# Chronic Otitis Media: Medical and Surgical Management

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### LEARNING OBJECTIVES

- Discuss the diagnosis of chronic otitis media and associated complications
- Appropriate work-up for chronic otitis media in the outpatient, emergency and inpatient settings
- Medical management of chronic ear disease
- Surgical techniques for patients with chronic otitis media



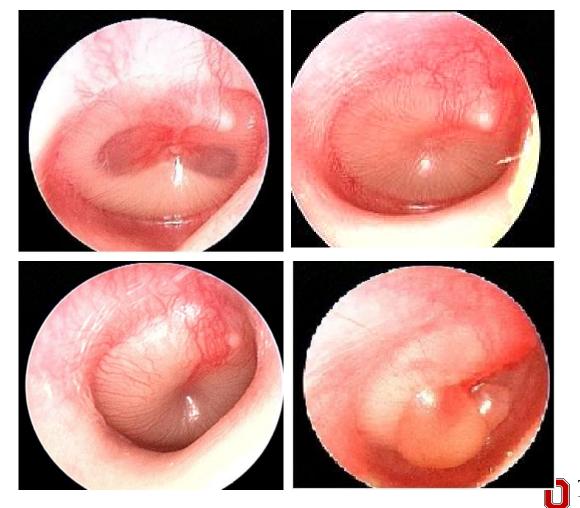


- Recurrent Acute Otitis Media
- TM Retraction
- TM Perforation
- Chronic Otitis Media with Effusion
- Cholesteatoma
- Extracranial complications
- Intracranial complications





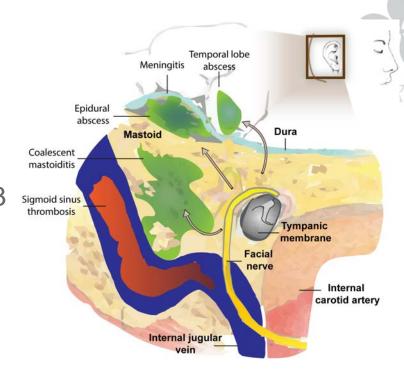
 Combination of cloudy, bulging TM with impaired mobility = best predictor of AOM (Karma, et al.1989)





### National Impact of Otitis Media

- #1 diagnosis in children <15 yrs</p>
- One of the most common childhood infections
  - Affects 50-85% of children by age 3
  - 20 million clinic visits (Klein 2000)
  - 2-3 million ED visits (Schappert 1992)



- Annual cost = \$3.8 billion (Gates 1996, Kaplan 1997)
  - \$1000-1600 for one episode of AOM
  - \$2,500 if requiring tube insertion
- 25% antibiotic prescriptions AOM most common reason











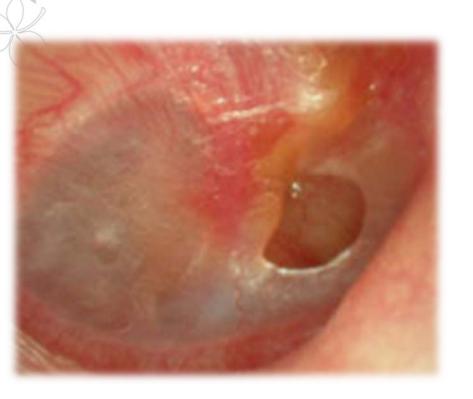
- Acute inflammation of middle ear space
  - **×** Suppurative
  - ▼ Non-suppurative
    - Inflammation w/o effusion or sterile effusion
  - **Recurrent**

### Chronic otitis media

- > 3 mo of inflammation of middle ear space
- Non-suppurative intact eardrum
  - Chronic otitis media with effusion
- Suppurative (TM perforation) or through tube)



# Work-up of AOM/COM: Clinical Exam





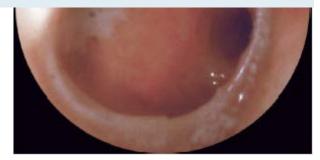






- Textbook findings are hard to see in real life!
- Usually taken with high amplification microscope or endoscope
- Microscopic exam with good lighting
- Pneumatic otoscopy is extremely helpful
- History and clinical exam are key





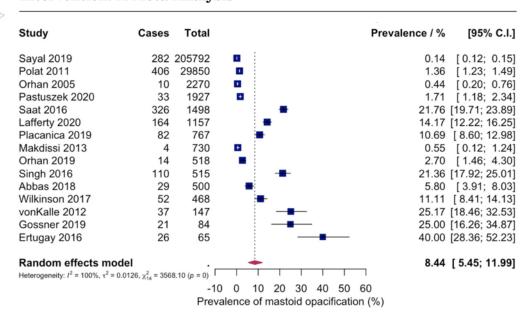




# Radiology for otitis media / mastoiditis

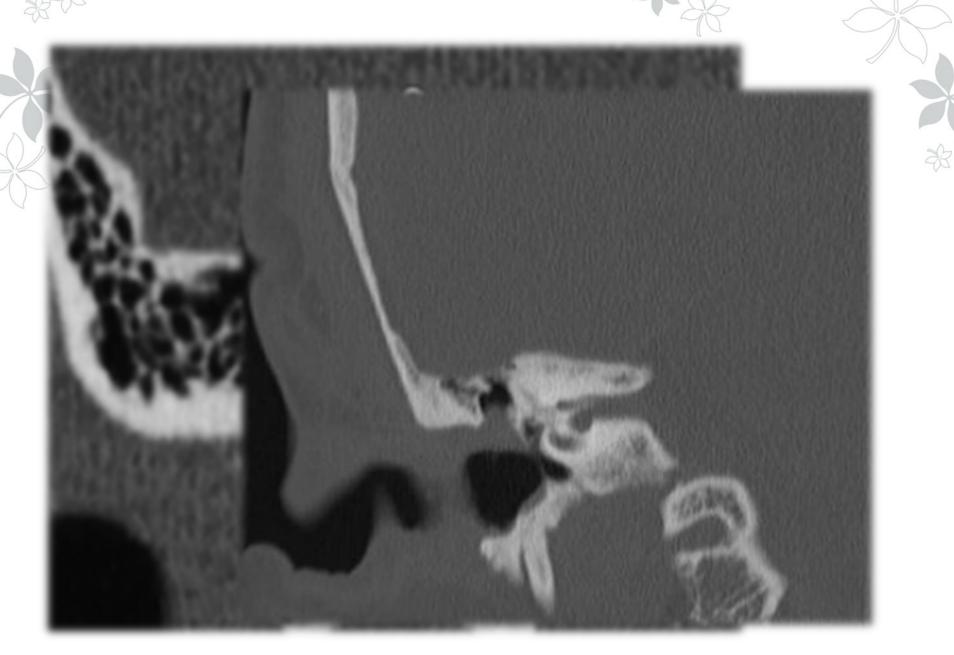
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### The Prevalence of Incidental Mastoid Opacification and the Need for Intervention: A Meta-Analysis

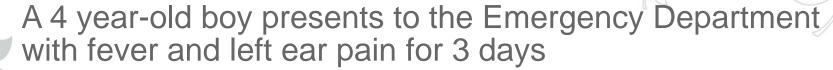


- 5-12% incidental opacification on CT
- More prevalent in pediatric population
- Of patients with imaging,
   <10% with clinical disease</li>
  - Sayal 2019: 0 of 160 had clinical mastoiditis









- Tmax 103F, HR 110, BP 90/50
- WBC 18.5

# Which is necessary to establish the diagnosis?

- A- CT
- B- MRI
- C- Tympanocentesis
- D- Needle aspiration
- E- Nothing









- Medical treatment is typically for acute otitis media, recurrent AOM, or acute exacerbations of COM
  - Does *not* address underlying etiology
- Topical drops for draining ear / otitis externa
  - Ofloxacin Opthalmic
  - Ciprofloxacin +/- Dexamethasone
  - Neomycin / Polymyxin /
  - Cortisporin
- Oral antibiotics for AOM: Keflex / Augmentin / Clindamycin
- IV antibiotics can be considered based on clinical settings
- PE tube may cause a biofilm, need to be removed
  - Otorrhea occurs after tube placement in 10% ears





- Not all cholesteatoma associated with COM, and not all COM causes cholesteatoma
- Congenital cholesteatoma
  - Present from birth
  - Originate from keratinizing epithelium in middle ear cleft
- Primary acquired cholesteatoma
  - ETD/retraction pocket
- Secondary acquired cholesteatoma
  - Introduction of epithelial cells into middle ear via trauma, PE tube placement













### Jean Cruveihier (1829)

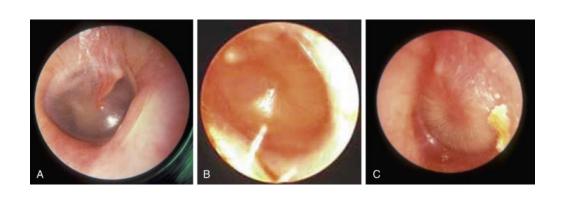
- "Tumeur perlée" of the temporal bone

### Johannes Müller (1838)

 "Layered pearly tumor of fat which was distinguished from other fat tumors by the biliary fat or cholesterin that is interspersed among the sheets of polyhedral cells"

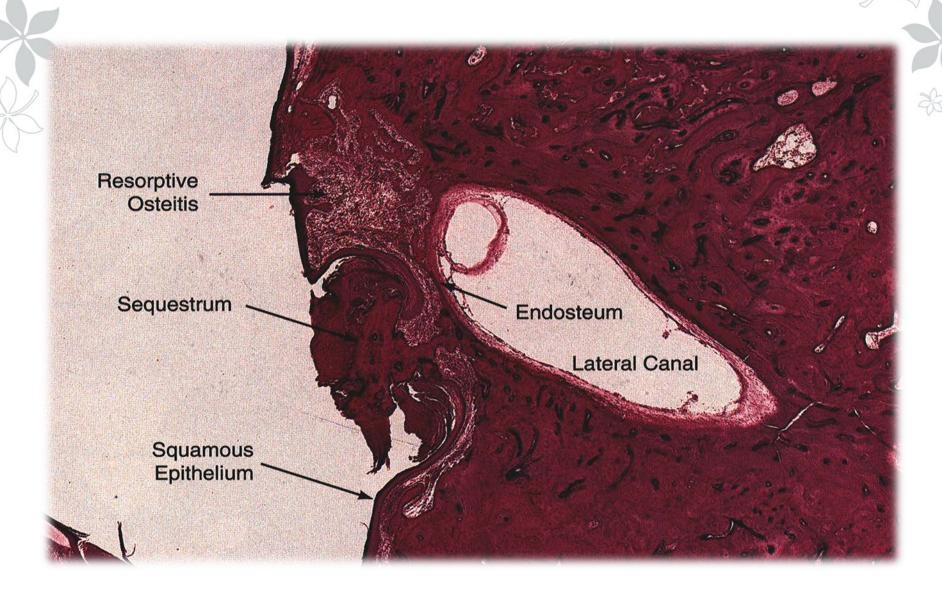
### Schuknecht (1974)

keratoma may be more appropriate









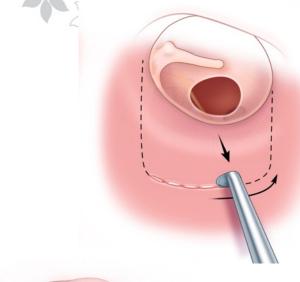




### Surgery

#### **Goals of Surgery:**

- Dry safe ear & Removal of disease
- Manage complications
- Improve hearing
- Tympanoplasty
  - Transcanal vs. postauricular
  - Medial graft vs. lateral graft
  - Microscopic vs. endoscopic
- Tympanomastoidectomy
  - Atticotomy
  - Canal wall up / Intact canal wall
  - Canal wall down
  - Cortical vs. modified radical vs. radical









# **Tympanoplasty**

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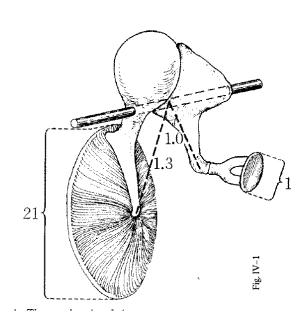
- Factors
  - Age, Location, Size, Infection Status, Status of Contralateral Ear, Hearing
- Postauricular vs. Trans-canal
- Outpatient
- 10 minutes 2 hours







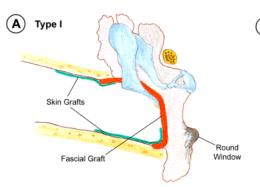
- Intact TM
- Aerated middle ear space
- Connection between TM and inner ear fluids
- Inner ear that transmits sound impulses

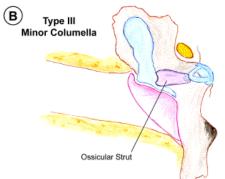


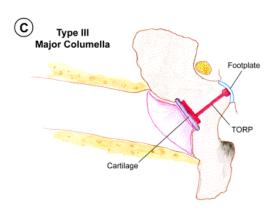


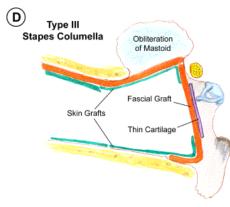


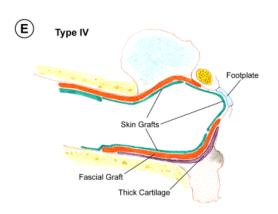


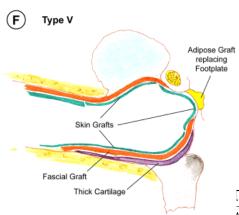










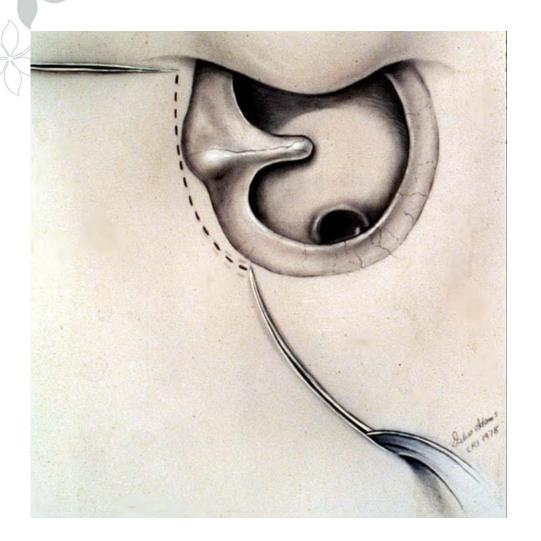


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# Lateral Graft Tympanoplasty

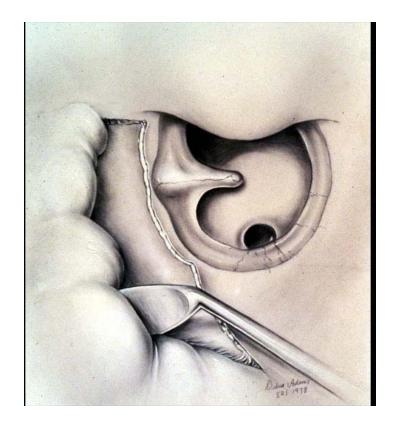


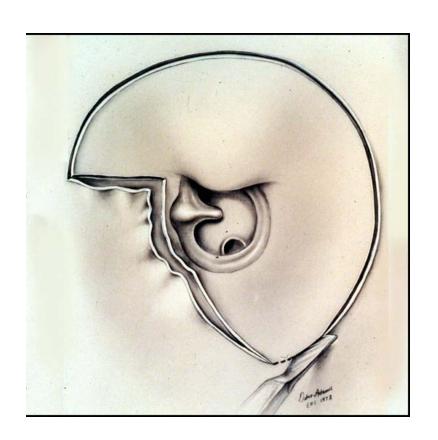


- Marginal perforation
- Near-total / total perforation
- Anterior perforation
- ++ tympanosclerosis
- Vascular strip incisions superiorly and inferiorly
- Medial canal incision at/near annulus
  - Length of vascular strip



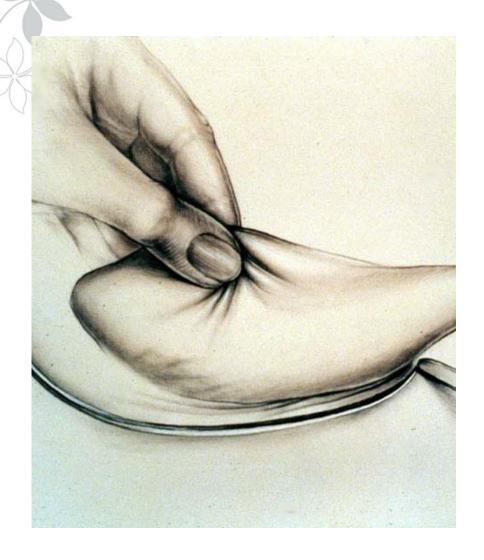
# Canal skin incision

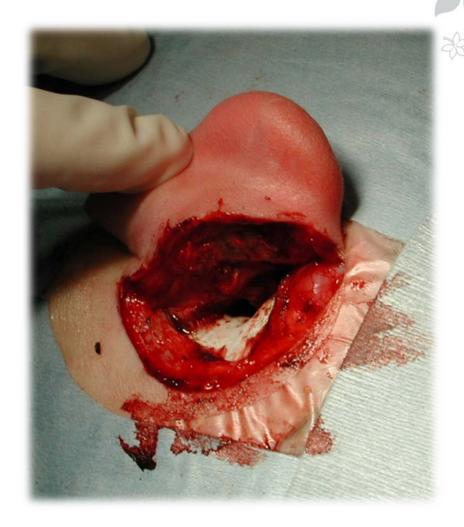






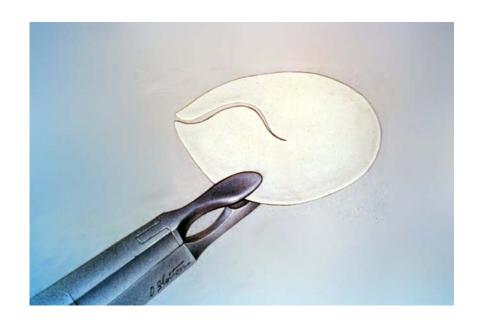
# Postauricular approach

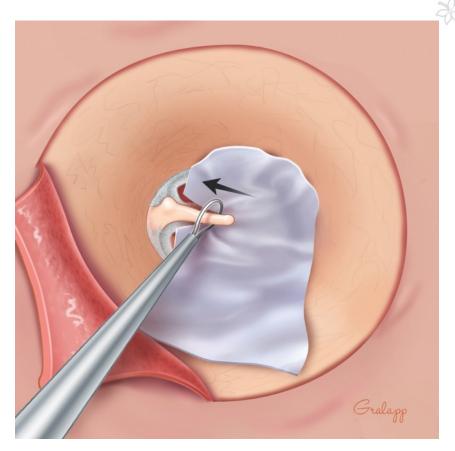




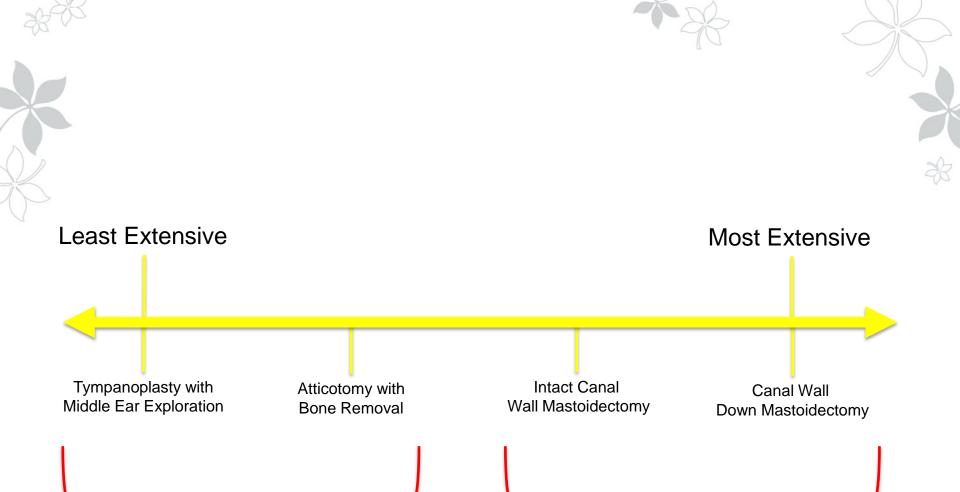


# Graft placement

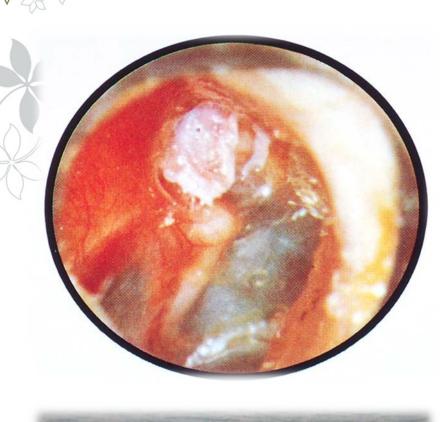






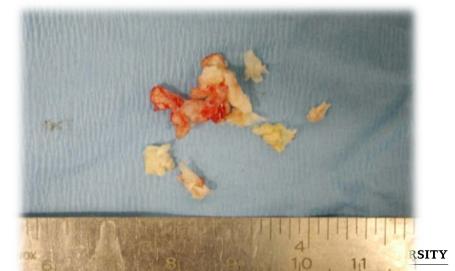








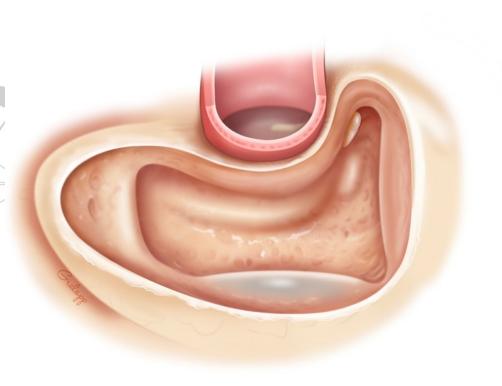




# Canal Wall Up vs. Down vs. "Others"

- No consensus in the literature
- No optimal surgical treatment
- Each with specific advantages and limitations
- Factors:
  - Hearing
  - Socioeconomic factors
  - Status of middle ear mucosa
  - Local anatomy
  - Status of contralateral ear
  - Other medical problems



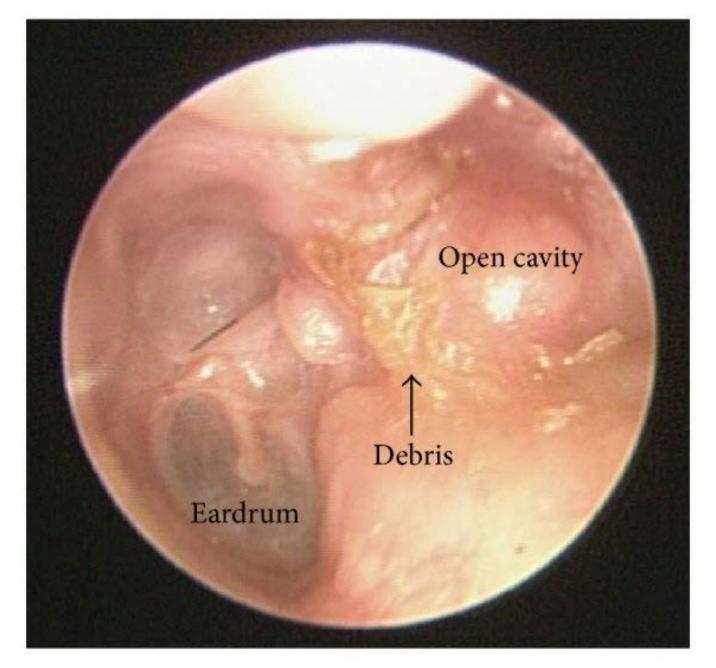


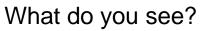














### CWU vs. CWD





- "Eliminate" recurrent cholesteatoma
- Mastoid & Epitympanum out of equation
- "Improve exposure"
- Minimize manipulation of fistula
- Unreliable patient
- Only hearing ear

### CWU:

- Functionally "normal" ear
- Quicker healing





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- Recurrence of cholesteatoma
- Persistence of cholesteatoma
  - need for 2nd look
- More difficult / time consuming \*
  - Low lying tegmen
  - Often requires facial recess approach
  - Reconstruction of canal wall



# Complications of Chronic Otitis Media

#### Extracranial

- Mastoiditis
- Subperiosteal abscess
- Petrous apicitis
- Labyrinthine fistula
- Facial paralysis
- Suppurative labyrinthitis
- Encephalocele / CSF leak

#### Intracranial

- Meningitis
- Epidural abscess
- Subdural empyema
- Brain abscess
- Lateral/SS thrombosis
- Otitic hydrocephalus





- Developmental
  - Dehiscent facial nerve (tympanic segment)
  - Mondini deformity
  - Enlarged vestibular aqueduct
  - Hyrtle's fissure
- Prior surgery/temporal bone trauma









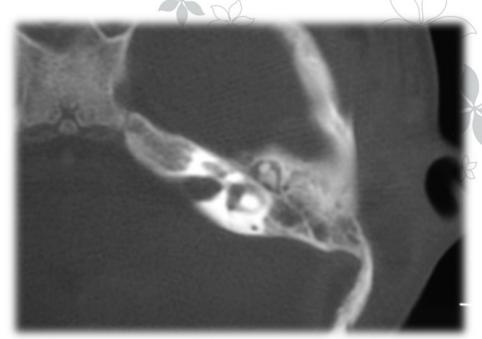
- Often managed with Myringotomy/Tube/IV Antibiotics
- Surgery for failure to improve or complications
- Clinical picture:
  - Fever, otalgia, ear protrusion
  - Tympanic membrane with evidence of AOM
  - CT and clinical features provide diagnosis













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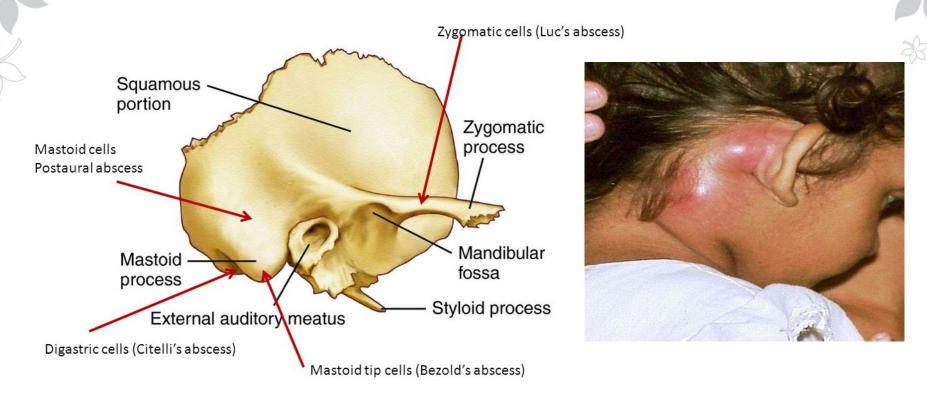




- Multicenter retrospective study
- 223 patients
- 56% diagnosed <4yo (mean age 3)</li>
- >2/3 had NO history of recurrent AOM
- 2/3 with bulging/erythematous TM
- 1/4 had complications on admission
  - Most common: subperiosteal abscess
- 1/3 ultimately required further surgical therapy



# Subperiosteal abscess



- Postauricular
- Bezold: through medial wall of mastoid tip, to SCM into neck
- Citelli's: along posterior belly of digastric
- Luc's: zygomatic root
- Treatment is surgical: mastoidectomy +/- tube







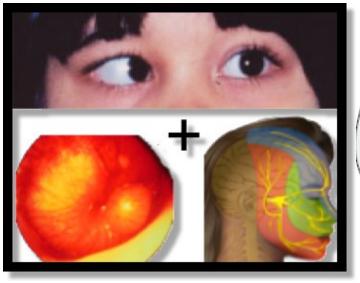
# **Facial Nerve Paralysis**

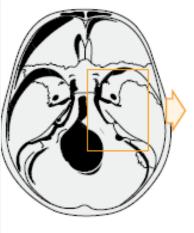
 Bacteria reach nerve second to dehiscence of bony fallopian canal (tympanic segment, adjacent to stapes)

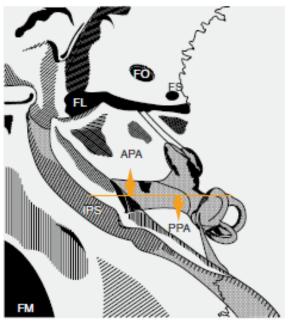
- Nerve function compromised
  - Inflammatory pressure
  - Suppurative neurapraxia
- Most common:
  - Incomplete paralysis
  - Resolves in 3 weeks
- Treatment: antibiotics, myringotomy with evacuation of purulence, +/- tube











- Extension into the petrous apex
- Deep facial pain, otalgia, +/- otorrhea, +/- CN V, VI, VII involvement
- Gradenigo syndrome
  - Deep facial pain
  - Otitis media
  - Ipsilateral CN VI abducens palsy
    - CN VI travels below petroclinoid ligament in Dorello's canal entrapment











# **Acute Suppurative Labyrinthitis**

- Bacterial invasion of the labyrinth
- Total loss of auditory and vestibular function
- Infection spreads through weak/dehiscent oval window
  - Risk F: Mondini's deformity, enlarged vestibular aqueduct
- Diagnosis: vertigo, nystagmus, hearing loss
- Treatment: Myringotomy, culture directed IV antibiotics, +/- ear tube





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# Meningitis

- Incidence otogenic meningitis has decreased dramatically since immunizations
  - H. Influenzae type B
  - Prevnar (PCU-7)
  - Incidence of meningitis second to AOM is inversely proportional to the prevalence of these 2 immunizations
  - Most common intracranial complication of AOM





# Meningitis: Hearing loss



- Bacterial meningitis:
  - Most common cause of ACQUIRED SNHL in children
- Labyrinthitis ossificans:
  - Inflammation of the inner ear from bacterial meningitis
  - Formation of new bone within the lumen of the otic capsule
  - Associated with profound deafnes
  - Cochlear implant asap



# Epidural and brain abscess

- Abscess development between temporal bone and underlying dura
- Results from direct extension via bone erosion with mastoiditis
- Often associated with lateral sinus thrombophlebitis, meningitis, brain abscess
- Treatment: surgical (mastoidectomy)
- 20% of brain abscess is otogenic













- Most common from direct extension of mastoid bone erosion with transmural sinus wall inflammation
- Clot can propagate retrograde to obstruct the transverse sinus or propagate to involve the IJV or cavernous sinus
- Symptoms:
  - Picket fence fevers': most consistent symptom





- Early recognition and treatment of acute otitis media
- Chronic otitis media = a spectrum of disease
- Cholesteatoma is a common sequelae and best treated with surgery
- Surgical management
  - Tympanoplasty (multiple techniques)
  - Mastoidectomy (ICW vs. CWD)
- Complications of otitis media are rare, but can be serious / deadly
  - Sensorineural hearing loss is a common sequelae







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