Congenital malformations of ear: microtia — characterized by small external ear and auricle or rudimentary cartilage; may be associated with hemifacial microsomia, hypoplasia of zygoma, asymmetry of mandible, or obstruction of upper airway; stenosis or absence of external auditory canal (EAC) — may be difficult to see tympanic membrane (TM); complete conductive hearing loss (CHL) possible; atresia of canal may be associated with abnormalities of middle ear and ossicles; preauricular sinuses and pits — found in front of ear above tragus; pits may become inflected or drain squamous debris and may require incision and drainage with antibiotics, or excision; may be associated with branchiootorenal syndrome; hearing and renal function should be checked

Otitis externa: etiology — acute infection from local trauma or aggressive cleaning can cause acute inflammation and infection; common pathogens Pseudomonas and Staphylococcus spp.; patients have acute pain and sometimes discharge; differential diagnosis includes mastoiditis; mastoiditis characterized by swelling over postauricular area; patients with otitis externa (OE) have pain on palpation of tragus; acute swelling may compromise examination of canal; prevention — blow dryer may keep ear canal dry; moisture alkalinizes canal, promoting bacterial infection; treatment — treatment with antibiotic drops may precipitate fungal infection; placing Oto-Wick (small sponge) in stenotic EAC for 48 hr facilitates delivery of topical medication

Foreign body in EAC: canal has hourglass shape; lateral canal near meatus has larger diameter than midpoint; objects pushed past narrowest portion may swell with moisture and become entrapped; may present with hearing loss, infection, or pain; foreign body (FB) in bony portion sometimes painful to remove; hooks may be placed beyond FB to pull it laterally; removal may require general anesthesia

Hematoma of external ear: “wrestler’s ear” occurs when hematoma forms between cartilage and perichondrium; if untreated, death of cartilage may cause deformed, “cauliflower” ear; treated with incision, drainage, and placement of bolster for 1 wk to prevent reaccumulation of hematoma; untreated hematoma may result in abscess

Acute otitis media (AOM): often associated with viral upper respiratory tract infection (URI) with occlusion of eustachian tube (ET); negative pressure allows organisms from nasopharynx to migrate into middle ear; microcilia in ET become dysfunctional; common pathogens include Streptococcus pneumoniae, nontypeable Haemophilus influenzae, and Moraxella catarrhalis; however, introduction of pneumococcal vaccine (Prevnar) has decreased streptococcal infections, so H influenzae now common pathogen; diagnosis — AOM characterized by bulging TM with purulent effusion; diagnosis requires presence of fluid in middle ear; management depends on age; 6 to 23 mo of age — children should receive antibiotics if severe illness lasts >48 hr, temperature >39°C, or AOM bilateral; otherwise, may treat with analgesics and evaluate in 48 to 72 hr; 60% to 70% of AOM resolves without antibiotics; effusion of middle ear clears within 1 mo in 50% of children, 2 mo in 80%, and 3 mo in 90%; >24 mo of age — may observe for 48 to 72 hr if no signs of acute infection; antibiotic indicated if symptoms persist; antibiotics — amoxicillin first-line therapy in child with nonrecurrent AOM who has not used amoxicillin in last 30 days; second-line therapy β-lactam antibiotic such as amoxicillin/clavulanate (Augmentin) or second-generation cephalosporin; children with allergy to penicillin treated with clindamycin and third-generation cephalosporin; 20% to 30% of nontypeable H influenzae and ≈100% of M catarrhalis that cause AOM produce β-lactamase; complications — acute mastoiditis presents with postauricular swelling, erythema, and sometimes fluctuant mass due to subperiosteal abscess; ear may be displaced forward; if mastoiditis suspected, computed tomography (CT) indicated to evaluate bone; treated with incision, drainage, and placement of tympanostomy tube (TT); if cortex of mastoid eroded, simple mastoidectomy required; recurrent AOM — treated with TT; season of year, exposure to smoke, and day care associated with recurrent disease; preventing recurrence — child should receive influenza vaccination and avoid exposure to tobacco smoke; nonacute otitis media (OM) with effusion — usually follows acute viral URI; risk factors include passive exposure to smoke; treated with observation; antihistamines, decongestants, and systemic and nasal steroids not recommended; TT should be considered if hearing, speech, or language affected in child with effusion lasting ≥3 mo; otherwise, child may be followed; abnormal behavior or development should prompt consideration of TT in child with chronic effusion; in chronic effusion, bacteria not always found in middle ear; recurrent AOM with effusion — defined as 3 episodes of AOM in 6 mo, or 4 episodes in 1 yr with most recent episode within past month; examiner should ensure that effusions resolve between episodes of AOM; prophylactic antibiotics not recommended; TT appropriate if patient exposed to smoke or in day care; breastfeeding reduces risk for recurrent OM; using pacifier after 1 yr of age may increase risk for recurrent AOM

Educational Objectives

The goal of this program is to improve diagnosis and treatment of common pediatric disorders of the ear and sinuses. After hearing and assimilating this program, the clinician will be better able to:

1. Manage a child with acute otitis media.
2. Recommend age-appropriate hearing tests for children.
3. Diagnose a child with ear pain.
4. Safely remove a foreign body from the ear of a child.
5. Discuss ear and sinus complications of pediatric facial fractures.

Faculty Disclosure

In adherence to ACCME Standards for Commercial Support, Audio Digest requires all faculty and members of the planning committee to disclose relevant financial relationships within the past 12 months that might create any personal conflicts of interest. Any identified conflicts were resolved to ensure that this educational activity promotes quality in health care and not a proprietary business or commercial interest. For this program, members of the faculty and planning committee reported nothing to disclose.
Otorrhea: may be caused by chronic OE, or perforation of TM with chronic suppurative OM or cholesteatoma; cholesteatoma — squamous epithelial cyst associated with enzymatic material that may destroy TM and erode ossicles and intracranial structures; congenital cholesteatoma — presents as pearl-like mass in anterior mesotympanum with intact TM; epithelial rests left over as skin of canal migrates toward middle ear; should be excised via TM; acquired cholesteatoma — more common; due to chronic perforation of TM; may be well-organized, cyst-like mass, or appear as flaky, diffuse squamous epithelium; untreated cholesteatoma may cause infection, loss of hearing, or intracranial complications; retraction cholesteatoma — related to prolonged abnormality of ET; as TM retracts, squamous epithelium in retraction pocket may organize into cholesteatoma; most common sites pars flaccida and posterosuperior aspect of TM; pars flaccida superior to lateral process of malleus; pars tensa larger segment of TM inferior to lateral process of malleus; managed by managing middle ear; mastoidectomy required if cholesteatoma extends into mastoid; large cholesteatomas may require >1 surgical procedure

Myringotomy with TT placement: indications for TT recurrent AOM and persistent effusion; in child with AOM refractory to medical management, culture may be obtained by tympanocentesis; complications of tympanocentesis pain and bleeding; sequelae of TT include otorrhea and persistent perforation of TM; otorrhea common and managed with topical antibiotic; oral antibiotics and earplugs not recommended; persistent perforation occurs in 2% to 16% of ears after extrusion of TT; long-duration TT associated with higher rates of persistent perforation (>15%)

Inner ear: balance problems associated with persistent fluid in middle ear after AOM; may improve when effusion treated; benign paroxysmal positional vertigo — patients have vertigo and imbalance with change from lying to sitting position; caused by dysfunction of otoliths; maneuvers used to reposition otoliths; vestibular problems — evaluation sometimes difficult in young children; children should also be evaluated for neurologic conditions; in older children, may ask about sense of environmental motion and lightheadedness; underlying cardiac problems or positional hypotension possible; viral labyrinthitis — may last for several weeks; presents with persistent instability; physical examination should evaluate lateral nystagmus; electronystagmography used in older children; tumors — rare cause of acute unilateral hearing loss; temporal bone and brainstem should be imaged

Hearing assessment: all newborns should be screened before discharge; may test for spontaneous otoacoustic emissions generated by hair cells of cochlea or use brainstem auditory evoked response (BAER) test; BAER evaluates integrity of auditory pathway from inner ear to brainstem but does not assess hearing; in children ≥7 mo of age, behavioral audiometry possible; by 2 yr of age, visual enforcement audiometry may be used to test ears separately

Types of hearing loss: audiometric testing distinguishes between sensorineural hearing loss (SNHL) and CHL; CHL indicates abnormality of TM or ossicles; SNHL indicates abnormality of cochlea or auditory nerve; pure CHL, cochlea and auditory nerve normal; SNHL congenital or acquired; congenital abnormalities may be genetic and may be syndromic or isolated; hereditary nonsyndromic hearing loss most common recessive hearing loss; hearing loss may progress in children born with impaired hearing

Traumatic hearing loss: may occur after trauma to TM or ossicles after insertion of FB; chronic suppurative OM may destroy ossicles or cause meningitis; CHL caused by effusion in middle ear resolves; child may need surgery to replace ossicle; basilar skull fracture may involve ossicles and cause hemotympanum or acute facial weakness

Management of hearing loss: children with effusion should be followed for CHL and reassessed when effusion resolves; children with bilateral SNHL need genetic testing and imaging of temporal bone; hearing aid — should be provided when diagnosis made; cochlear implants — used for profound hearing loss; children who do not benefit from hearing aids should receive cochlear implants; surgical intervention — in addition to procedures to open ear canal and reconstruct ossicles, children with CHL due to atresia of ear canal may receive bone-anchored or soft band hearing aid

Complications of AOM: mastoiditis — middle ear continuous with mastoid air cells; fluid in cells does not necessarily represent infection; mastoiditis often follows AOM; CT can detect pus in epidural space; facial paralysis — in 15% of temporal bones, part of VII not fully encased in bone and vulnerable to inflammation; ear should be examined in any patient with facial weakness

Pain in ear: AOM, acute pharyngeal infections, and OE present with pain; pain upon palpation of tragus and swelling of ear canal typical for OE but not AOM; abnormalities of temporomandibular joint — palpable on examination; opening jaw may cause pain; joint may pop

Choanal atresia: stenosis of posterior nasal cavity causes acute airway crisis at birth; in normal cavity, bilateral suction catheters passed through nasal cavity emerge in posterior pharynx; holding mirror in front of nares confirms movement of air through nose; caused by bony or membranous obstruction; axial CT reveals patency of choanae; nose should be suctioned before doing CT; associated with other congenital abnormalities; piriform aperture stenosis also causes nasal obstruction

Epistaxis: most children have no hematologic abnormality; bleeding usually from anterior aspect of nasal septum due to prominent nasal vessels; children with recurrent episodes should be screened for hematologic problems; primary etiology local trauma to nose; managed with behavioral therapy or moisturizing lubricants; vessels may be treated with silver nitrate or electrocautery in office or under anesthesia

Chronic rhinitis: allergic — associated with ocular pruritus, sneezing, family history of allergy, and season of year; FB — suspected in children with unilateral rhinorrhea and no evidence of URI; button-shaped batteries can cause significant mucosal damage and should be removed emergently; infectious — usually bilateral with purulent discharge and sometimes cough and fever; polypos — less common in children than adults and should prompt evaluation for cystic fibrosis; sweat chloride test confirmed by genetic testing; older children with polypos may have allergy; unilateral polypl may be antrochoanal (poly in maxillary sinus that migrates into nasal cavity); children should undergo complete physical examination and CT; URI — clinical findings used to differentiate between viral and bacterial infection; viral URI improves in 5 to 6 days

Nasal trauma: hematoma of nasal septum caused by blood between periosteum and cartilage of septum; may lead to loss of cartilage and saddle nose deformity if untreated; examiner should look for other facial fractures or crepitance; open fractures of nose require cleansing and antibiotics; hematoma presents with bilateral nasal obstruction and fullness in septum; if otoscope does not transilluminate septum, hematoma should be suspected and drained; if no hematoma present but nasal bone fractured, child may be assessed in 5 to 7 days after edema resolves; if required, closed reduction optimally performed in 5 to 7 days

Nasal FB: characterized by unilateral obstruction, no evidence of URI, unilateral rhinorrhea, and foul-smelling discharge; general anesthesia may be required for removal; FB usually found along floor of nose; removed under direct vision; decongestant can reduce edema and facilitate removal

Obstructing adenoids: evaluated with flexible telescope; radiograph of lateral neck may show adenoidal tissue in nasopharynx; neither method of diagnosis 100% specific or sensitive;
Adenoidal obstruction should be suspected in children with persistent mouth breathing.

Paranasal sinuses: newborns have ethmoid, maxillary, and sphenoid sinuses; pneumatization of frontal sinuses occurs with aging.

Acute sinusitis: usually follows acute URI; nonspecific findings include discharge, mucosal edema, cough, and sometimes fever; imaging only indicated if complications present; symptoms lasting >1 wk suggest sinusitis; discoloration of nasal secretions not required for diagnosis; management — treated with amoxicillin; typical organisms S pneumonieae and non-typeable H influenzae; treatment should continue for 10 days; if patient used amoxicillin within last 30 days, may be treated with amoxicillin/clavulanate or second-generation cephalosporin; saline irrigation helpful; benefits of antihistamines and decongestants unproven; complications — more common in adolescents; CT or MRI indicated to look for intracranial complication if change in sensorium, significant headache, or high fever.

Chronic sinusitis: characterized by signs and symptoms lasting >3 mo; treated with longer course of antibiotic such as high-dose amoxicillin, amoxicillin/clavulanate, or second-generation cephalosporin; patients allergic to penicillin may take clindamycin and third-generation cephalosporin; treatment should continue for 1 wk after symptoms resolve; patients refractory to oral antibiotics should undergo imaging; evaluation for allergy and immunologic abnormalities advisable; children with refractory chronic sinusitis may benefit from adenoidectomy.

Sinus trauma: child with midface trauma may have maxillary fracture; frontal most common sinus requiring surgical intervention in children with facial fracture; fracture of frontal sinus requires intervention to prevent mucocele; fracture of posterior frontal sinus associated with intracranial infection; children with severe trauma to forehead need CT to evaluate frontal sinus.

Acknowledgments

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Suggested Reading


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Estimated time to complete the educational process:

- Review Educational Objectives on page 1: 5 minutes
- Take pretest: 10 minutes
- Listen to audio program: 60 minutes
- Review written summary and suggested readings: 35 minutes
- Take posttest: 10 minutes

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Remarks represent viewpoints of the speakers, not necessarily those of the Audio Digest Foundation.

1. Which bacterial genus is commonly associated with otitis externa (OE)?
   - (A) *Streptococcus*
   - (B) *Pseudomonas*
   - (C) *Moraxella*
   - (D) *Haemophilus*

2. A 1-yr-old with acute otitis media (AOM) may be observed without antibiotic treatment if he has:
   - (A) Temperature of 39.5°C
   - (B) Illness lasting 3 days
   - (C) Middle ear effusion
   - (D) Bilateral disease

3. Select the best treatment for a child with nonrecurrent AOM who requires treatment and has used amoxicillin within the last 30 days.
   - (A) Amoxicillin
   - (B) Clindamycin
   - (C) Second-generation cephalosporin
   - (D) Third-generation cephalosporin

4. What is the preferred treatment for nonacute otitis media with effusion?
   - (A) Observation
   - (B) Antihistamines
   - (C) Decongestants
   - (D) Antibiotics

5. A child with tympanostomy tubes who develops otorrhea should be treated with:
   - (A) Topical antibiotics
   - (B) Systemic antibiotics
   - (C) Earplugs when exposed to water
   - (D) Corticosteroids

6. Which test is used to screen hearing in a newborn?
   - (A) Brainstem auditory evoked response
   - (B) Behavioral audiometry
   - (C) Visual enforcement audiometry
   - (D) Spontaneous otoacoustic emissions

7. In a child presenting with ear pain, pain upon palpation of the tragus suggests:
   - (A) Abnormality of temporomandibular joint
   - (B) AOM
   - (C) OE
   - (D) Congenital anomaly

8. In a child, unilateral rhinorrhea without evidence of an upper respiratory infection suggests a diagnosis of:
   - (A) Midface fracture
   - (B) Antrochoanal polyp
   - (C) Infection
   - (D) Foreign body

9. Initial evaluation of a young child with nasal polyps should include all of the following, except:
   - (A) Allergy testing
   - (B) Sweat chloride test
   - (C) Complete physical examination
   - (D) Computed tomography

10. Which sinus most commonly requires surgical intervention in children with facial trauma?
    - (A) Ethmoid
    - (B) Frontal
    - (C) Maxillary
    - (D) Sphenoid

Answers to Audio Digest Otolaryngology Volume 47, Issue 21: 1-C, 2-A, 3-D, 4-B, 5-A, 6-B, 7-D, 8-A, 9-D, 10-C