

Otitis Media

Kevin Katzenmeyer, MD

Ronald W. Deskin, MD

Dept. of Oto-HNS

UTMB-Galveston

February 17, 1999

Otitis Media

- \$3.5 billion in expenditures
- Most common reason for visit to pediatrician
- Tympanostomy tube placement is 2nd most common surgical procedure in children
- Development of multidrug-resistant bacteria

Otitis Media - History

- Egyptian mummies have perforations of TM and mastoid destruction
- Prehistoric Iranian population has evidence of middle ear disease
- OM accounted for 27% of admissions to Bellevue Hospital in 1932

Otitis Media - Definition

Inflammation of the middle ear

May also involve inflammation of mastoid, petrous apex, and perilabyrinthine air cells

Otitis Media - Classification

- Acute OM - rapid onset of signs & sx, < 3 wk course
- Subacute OM - 3 wks to 3 mos
- Chronic OM - 3 mos or longer

OM - Epidemiology

- Age
- Sex
- Race
- Day care
- Seasons
- Genetics
- Breast-feeding
- Smoke exposure
- Medical conditions

OM - Epidemiology

- Increasing incidence?
- Increases after newborn period
- 2/3 with AOM by one year of age
- 1/2 with >3 episodes by three years
- most common in 6 - 11 mos

OM - persistent middle ear effusion (MEE)

- High incidence of MEE, avg of 40 days
- Children less than 2 years much more likely to have persistent MEE
- White children with higher incidence of MEE

Otitis Media - Race

- Higher incidence in:
 - Eskimos
 - Native Americans
 - Australian and African aborigines

OM - Day Care

- Greater risk of AOM in children < 3 years
- Home care best, large group day care worst
 - more exposures with wider range of flora
 - increased URI's
 - more frequent visits to MD to decrease parental leave time from work

OM - Breast-feeding

- Decreases incidence of URI and GI disease
- Inverse relationship between incidence of OM and duration of breast-feeding
- Protective factor in breast-milk?

OM - smoke exposure

- Induces changes in respiratory tract
- Cotinine marker associated with increased AOM and persistent effusion
- Increased PET, otorrhea, chronic and recurrent AOM in children with hx of parental smoking

OM - Medical Conditions

- Cleft palate
 - decreases after repair
- Craniofacial disorders
 - Treacher-Collins
- Down's syndrome
- Ciliary dysfunction
- Immune dysfunction
 - AIDS
 - steroids, chemo
 - IgG deficiency
- Obstruction
 - NG tubes
 - NT intubation
 - adenoids
 - malignancy

Eustachian Tube

- Connects middle ear and nasopharynx
- Lumen shaped like two cones with apex directed toward middle
- Mucosa has mucous producing cells and ciliated cells

Eustachian tube

■ Adults

- ant 2/3- cartilaginous
- post 1/3- bony
- 45 degree angle
- isthmus 1-2 mm
- nasopharyngeal orifice 8-9 mm

■ Children

- longer bony portion
- 10 degree angle
- isthmus larger
- nasopharyngeal orifice 4-5 mm in infants

Eustachian tube

- Usually closed
- Opens during swallowing, yawning, and sneezing
- Opening involves cartilaginous portion
- Tensor veli palatini responsible for active tubal opening
- No constrictor function

Eustachian tube

- Protection from nasopharyngeal sound and secretions
- clearance of middle ear secretions
- ventilation (pressure regulation) of middle ear

Pathology

- Edema, capillary engorgement, and PMN infiltration
- Epithelial ulceration and granulation tissue
- Fibrosis, influx of chronic inflammatory cells
- Increased columnar and goblet cells
- Osteitis
- Edema and polypoid changes

Pathology

- Eustachian tube abnormalities
 - Impaired opening
 - open in DS and American Indians
 - shorter tube
- Impaired immunity
 - children have poorer immune response
 - less cytokines in nasopharynx in children with OM
- Inflammatory mediators
 - Bacterial products induce inflam response with IL-1, IL-6, and TNF
- Allergy

Microbiology

- *S. pneumoniae* - 30-35%
- *H. influenzae* - 20-25%
- *M. catarrhalis* - 10-15%
- Group A strep - 2-4%
- Infants with higher incidence of gram negative bacilli

Virology

- RSV - 74% of middle ear isolates
- Rhinovirus
- Parainfluenza virus
- Influenza virus

Microbiology

■ PCN-resistant Strep

- 1979 - 1.8%
- 1992 - 41%
- Altered PCN-binding proteins
- Lysis defective
- Age, day-cares, and previous tx

■ *H. flu* and *M. catarrhalis*

- beta-lactamase production
- All *M. catarrhalis* +
- 45-50% *H. flu*

Chronic MEE

- Previously thought sterile
- 30-50% grow in culture
- over 75% PCR +
- Usual organisms

Diagnosis

■ Acute OM

- preceding URI
- fever, otalgia, hearing loss, otorrhea
- may have assoc constitutional sx

■ Chronic MEE

- poss asymptomatic
- hearing loss
- “plugged”
- “popping”

Diagnosis

- Pneumatic otoscopy is gold standard
 - Color - opaque, yellow, blue, red, pink
 - Position - bulging, retracted
 - Mobility - normal, hypomobile, neg pressure
 - Assoc pathology - perfs, cholesteatoma, retraction pockets
- Head & neck exam

Diagnosis

- Audiogram
 - document CHL, SNHL, baseline, preop
 - sooner if high risk
- Impedance
- Acoustic reflexes

Treatment - AOM

- Adults and older children - observation?
- Antibiotics - consider drug resistance patterns
 - Amoxil - not for *B* lactamase +
 - TMP-SMT - not for group A strep
 - Need high middle ear concentrations

Antibiotics

■ First line

- Amoxil - 60-90 mg/kg divided tid
- Ceftin - B lactam stable
- Augmentin - B lactam stable
- Bactrim, Pediazole

■ Second line

- Augmentin
- Ceftin
- Rocephin
- Macrolides - Zithromax, Biaxin

Treatment - Recurrent AOM

■ Chemoprophylaxis

- Sulfoxazole, amoxicillin, ampicillin, pcn
- less efficacy for intermittent prophylaxis

■ Myringotomy and tube insertion

- decreased # and severity of AOM
- otorrhea and other complications
- may require prophylaxis if severe

■ Adenoidectomy

- 28% and 35% fewer episodes of AOM at first and second years

Treatment - OME

- MEE > 3 mos or assoc hearing loss, vertigo, frequency, ME pathology, discomfort
- Antibiotics
 - shown to be of benefit, 75% PCR + bacterial DNA
- Antibiotics + steroid
 - 21% improvement compared to abx alone
 - prednisone 1 mg/kg day x 7 days
 - varicella?
- Myringotomy & tympanostomy +/- adenoidectomy

Tympanostomy tube insertion

- Unresponsive OME >3 mos bil, or >6 mos uni, sooner if assoc hearing problems
- Recurrent MEE with excessive cumulative duration
- Recurrent AOM - >3/6 mos or >4/12 mos
- Eustachian tube dysfunction
- Suppurative complication

Complications

■ Intratemporal

- hearing loss
- TM perforation
- CSOM
- retraction pockets
- cholesteatoma
- mastoiditis
- petrositis
- labyrinthitis
- adhesive OM
- tympanosclerosis
- ossicular discontinuity and fixation
- facial paralysis
- cholesterol granuloma
- necrotizing OE

■ Intracranial

- meningitis
- extradural abscess
- subdural empyema
- focal encephalitis
- brain abscess
- lateral sinus thrombosis
- otitic hydrocephalus

Case history

- 1 1/2 year old wm presents to ENT clinic with 2nd episode of “ear infections” in last month
- Normal history with no medical problems and no prior surgical procedures
- Mother describes a “cold” for the last few days and then started running a fever and pulling at ears. Describes the child as very irritable

Physical Exam

- Temp 100 F, VS wnl
- Irritable child
- Ears - eac clear, tms erythematous, bulging with yellowish MEE AU
- Nose - clear rhinorrhea
- otherwise wnl

Case history

- Returns to clinic one month later with same complaints again
- Dx as AOM
- 3rd episode in last 2 mos and 5th in last year

Case history

- Placed on sulfisoxizol prophylaxis
- 3 wks later presents with recurrent AOM

Case history

- BM&T performed, doing well at 3 wks
- Mother calls at 3 mos and says has had to be tx with po abx and ear gtts 3 times by pcp for bilateral otorrhea

New Frontiers

- Prevention more cost effective than treatment
- Even slight decrease would have profound economic impact
 - Vaccines
 - Xylitol

Vaccines

- Pneumococcal vaccine
 - poorly immunogenic in children
 - did exhibit antibody response
- *H. influenzae*
 - no polysaccharide capsule
 - serum bactericidal antibody
- *M. catarrhalis*
 - human pathogen

Vaccines

- 150 viral immunotypes
- 100 rhinoviruses with poor prognosis for vaccine development
- RSV most common - developing intranasal delivery system

Xylitol

- Sweetening substitute
- Inhibits growth of pneumococcus and inhibits adhesion of pneumococcus and H. flu in nasopharynx
- Gum and syrup reduced incidence of AOM 40% and 30%

Otitis Media
