying. Epistaxis may be an early sign of a more significant illness, such as hypertension (high blood pressure) or a blood clotting disorder.

Management of Epistaxis. Controlling bleeding takes priority when treating epistaxis. The patient should sit up and lean forward. Direct the patient to tilt their head forward and pinch their entire nose firmly for 10 to 15 minutes. If this does not control the bleeding, a vasoconstrictive nasal spray, such as oxymetazoline nasal spray, or phenylephrine may also be used for periods not to exceed 3 days. To prevent recurrence when the cause is a dry nasal mucosa, the patient may be given antibiotic ointment to use as a protective coating for the nasal mucosa, or a saline nasal spray.

Exam for Epistaxis. Once the bleeding is stopped, gather a patient history (See Exhibit 7-1) and check the patient's blood pressure. If the patient has a history of multiple nosebleeds or a nosebleed that cannot be controlled, refer to an MO and gather information about family history of bleeding problems, patient medications (eg, aspirin or other nonsteroidal anti-inflammatory drugs), and any history of chronic illnesses that predispose the patient to nosebleeds (hypertension or blood clotting disorder).

Allergic Rhinitis

Rhinitis is an inflammation of the nasal membranes. Patients with rhinitis often have family histories of multiple allergic disorders, including hay fever (seasonal allergies or allergic rhinitis), asthma, and eczema. Allergens such as dust, dander, and pollen can cause the sensitized immune system to produces antibodies, which in turn cause chemicals called **histamines** to be released into the bloodstream. Histamines play a major role in many allergic reactions and cause numerous physiological events including dilation of blood vessels, increased vessel permeability, increased secretion of acid by the stomach, smooth muscle constriction, mucus production, tissue swelling, and itching.

Exam for Allergic Rhinitis. A patient with seasonal allergies may complain of congestion, fatigue, and an overall feeling of being unwell. Signs and symptoms manifest predominantly in the nose and eyes and vary in severity from person to person, but may include the following:

- sneezing,
- **pruritis** (swelling and itching of the affected tissue),
- **rhinorrhea**,
- nasal congestion,
- hives, and
- rashes.

Refer these patients to an MO.

Treatment for Allergic Rhinitis. Treatment is aimed at identifying and avoiding the allergen, if possible. If avoidance is not possible, treat according to the symptoms. Treat itching and sneezing symptomatically with an antihistamine. However, antihistamines can worsen nasal congestion because they dry out the nasal mucosa. Nasal saline will keep the inside of the nose moist. If eye irritation is significant, add an antihistamine eye drop (eg, tetrahydrozoline).

Decongestants can be used to treat nasal congestion. If nasal congestion is severe, a nasal decongestant spray may also be used for periods not to exceed 3 days.

Caution: Sedating antihistamines should be used cautiously. Any soldier who must operate heavy equipment or drive must not be under the influence of any drug that has a sedative effect.

Note: Antihistamines increase the risk of heat injury.

Sinusitis

Sinusitis (sinus infection) may be caused by anything interfering with airflow into the sinuses and drainage of mucus out of the sinuses. The sinus openings may be obstructed by swelling of the tissue lining and adjacent nasal passage tissue. The mucus-producing cells have small, hair-like fibers (cilia) that move back and forth to help the mucus move out of the sinuses. Cilia may be damaged by many irritants, especially smoke, which prevent them from helping mucus drain from the sinuses. Examples of causes for sinus pain or fullness include the following:

- common colds;
- allergies;
- tissue irritants (eg, cigarette smoke);
- obstruction by tumors or growths in the proximity of the sinus ostia;
- thickening of mucous secretions by decrease in the water content of the mucus, brought on by disease (ie, cystic fibrosis);
- drying medications (antihistamines); and
- lack of sufficient humidity in the air.

Inflammation or infection of the paranasal sinuses is known as acute sinusitis. Common causes of acute sinusitis include infection by a pathogenic microorganism (bacterial or viral) or an allergen. Patients may present with the following signs and symptoms:

- headache that will not go away or intensity that changes with head position,
- facial tenderness or pain,
- fever,
- cloudy or discolored nasal drainage,
- nasal stuffiness,
- sore throat,
- tooth pain,
- cough,
- increased sensitivity or headache when leaning forward, and
- fever in up to 25% of patients.

Exam for Acute Sinusitis. Physical examination shows tenderness to percussion over the frontal or maxillary sinuses. Allergic sinusitis or other associated allergy symptoms (eg, itchy eyes and sneezing) may be common. Tooth pain occurs because the sinuses are in close proximity to the tooth roots and nerves of the upper jaw. Sinus infection should be ruled out before referring the patient to dental. Patients with suspected sinusitis should be referred to an MO.

Treatment for Acute Sinusitis. Antibiotics and decongestants are prescribed to manage bacterial acute sinusitis, but antihistamines should be avoided because they dry the eustachian tubes and nasal mucosa and prevent proper drainage. Decongestants are recommended for viral sinusitis.

Check on Learning

7. What are the RED FLAGS when dealing with sinus complaints?
8. Which way should the head be tipped when treating epistaxis?
9. Hay fever is considered what type of rhinitis?

MOUTH AND THROAT

Anatomy and Physiology of the Mouth and Throat

The tongue, teeth, mouth, and gums are located in the anterior portion of the oropharynx (the whitish, hard, dome-shaped palate; the pinker soft palate should be **contiguous** with the hard palate). Figure 7-15 shows the anatomy of the mouth and throat. The vestibule is the space between the **buccal mucosa** and the outer surface of the teeth and gums. Mucous membranes should look pinkish-red, smooth, and moist. Gums should have a slightly pink appearance with a clearly defined, tight margin at each tooth. The tongue should appear dull red, moist, and glistening; it should be smooth with increasing roughness as it moves back into the throat. The back of the tongue is covered with **papillae**, giving it a roughened surface. Taste buds contain taste receptor cells known as gustatory cells and are located around the small structures known as papillae. Papillae are scattered over the upper surface of the tongue, soft palate, upper esophagus, cheek, and epiglottis.

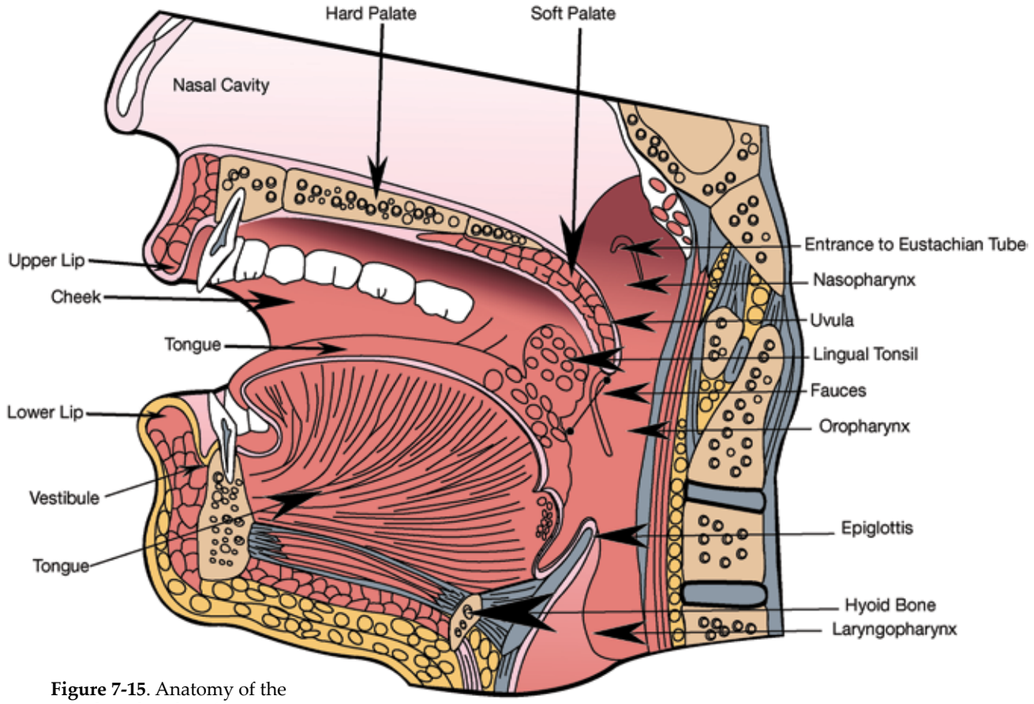

Figure 7-15. Anatomy of the mouth and oral cavity.

Examination of the Mouth and Throat

All physical exams begin with obtaining a history of the patient. See Exhibit 7-1 for the required data.

When conducting an exam of the mouth or throat, the patient should remove any dental appliances. Inspect and palpate the lips for symmetry, color, edema,

and surface abnormalities. Ask them to open their mouth, stick out their tongue, and say, "ahh." Use a tongue blade and bright light to inspect the mucous membranes, the entire mouth, teeth, posterior pharynx, and tonsils. Examine the mucosal membranes and tongue (which are normally pink and moist) for any ecchymosis, erythema, or lesions. Examine the posterior pharynx (consisting of the tonsils and uvula) for exudates, erythema, and lesions. Finally, inspect the uvula to ensure it is midline.

Warning: Difficulty breathing, difficulty swallowing, fever of ≥ 101 °F, tonsillar exudates, and midline deviation of uvula are RED FLAGS. The patient must see an MO immediately!

Common Complaints of the Mouth and Throat

Upper Respiratory Infection

A **URI** is an acute infection of the upper airway usually caused by viruses, and less frequently by bacteria. Patients may complain of the following:

- sore throat,
- congestion,
- discharge,
- sinus pressure,
- productive or nonproductive cough (if productive, sputum may be clear or purulent), and
- low-grade fever.

Exam for Upper Respiratory Infection. The pharynx may appear slightly reddened with mucous streaking. If the infection is contained in the upper respiratory tract, the lungs are clear to auscultation. Options for patient referral are based on the preferences of the MO and local SOP.

Treatment for Upper Respiratory Infections. Manage URI symptoms with cough suppressants, decongestants, and throat lozenges or sprays. Analgesics can be used for fever and body aches. Antibiotics are not indicated for most URIs because they are viral infections.

Streptococcal Pharyngitis

Streptococcal pharyngitis (strep throat) is an infection of the posterior pharynx or tonsils (Figure 7-16), typically caused by **group A streptococci (GAS) bacteria**. It is most common in the late fall, winter, and early spring. It is spread by person-to-person contact

Figure 7-16. A patient exhibiting tonsillar exudates who tested positive for streptococcal pharyngitis. Photograph by James Heilman, MD. Reproduced with permission from Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Pos_strep.JPG

with nasal secretions or saliva, often among family or household members. There are many strains of group A streptococcus bacteria. Some produce toxins that can lead to a deadly complication known as scarlet fever (thought to be an allergic reaction to the toxins), with a fatality rate up to 25% if untreated.

In some people, strep throat is very mild and manifests with only a few symptoms. In others, the infection is severe. Signs and symptoms begin 2 to 5 days after exposure, usually with a sudden onset, of fever that peaks on the second day, erythema, edema and/or exudates of the tonsils, **palatal petechiae**, pain, **odynophagia**, and cervical **lymphadenopathy.** Chief complaints of strep throat are listed in Exhibit 7-2.

Exam for Streptococcal Pharyngitis. Obtain a history. Refer patients with the previously listed signs and symptoms to an MO for treatment.

Treatment for Streptococcal Pharyngitis. Diagnosis is confirmed with a throat culture, but the MO may treat for this condition based on symptoms alone. Treatment requires antibiotics (penicillin has traditionally been recommended and is still very effective). Even though the sore throat usually gets better on its own, people who have strep throat take antibiotics to prevent more serious complications of the infection, including **rheumatic fever**, which can be fatal.

Exhibit 7-2. Strep Throat vs Mononucleosis

Strep Throat (bacterial)

- Mild to severe illness; few to all symptoms; sudden onset
- Treat with antibiotics (eg, penicillin)
- Severe sore throat
- Fever (peaking on 2nd day)
- Tender, swollen neck glands
- **Scarlet fever rash**
- **Malaise**
- Exudate (pus) and/or edema common on reddened tonsils and pharynx
- Headache
- Chills
- Nausea
- Erythema
- Palatal petechiae and pain
- Odynophagia (difficulty swallowing)

Mononucleosis (viral)

- Symptoms develop slowly
- Do not treat with penicillin or other antibiotics; treat symptoms
- Sore throat
- Fever
- Significant posterior lymph node enlargement of the neck
- Exhaustion
- Shaggy white-purple tonsillar exudate
- Common significant enlargement of lymph nodes and neck
- Abdominal pain may indicate inflammation of spleen

Infectious Mononucleosis

Infectious mononucleosis (mono) is a viral infection that presents as a sore throat. It is usually spread by person-to-person contact via saliva, and is commonly called "the kissing disease" from this prevalent form of transmission among teenagers. Mononucleosis is caused by the Epstein-Barr virus. This virus is spread by coughing or sneezing small droplets of infected saliva or mucus.

Exam for Infectious Mononucleosis. Signs and symptoms are listed in Exhibit 7-2 and include: sore throat; fatigue; significant posterior lymph node (gland) enlargement of the neck (Figure 7-17); shaggy, white-purple tonsillar exudates; and possibly abdominal pain (indicative of spleen inflammation). Patients with suspected infectious mononucleosis must be referred to an MO for treatment.

Treatment for Infectious Mononucleosis. A blood test (mononucleosis spot test) may be ordered, along with a throat culture to rule out streptococcal pharyngitis and confirm mononucleosis. See Exhibit 7-2 for a comparison of signs and symptoms of these two infections.

Note: Mono and strep throat have similar symptoms, but there is no abdominal pain with strep throat.

Treatment is symptomatic and may include use of throat lozenges, acetaminophen, decongestants,

Figure 7-17. Lymphadenopathy in a patient with mononucleosis. Photograph by James Heilman, MD. Reproduced with permission from Wikimedia Commons. https://commons.wikimedia.org/wiki/File:Lymphadanopathy.JPG

and sometimes short courses of oral steroids. Mono is a virus, so antibiotics are not indicated. Patients are advised to avoid excessive physical activity for at least 30 days after diagnosis due to the increased risk of splenic rupture, which causes fatal hemorrhage if not identified and treated. Most patients will be given a short convalescent leave to avoid spreading the disease and to reduce risk of potential complications.

Peritonsillar Abscess

Peritonsillar abscess (**PTA**) is a bacterial infection of the tonsils that spreads into a cellulitis and **abscess** in the throat tissues next to one of the tonsils. The abscess can cause pain and swelling and may occlude the airway. PTA usually results as a complication of streptococcal pharyngitis.

Exam for Peritonsillar Abscess. Signs and symptoms of PTA include the following:

- difficulty swallowing,
- muffled voice (often described as a "hot potato" voice that sounds as if the speaker has a mouthful of hot potato),
- severe sore throat that is isolated to one side (the abscess usually affects one side of the mouth, resulting in a tonsil deviating toward the midline) (Figure 7-18),
- fever,
- chills,
- ear pain on the same side as the abscess, and
- spasm in the muscles of the jaw or **trismus** (difficulty opening the mouth).

Figure 7-18. Right-sided peritonsillar abscess. Photograph by James Heilman, MD. Reproduced with permission from Wikimedia Commons. https://commons.wikimedia.org/wiki/File: PeritonsilarAbsess.jpg

Treatment for Peritonsillar Abscess. PTA is a surgical emergency that commonly requires urgent surgical drainage and antibiotic therapy. All patients exhibiting signs and symptoms of a PTA require immediate referral to an MO.

Check on Learning

10. What illness that manifests in the throat can cause an enlarged spleen?
11. Strep throat can progress to what fatal disease if left untreated?

SUMMARY

Primary care of the eyes, ears, nose, and throat begins with knowledge of their structures and functions. To recognize and accurately assess, treat, or refer these patients to an MO, clinical observation, accurate vital signs, and appropriate history taking are essential. Early assessment and treatment will reduce the amount of time soldiers are unable to perform their duties due to debilitating illness.

KEY TERMS AND ACRONYMS

Abscess. A local accumulation of pus anywhere in the body.
Anisocoria. Unequal pupils.
Battle's sign. The sign is named after William Henry Battle. It is an indication of a fracture of the middle cranial fossa of the skull, and may suggest underlying brain trauma. Battle's sign consists of bruising over the rounded protrusion of bone just behind the ear, as a result of leakage of blood along the path of the small artery between the cartilage of the ear and the mastoid process of the temporal bone along the lateral side of the head.
Buccal mucosa. The mucous membrane lining the inner surface of the lips and cheeks.
Cerumen. A substance secreted by glands at the outer third of the ear canal; earwax.

Cilia. Threadlike projections from the free surface of certain epithelial cells such as those lining the trachea, bronchi, and some reproductive ducts that propel or sweep materials, such as mucus or dust, across a surface.
Cone of light. Reflection of light from the otoscope, resembling a cone shape, which is visualized on a healthy tympanic membrane during otoscopic exam.
Contiguous. In contact; touching along the side or boundary.
Epistaxis. A nosebleed.
Eustachian tube dysfunction. Any condition that prevents the eustachian tube from equalizing middle ear pressure with outer ear pressure.
Exudate. Any fluid released from the body with a high concentration of protein, cells, or solid debris; usually the result of inflammation.
Group A streptococci (GAS). Gram-positive coccal-shaped bacteria that appear usually as a chain of two or more bacteria, with molecules on their surface known as Lancefield group A antigens. Organisms are normally spread by direct human-to-human contact; however, they can occasionally be spread by droplets or by contact with items recently handled by an infected individual.
Histamine. A compound stored in mast cells that plays a major role in many allergic reactions. Histamine release is part of the natural allergic response that allows for greater capillary permeability to aid in phagocytosis.
Hordeolum (stye). A localized, inflamed bump that forms on or in the eyelid as the result of a blocked gland.
Lesion. Any abnormal change involving any tissue or organ due to disease or injury. Lesions vary in severity from harmless to serious.
Lymphadenopathy. Enlargement of lymph nodes greater than 1.5 cm.
Malaise. A subjective sense of discomfort, weakness, fatigue, or feeling run down that may occur alone or accompany other symptoms and illnesses.
Meatus. The opening to the external auditory canal.
Odynophagia. Pain on swallowing.
Ossicles. Any small bone, such as the tiny bones within the human ear.
Otolith organs. Sensory organs in the ear that detect linear acceleration.
Palatal petechiae. Small red or purple spots on the palate (less than 3 mm in size), caused by tiny minor bleeding from broken capillary beds.
Papillae. Tiny bumps that give the tongue its rough texture.
PERRL. Pupils equal, round, regular, and reactive to light.
Pruritus. Itching.
PTA. Peritonsillar abscess.
Purulent. A pus-like fluid.
Rheumatic fever. A multisystem, febrile inflammatory disease that is a delayed complication of untreated group A streptococcal pharyngitis.
Rhinorrhea. A runny nose.
Scarlet fever rash. A rash that starts on the trunk and spreads to the arms and legs. It looks like sunburn, but it feels rough like sandpaper. The rash may be redder in skin folds. As the rash starts to go away, the skin may peel.
Tinnitus. A subjective ringing, buzzing, tinkling, or hissing sound in the ear that can range from minor irritation to debilitating noise.
Trismus. The tonic contraction of the muscles of the jaw, which can be caused by trauma, diseases such as tetanus, mouth infections, encephalitis, and salivary gland inflammation.
URI. Upper respiratory infection**; i**nfection of the air passages of the nose, throat, or bronchial tubes.
Valsalva maneuver. A movement or procedure in which one tries with force to exhale with the windpipe closed, impeding the return of venous blood to the heart.
Vertigo. A feeling of spinning movement, sometimes accompanied by nausea and vomiting; usually described by patients as dizziness or lightheadedness.

CHECK ON LEARNING ANSWERS

1. What medical condition is described as an inflammation of oil or sweat glands on the eyelid?
   Stye or hordeolum.
2. Is 20/15 vision better or worse than 20/20?
   Better.
3. Which structure in the eye has cone and rod cells?
   Retina.
4. Valsalva maneuver is contraindicated in which patients or casualties?
   Cardiac or respiratory.
5. What does TM stand for?
   Tympanic membrane.
6. The eustachian tube runs from the back of the ear to the back of the _____.
   Nasopharynx.
7. What are the RED FLAGS when dealing with sinus complaints?
   Fever ≥ 100.4 °F.
8. Which way should the head be tipped when treating epistaxis?
   Down.
9. Hay fever is considered what type of rhinitis?
   Allergic.
10. What illness that manifests in the throat can cause an enlarged spleen?
    Mononucleosis.
11. Strep throat can progress to what fatal disease if left untreated?
    Rheumatic fever.

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