Otitis Media

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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 that 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, Pediazone

- **Second line**
  - Augmentin
  - Ceftin
  - Rocephin
  - Macrolides - Zithromax, Biaxin
Treatment - Recurrent AOM

- **Chemoprophylaxis**
  - Sulfisoxazole, amoxicillin, ampicillin, pcn
  - less efficacy for intermittent propylaxis

- **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 dyscontinuity 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%
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