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## BASIC INFORMATION



### DEFINITION

Otitis media is inflammation of the mucoperiosteal lining of the middle ear cavity. Otitis media may be described as suppurative or serous and as acute or chronic. Complications include extension into the adjacent mastoid air cells, resulting in mastoiditis or perforation of the tympanic membrane with otitis externa. The diagnosis of acute otitis media requires a history of acute onset of symptoms, middle ear effusion, and signs of middle ear inflammation.

### SYNONYMS

Acute otitis media  
Otitis media with effusion  
Serous otitis media  
Suppurative otitis media

### ICD-9-CM CODES

381.10 Chronic serous otitis media  
382.01 Acute otitis media with spontaneous rupture of the tympanic membrane  
382.9 Acute otitis media

### EPIDEMIOLOGY & DEMOGRAPHICS

- Approximately 90% of children have one episode of acute otitis media by age 2 years.
- Fifty percent of infants in the United States have an episode of acute otitis media by age 6 months.
- About 42% of antibiotics prescribed for children are written to treat otitis media.
- Approximately 2 million surgical procedures are performed each year to place tympanostomy tubes.
- The peak incidence coincides with a peak in the upper respiratory infection rate in the winter months. This pattern may be caused by associated edema and hyperemia of the eustachian tube.
- An increased incidence of the disease is associated with the following factors:
  - Native American or Inuit ethnicity
  - Cleft palate, cleft uvula
  - Craniofacial anomalies
  - Eustachian tube dysfunction
  - Immune deficiencies, such as chronic granulomatous disease, immunoglobulin deficiencies, malignancies, acquired immunodeficiency syndrome, or immune suppression
  - Day-care attendance
  - Down syndrome
  - Connective tissue disorders
  - Passive smoke exposure
- Breastfeeding for at least 6 months is associated with a decreased risk of acute otitis media in the first year of life.

### CLINICAL PRESENTATION

#### History

- Symptoms have an acute onset.

- Fever may be present.
- Otalgia may occur.
- Hearing difficulty may occur.
- In infants and small children, typical symptoms include the following:
  - Irritability
  - Decreased feeding
  - Fever
  - Difficulty sleeping and frequent arousals

#### Physical Examination

- Immobility of the tympanic membrane
- Bulging tympanic membrane
- Loss of tympanic membrane landmarks
- Hyperemia of the tympanic membrane
- Cloudy or purulent fluid in the middle ear space
- Fever, other signs of systemic illness
- Unsteady gait, suggesting vestibular disturbance
- Hearing loss
- Tympanosclerosis, or scarring of the tympanic membrane, from previous infections

### ETIOLOGY

- Poor drainage or obstruction of the eustachian tube leads to accumulation of fluid in the middle ear cavity. This fluid then becomes infected, resulting in otitis media.
- Upper respiratory infections lead to edema and hyperemia of the eustachian tubes, obstructing the drainage of fluid.
- The younger child is anatomically predisposed to ear infections because the eustachian tube is more horizontal than in the adult.
- Causative agents include the following:
  - *Streptococcus pneumoniae*: 25% to 50%
  - *Haemophilus influenzae*: 15% to 30%
  - *Moraxella catarrhalis*: 3% to 20%
  - Viruses, including respiratory syncytial virus (RSV), human rhinovirus, adenovirus, coronavirus, enterovirus, and parainfluenza: 5% to 22%

### DIAGNOSIS

#### DIFFERENTIAL DIAGNOSIS

- Myringitis
- Otitis externa
- Mastoiditis
- Cholesteatoma
- Otorrhea caused by a foreign body in the canal

#### WORKUP

- Pneumatic otoscopy
  - An insufflator attached to the otoscope head is used to move the tympanic membrane.
  - Fluid in the middle ear space inhibits this movement.
- Tympanometry
  - Tympanometry incorporates sound energy to determine movement of the tympanic membrane.
  - Abnormal movements indicate abnormal pressures in the middle ear.

- Tympanometry is used to evaluate and monitor middle ear effusions.
- Spectral gradient acoustic reflectometry
  - Reflected sound waves indicate movement of the tympanic membrane.
  - This method is helpful when a seal of the canal cannot be achieved.
- Tympanocentesis
  - The sample is used for a diagnostic culture.
  - The procedure provides pain relief.
  - It should be considered for the following conditions:
    - In the seriously ill patient with acute otitis media
    - For inadequate response to a second-line antibiotic
    - In the neonate with acute otitis media
    - For immunosuppressed patients
    - For chronic effusion
- For infants younger than 2 months with or without fever, consider further evaluation for extension of the infection and possible sepsis or meningitis.

### TREATMENT



#### NONPHARMACOLOGIC THERAPY

- Observation without antibiotics may be considered for a previously healthy child 6 months to 2 years old if the illness is not severe and the diagnosis is uncertain. This approach may also be considered for children older than 2 years with a nonsevere illness or an uncertain diagnosis.
- Observation without antibiotics should not be considered for the child who does not have access to a follow-up evaluation in 48 to 72 hours.

#### ACUTE GENERAL Rx

- Administer amoxicillin (80 to 90 mg/kg/day, divided two times per day) for a 10-day course.
- A 5-day course of antibiotics may be adequate for children older than 2 years.
- Pain relief is achieved with oral analgesics (e.g., acetaminophen, ibuprofen).
- Topical otic analgesics may be used to temporarily ease pain.
- Antihistamines and decongestants have not been useful in the treatment or prevention of otitis media.
- When there may be  $\beta$ -lactamase-positive organisms (e.g., day-care attendance, antibiotics in the previous 30 days) or in cases of severe illness or severe otalgia, a second-line antibiotic may be used. A second-line antibiotic should also be used in children without improvement after 2 to 3 days of the initial therapy.
  - Augmentin: 90 mg/kg of amoxicillin and 6.4 mg/kg of clavulanate, divided two times per day
  - Cefuroxime axetil: 50 to 100 mg/kg/day divided three times per day

- Cefprozil or cefpodoxime
- Azithromycin or clarithromycin
- Ceftriaxone: 50 mg/kg, administered intramuscularly for three daily doses in children unable to tolerate oral medication or in cases of treatment failure with Augmentin
- Clindamycin: 30 mg/kg/day, divided three times daily; may also be used in culture-confirmed pneumococcal disease
- Trimethoprim-sulfamethoxazole
- Fluoroquinolones: oral administration not for routine treatment of otitis media

### DISPOSITION

- After the acute infection has been successfully treated, an effusion may persist for 3 months in up to 15% of cases.
- Children should be re-evaluated every 3 months until the effusion resolves. A hearing test is indicated if the effusion persists for 3 months or for any child with language delay, learning problems, or hearing loss.

### REFERRAL

- Referral to an otolaryngologist should be considered for any child with four episodes of acute otitis media in a 6- to 12-month period.
- Refer any child with hearing loss to a specialist.

- Bilateral otitis media with effusion persisting for more than 3 months warrants referral.
- Refer a patient with unilateral otitis media with effusion that persists longer than 6 months.

## PEARLS & CONSIDERATIONS



### COMMENTS

- A red tympanic membrane is not an indication of otitis media without concurrent fluid in the middle ear space. Comparison of ears is useful. The tympanic membrane becomes injected with crying and fever.
- Children have shorter, more horizontal eustachian tubes with less cartilaginous support than adults, and this results in poor ventilatory function. Most children younger than 2 years who spend time in a day-care setting have some middle ear fluid collection with each upper respiratory infection.
- Acute otitis media with purulent conjunctivitis is associated with nontypable *H. influenzae* infection.
- Acute otitis media with hemorrhagic conjunctivitis and pharyngitis may indicate an adenovirus infection.

### PREVENTION

The pneumococcal vaccine, a conjugated polysaccharide-protein vaccine, may be a preventive measure.

### PATIENT/FAMILY EDUCATION

- Parents should be counseled on the adverse effects of bottle propping, pacifier use after 6 months of age, and passive cigarette smoke exposure in the development of otitis media.
- Breastfeeding for at least 6 months should be recommended to families whose children have recurrent otitis media.
- Day-care attendance is also associated with an increased risk of otitis media.

### SUGGESTED READINGS

Subcommittee on Management of Acute Otitis Media, American Academy of Pediatrics and American Academy of Family Physicians: Clinical practice guideline: diagnosis and management of acute otitis media. *Pediatrics* 113:1451, 2004.

Subcommittee on Otitis Media with Effusion, American Academy of Family Physicians, American Academy of Otolaryngology–Head and Neck Surgery, American Academy of Pediatrics: Otitis media with effusion. *Pediatrics* 113:1412, 2004.

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