Learning Objectives

1. Recognize the diagnosis and management of acute and chronic otitis media, acute and chronic sinusitis, and vertigo.

2. Identify ancillary tests including tympanometry and imaging studies in the appropriate clinical situation.

1. A 2-year-old male patient of yours is brought into your office by his mother for fever, cough and left earache. He is afebrile in your office, playful and interactive. When you examine his ear, the tympanic membrane is erythematous, but freely mobile by pneumatic otoscopy. Your diagnosis is:

A. Acute Otitis Media
B. Otitis media with effusion
C. URI
D. Ramsay Hunt syndrome

Diagnosis of Acute Otitis Media

- Must use stringent criteria
  - Ensure appropriate treatment
  - Avoid overuse of antibiotics
- Two required elements to make the diagnosis
  - Presence of a middle ear effusion
  - Acute signs of middle ear inflammation

Diagnosis of Middle Ear Effusion

- Decreased or absent mobility of TM
  - Pneumatic otoscopy – most reproducible method
  - Must have an air seal in canal and no air leaks in the system
    - Squeezing the bulb -> positive pressure
    - Releasing the bulb -> negative pressure
  - Tympanometry
2. The best and most reproducible sign of acute inflammation of the middle ear is:

A. Erythema of the TM  
B. Bulging of the TM  
C. Opaque TM  
D. Immobility of the TM

48%   18%   29%   6%

Diagnosis of Middle Ear Inflammation
- Bulging and fullness of the TM
- Bullae on the TM
- Acute purulent otorrhea (not from otitis externa)
- Marked erythema...BUT...
  - An erythematous TM in the absence of bulging or immobility of the TM has only a 15% PPV for AOM  
  - An erythematous TM can be caused by fever, crying, and URI

Otitis Media with Effusion (OME)
- Signs of middle ear fluid  
  - Impaired TM mobility  
  - Air fluid levels  
  - Bubbles  
  - Amber or blue color  
- Absence of signs of acute inflammation

AOM vs OME
- Bulging TM  
- TM red or yellow  
- Pus, otorrhea, or bullae
- Retracted or neutral TM  
- TM amber or blue  
- Air fluid levels or bubbles

Tympanometry
- Quantifies pneumatic otoscopy
- Should be used with pneumatic otoscopy and is considered optional
- Measures:
  - Ear canal volume (cm³)  
  - Compliance (cm³)  
  - Pressures
Tympanometry
- Type A curve
  - Normal compliance and pressures

From: Wikimedia/www.drtbalu.com

Tympanometry
- Type B curve
  - Decreased compliance
  - MEE
  - Stiff TM from
    - Scarring
    - Tymanosclerosis
    - Cholesteatoma
    - Tumor

From: Wikimedia/www.drtbalu.com

Tympanometry
- Type C curve
  - Negative pressures
  - Retracted TM
  - Eustachian tube dysfunction

From: Wikimedia/www.drtbalu.com

3. A 22-month-old female patient is brought to you crying and in obvious acute distress from right ear pain. She has a fever of 103.6°F, and has an immobile, bulging erythematos right TM. The best treatment option would be:

A. Start antibiotics immediately
B. Do not use antibiotics because this is probably a viral illness
C. Have the parents observe for 24-48 hours and treat with antibiotics if the child does not improve
D. Treat with anesthetic ear drops alone

Treatment of AOM
- Pain control
  - Use ibuprofen or acetaminophen
  - Anesthetic ear drops
- Decongestants/Antihistamines
  - Not proven to help
  - Increased side effects
  - May relieve nasal congestion

© American Academy of Family Physicians. All Rights Reserved.
Treatment of AOM

- Three bacterial pathogens
  - S. pneumoniae
  - H. influenzae
  - M. catarrhalis

- Antibiotics or Observation?
  - First studies out of Europe
  - Concerns about overusage of antibiotics
  - Several meta-analyses suggest most children do well without ATBs
    - 61% resolve symptoms within 24 hours

61% resolve symptoms within 24 hours

Treatment of AOM 2004 AAP/AAFP Guideline

- <6 months old – all get ATBs
- 6 months – 2 years old
  - ATBs if diagnosis of AOM certain OR
  - Diagnosis uncertain and illness severe
  - “Severe” defined as moderate to severe otalgia or fever ≥39°C
  - Observation is an option if diagnosis not certain and illness not severe


Treatment of AOM 2004 AAP/AAFP Guideline

- >2 years old
  - ATBs if diagnosis of AOM certain AND illness severe
  - Observation is an option if:
    - Diagnosis certain but illness not severe or
    - Patients with an uncertain diagnosis

Observation of AOM 2004 AAP/AAFP Guideline

- Observation is only appropriate if follow-up can be ensured and ATBs started if symptoms worsen or persist
  - Follow-up visit at 48-72 hours
  - Phone call at 48-72 hours
  - Prescription that can be filled if child not improved at 48-72 hours

4. The same 22-month-old female patient weighs 17kg (37LB.). Which of the following would be the appropriate dosage of amoxicillin for this child?

A. 375 mg/day
B. 500 mg/day
C. 750 mg/day
D. 1000 mg/day
E. 1500 mg/day
Antibiotics for AOM
2004 AAP/AAFP Guideline

- Amoxicillin 80-90 mg/Kg per day
- Amoxicillin-clavulanate for those
  - Treated with ATBs in last 30 days
  - With concurrent conjunctivitis (H. influenzae)
  - Taking prophylactic amoxicillin for recurrent AOM

Antibiotics for AOM
2004 AAP/AAFP Guideline

- Penicillin allergy - No urticaria or anaphylaxis (Non-type 1)
  - Cephalosporins
    - Cefdinir (Omnicef) 14 mg/Kg per day
    - Cefpodoxime 10 mg/Kg per day
    - Cefuroxime (Ceftin) 30 mg/Kg per day
    - Ceftriaxone (Rocephin) 50 mg/Kg IM/IV

Antibiotics for AOM
2004 AAP/AAFP Guideline

- Penicillin allergy with urticaria or anaphylaxis (Type 1)
  - Macrolides
    - Erythromycin + sulfisoxazole
    - Azithromycin (30 mg/Kg single dose)
    - Clarithromycin
  - Clindamycin
  - Not recommended due to resistance
    - Trimethoprim-sulfamethoxazole
    - Levofloxacin

Antibiotics for AOM
2004 AAP/AAFP Guideline

- Duration of treatment
  - 10-day course of antibiotics
    - Children ≥6 years old may be treated for 5-7 days
    - Poor quality studies on shorter courses of antibiotics in AOM

Follow-up for AOM

- Monitor middle ear effusion (MEE)
- Does not mean treatment failure
  - 70% had MEE after two weeks
  - 40% after one month
  - 20% after two months
  - 10% after three months
- Follow-up recommended at 8-12 weeks
- Monitor for hearing, language and learning problems – refer for ventilation tubes

5. Which of the following is the most common cause of recurrent and persistent acute otitis media in children?

A. Haemophilus influenzae
B. Penicillin-resistant Streptococcus pneumoniae
C. Moraxella catarrhalis
D. Staphylococcus aureus
5. Which of the following is the most common cause of recurrent and persistent acute otitis media in children?

- A. *Haemophilus influenzae* (28%)
- B. Penicillin-resistant *Streptococcus pneumoniae* (52%)
- C. *Moraxella catarrhalis* (14%)
- D. *Staphylococcus aureus* (9%)

### Persistent AOM
- No improvement in 48-72 hours
- Must be reassessed to confirm diagnosis
- Switch to second-line ATB – assume resistant bacteria

### Recurrent AOM
- Antibiotic prophylaxis
  - No widely accepted recommendations
  - May reduce recurrences
- Minimize risk factors
  - Exposure to cigarette smoke
  - Pacifier, bottle-feeding
  - Daycare attendance

### Rhinosinusitis
- **Classification**
  - Acute – < 4 weeks
  - Subacute – 4-12 weeks
  - Chronic – > 12 weeks
- **Acute rhinosinusitis**
  - Viral is most common etiology
  - Bacterial rhinosinusitis – 0.5-2%
Indicators of Bacterial Rhinosinusitis

- Duration of seven or more days
- Purulent nasal discharge
- Maxillary tooth or facial pain
- Unilateral maxillary sinus tenderness
- Worsening of symptoms after initial improvement

Non-Helpful Tests

- Transillumination of sinuses
- Viral or bacterial cultures (except endoscopic)
- Sinus x-rays
- Sinus CT scans
- MRI or Ultrasound

Treatment of Viral Rhinosinusitis

- Self-limited disease – treatment does not shorten the course
- Analgesics (NSAIDs, Acetaminophen)
- Saline nasal sprays (irrigation)
- Topical nasal steroids
- Topical decongestants
- Topical ipratropium (Atrovent)
- Mucolytics (guaifenesin)
- Antihistamines may over-dry and increase discomfort
- Zinc preparations show no benefit

Treatment of Bacterial Rhinosinusitis

- To treat, or not to treat???
- Observation OR antibiotics acceptable for patients with mild symptoms for 10 or more days
- High rate of spontaneous resolution
- Observation should include supportive treatment for seven days

Antibiotics for Bacterial Rhinosinusitis

- Empiric antibiotics if in moderate to severe pain and fever >101°F
- Empiric antibiotics if worsens or does not improve after seven days of observation
- Newer broad-spectrum antibiotics offer no advantage
- Amoxicillin 500 mg TID x 10-14 days

Antibiotics for Bacterial Rhinosinusitis

- Trimethoprim-sulfamethoxazole or erythromycin equally good choices
- 15-20% penicillin resistance
  - Use broader spectrum if symptoms persist on amoxicillin
  - Amoxicillin-clavulanate
  - Cefpodoxime, cefdinir, cefuroxime
Treatment of Bacterial Rhinosinusitis

- Adjunctive therapy as for AVRS
- Nasal steroids
  - Reduces inflammation and swelling of nasal mucosa
  - Meta-analysis showed increased symptom response, especially milder disease

7. A 57-year-old female patient of yours presents with dizziness and a sensation that she is spinning. It occurs when she turns in bed or lifts her head to look in an upper cabinet. Episodes are brief but are becoming more frequent. She has no tinnitus or hearing loss. The most likely diagnosis would be:

A. Meniere's Disease
B. Benign paroxysmal positional vertigo
C. Vestibular neuronitis
D. Acoustic neuroma

Vertigo

- Illusion of movement
  - Spinning, tilting, swaying
  - Subjective or objective (patient or environment)
- Must be distinguished from pre-syncopal faintness and dysequilibrium
- Central and Peripheral causes

Peripheral Vertigo

- Benign paroxysmal positional vertigo
  - Canalithiasis
  - Brief spinning spells (seconds) when head moved
  - Nausea, but rarely vomit
  - No hearing loss, ear pain or tinnitus
- Vestibular Neuronitis
  - Viral or post-viral inflammation of labyrinth
  - Sudden onset of severe, persistent vertigo; nausea and vomiting; and gait instability
  - With unilateral hearing loss, it is called "labyrinthitis"
  - Last 1-2 days before resolution
  - Must be distinguished from cerebellar hemorrhage/infarct

- Herpes Zoster Oticus (Ramsay Hunt Syndrome)
  - Herpes infection of geniculate ganglion
  - Acute vertigo, hearing loss, ipsilateral facial paralysis and zoster vesicles in canal and auricle
  - Treat with antivirals, ?steroids?
- Meniere's Disease
  - Endolymphatic Hydrops
  - Spontaneous episodes of vertigo lasting minutes to hours
  - Associated with tinnitus, hearing loss and ear fullness
Peripheral Vertigo

- Labyrinthine concussion
- Perilymphatic fistula
  - Vertigo and/or hearing loss stimulated by sneezing, coughing, lifting, straining
  - “Tullio Phenomenon” – vertigo from loud noises
- Acoustic neuroma
  - Vertigo is minor, tinnitus and hearing loss are main complaints
- Aminoglycoside toxicity

Central Vertigo

- Migrainous vertigo
  - Often associated with headache
- Wallenberg’s syndrome
  - Lateral medullary infarction
  - Posterior inferior cerebellar artery from vertebral artery
  - Vertigo, ipsilateral Horner’s syndrome, ipsilateral limb ataxia, hoarseness and dysphagia
  - Loss of pain and temperature sensation on ipsilateral face and contralateral trunk
- Cerebellar hemorrhage or infarction
  - Sudden intense vertigo and vomiting
  - Markedly impaired gait – falls to the side of the lesion
  - Nystagmus away from the lesion
  - Confused with vestibular neuronitis, but gait more disturbed
- Chiari malformation
  - Congenital protrusion of cerebellar tonsils through the foramen magnum
  - Positionally induced vertigo
  - Headache, long tract signs and lower cranial nerve involvement
- Cerebellopontine angle tumors
- Multiple sclerosis
- Drug-induced vertigo

Evaluation of Vertigo

- Careful history
- Neurological exam
- Lab tests help < 1% of the time
- MRI if imaging necessary
- Dix-Hallpike Maneuver
  - [http://www.aafp.org/afp/20050315/1115.html](http://www.aafp.org/afp/20050315/1115.html)
Treatment of Vertigo

• Medications
  – Most useful for vertigo that lasts hours or days – not BPPV
  – Lots of sedation as well as risk of falls and urinary retention in older patients
  – Anticholinergics - scopolamine
  – Antihistamines – meclizine, dimenhydrinate
  – Phenothiazines – promethazine, metoclopramide
  – Benzodiazepines – diazepam, lorazepam

Treatment of Vertigo

• Vestibular Rehabilitation (PT)
• CNS compensation for peripheral vestibular injury - ? Central ?
• When started early, balance and function are improved compared to controls
• Home exercises also effective

Benign Paroxysmal Positional Vertigo

• Medications generally not helpful
• Canalith repositioning – Epley Maneuver

Answers

1. C
2. B
3. A
4. E
5. B
6. C
7. B