



# GRAND ROUNDS (Oct. 25, 2019)

AKHernandez/Tongol/Lacuata/Ilustre/PR Tan

DEPARTMENT OF OTORHINOLARYNGOLOGY  
PHILIPPINE GENERAL HOSPITAL

# VISION

The Department of Otorhinolaryngology shall be an internationally recognized center of excellence in the field of Otorhinolaryngology and Head and Neck Surgery



# MISSION

The health needs of the Filipino shall be its prime consideration.

It shall provide excellence and leadership in the different aspects in Otolaryngology – Head and Neck Surgery by teaching, providing exemplary clinical practice and dynamically pursuing relevant researches beneficial to the community in an environment guided by moral, ethical and spiritual values.

# General Information



- MA
- 20M
- Single
- Roman Catholic
- Lives in Montalban, Rizal

# Chief Complaint

## Hearing Loss, AS

# History of Present Illness

## 8 Years PTA (2011),

At age 11, the patient started to have spontaneous left otalgia with associated autophony and aural fullness. No history of manipulation, signs of hearing loss or ear discharge. He consulted a private MD and was assessed to have impacted cerumen, subsequently resolved with aural irrigation. The patient was not informed about the status of the tympanic membrane. He started to notice gradual, yet minimal hearing loss on the left with no associated tinnitus, dizziness approximately 2 weeks post irrigation



# History of Present Illness

## In the interim (2011-2013)

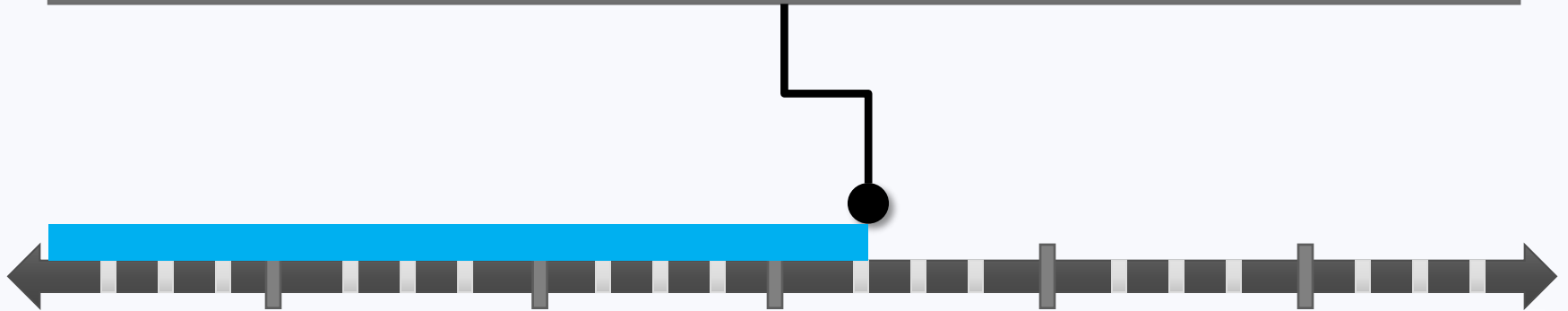
The patient tolerated the hearing loss, There were no signs of progression of hearing loss, vertigo or tinnitus. He still had recurrent aural fullness. No consults were done, no medications were taken at this time.



# History of Present Illness

## 6 years PTA (2013)

The patient noted purulent yellowish, foul-smelling, left ear discharge. Patient would manipulate ears with cotton buds to clean the discharge but otorrhea would recur. No other medications were taken. With minimal hearing loss, autophony and aural fullness, and onset of non-pulsatile high-pitched tinnitus. No vertiginous symptoms

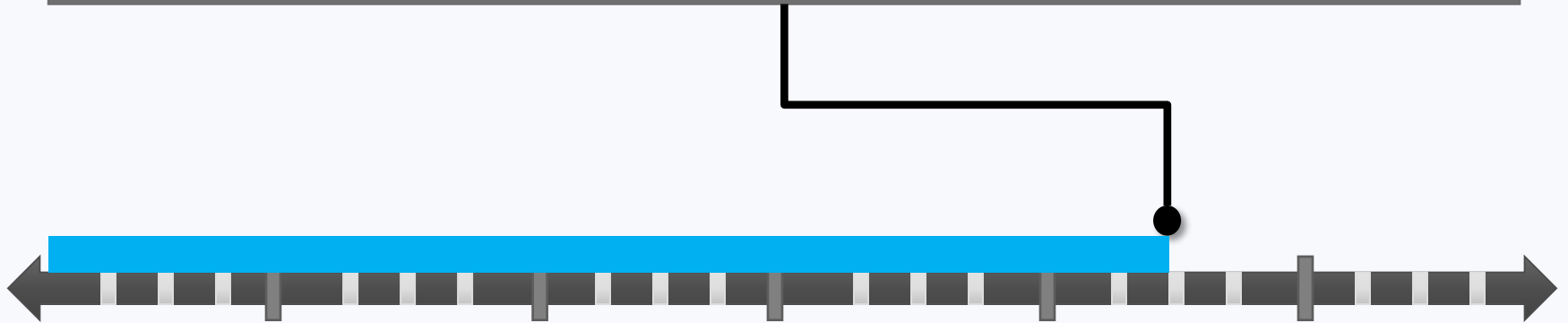




# History of Present Illness

## In the interim (2013-2017)

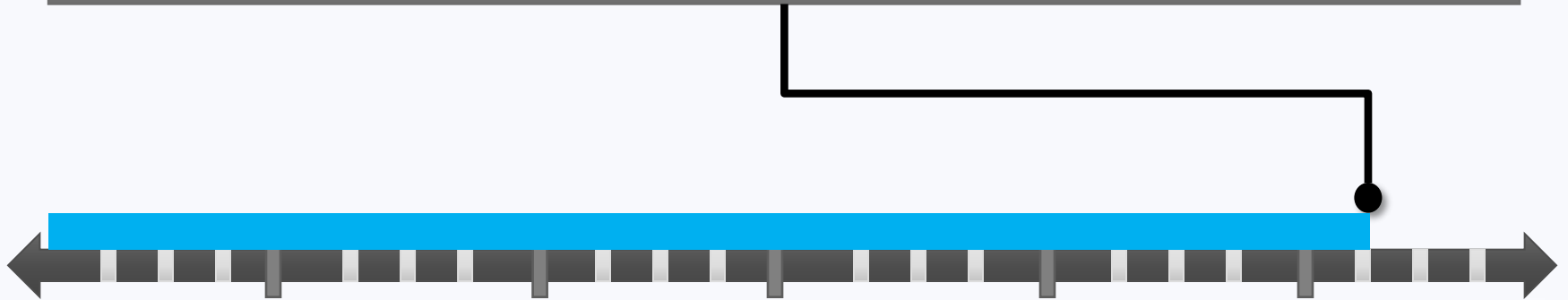
The patient tolerated his symptoms without any consults or medications. Hearing loss gradually progressed over time, but still not worse enough to affect his academic performance and daily activities. At this time, still with recurrent otorrhea



# History of Present Illness

## 2 Year PTA (2017)

Due to the persistence of symptoms, the patient consulted in FEU and the assessment was: CSOM, AS. He was advised aural toilette and Ofloxacin Otic drops with note of temporary relief of symptoms but with recurrence when he discontinued the otic drops. He was lost to follow-up thereafter.



# History of Present Illness

## In the interim (2017 - 2019)

Hearing loss persisted with associated yellowish foul-smelling purulent discharge on the left ear, with noted autophony, aural fullness and tinnitus but no vertiginous symptoms. No consults and medications were discontinued.



# History of Present Illness

## 5 months PTA (2019)

He eventually sought consult at PGH ORL OPD due to progressive hearing loss and recurrent otorrhea. He was managed as CSOM, AS, prescribed aural toilette and Ofloxacin otic drops. PTA-ST and Temporal Bone CT Scan were done. He was eventually seen at the Ear Clinic and was advised surgery; hence, this admission.



# Review of Systems

(-) fever

(-) weight loss

(-) headache

(-) dizziness

(-) blurring of vision

(-) epistaxis

(-) nasal congestion

(-) cough

(-) chest pain

(-) abdominal pain

(-) diarrhea/constipation

(-) dysuria

(-) polyuria

(-) nocturia

(-) numbness

(-) edema

# Past Medical History

- (-) Hypertension
- (-) Heart disease
- (-) Diabetes
- (-) Bronchial asthma
- **(+) Pulmonary Tuberculosis, s/p Cat I treatment for 6 months (2014)**
- (-) Cancer
- (-) Liver disease
- (-) Kidney disease
- (-) Previous surgeries
- (-) Allergies

# Family Medical History

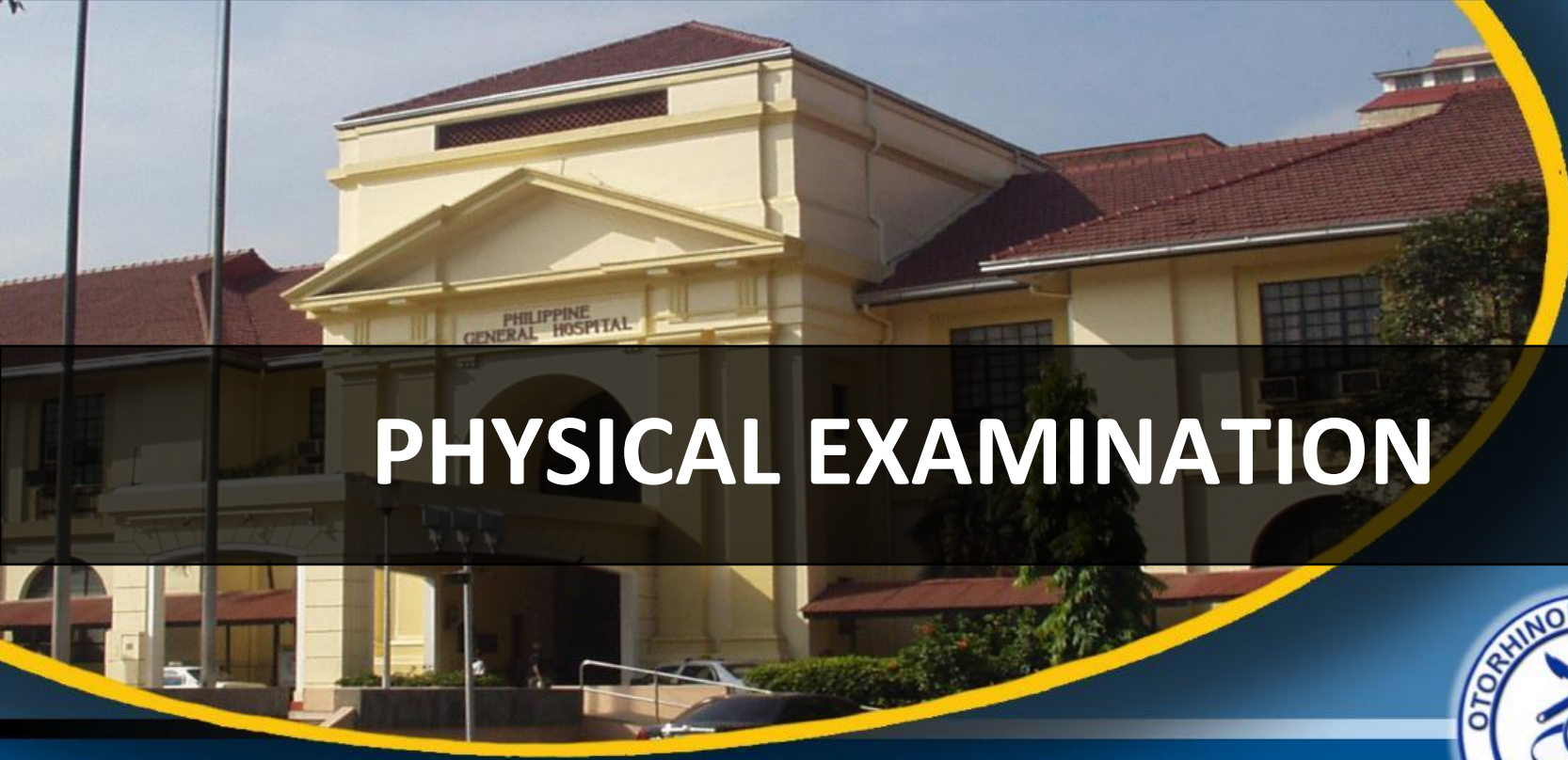
- (-) Similar disease
- (-) Hypertension
- (-) Diabetes
- (-) Cancer
- (-) Heart disease
- (-) Cerebrovascular disease
- (-) Bronchial asthma
- **(+) Tuberculosis, Uncle**
- (-) Allergies

# Personal and Social History

- Non-smoker
- Non-alcoholic beverage drinker
- Denies illicit drug use
- Currently a second year college student, on excused absence due to scheduled operation







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# PHYSICAL EXAMINATION

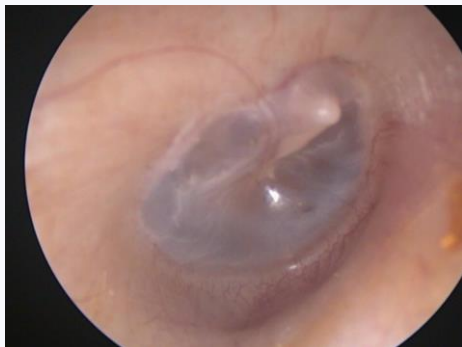


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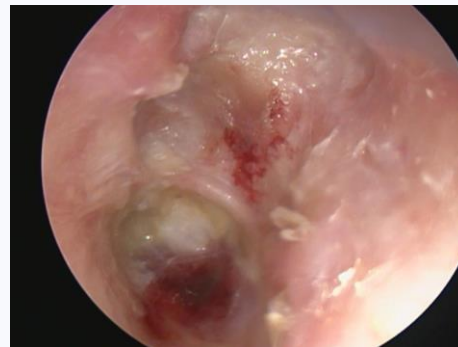
# SYSTEMIC PE

- **VITAL SIGNS:** BP 110/80, HR 74, RR 18, Temp 36.7, Ht 161cm, Wt 60.2 kg
- **GENERAL:** awake, coherent, ambulatory, not in cardiorespiratory distress
- **CARDIAC:** adynamic precordium, normal rate with regular rhythm, no murmurs
- **PULMONARY:** equal chest expansion, clear breath sounds
- **ABDOMEN:** soft abdomen, normoactive bowel sounds, no tenderness
- **EXTREMITIES:** full and equal pulses, pink nail beds, good capillary refill time, no edema
- **SKIN:** no lesions

# OTOSCOPY



Right ear:  
No gross deformities, patent non-hyperemic EAC  
Intact Tympanic Membrane  
Mobile on Pneumatostcopy



Left ear:  
No gross ear deformities  
Near Total Perforation with Attic Retraction  
Erythematous Middle Ear Mucosa  
Cholesteatoma

**Weber Test**

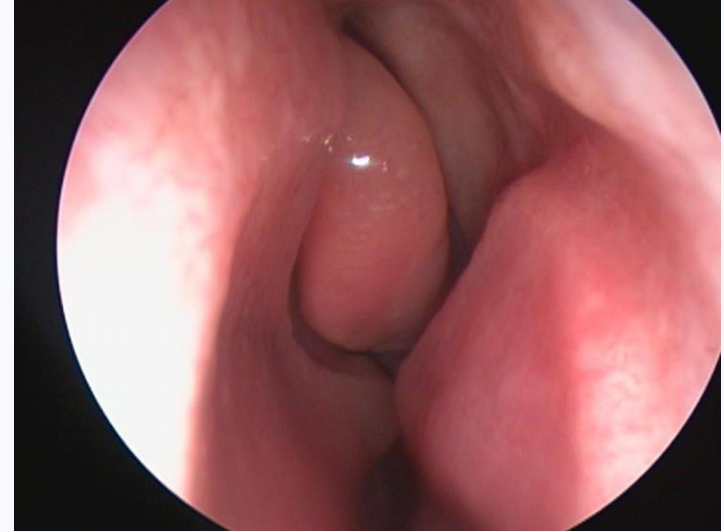
**Rinne Test**

Left

AD:  $AC > BC$

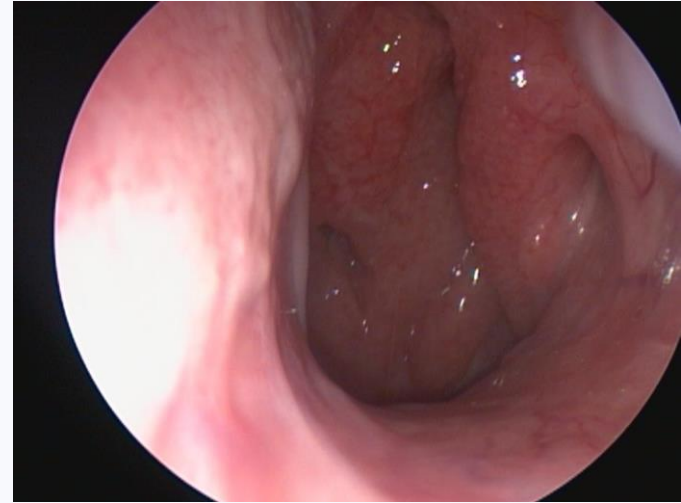
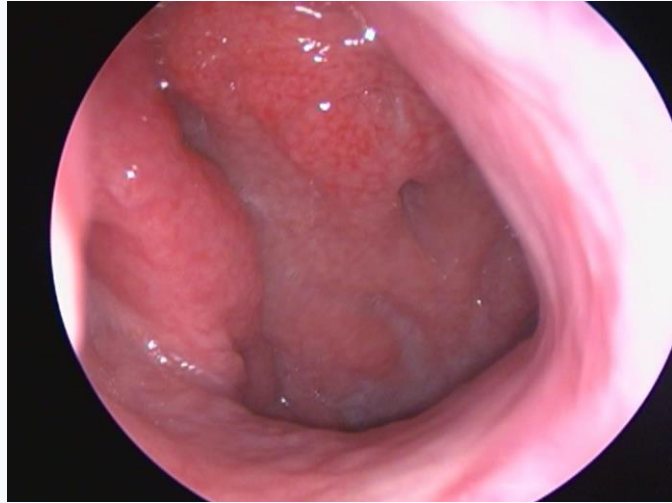
AS:  $AC < BC$

# RHINOSCOPIC EXAM



Nasal Endoscopy: Septal spurs noted; middle and inferior turbinates visualized with pink moist mucosa

# RHINOSCOPIC EXAM



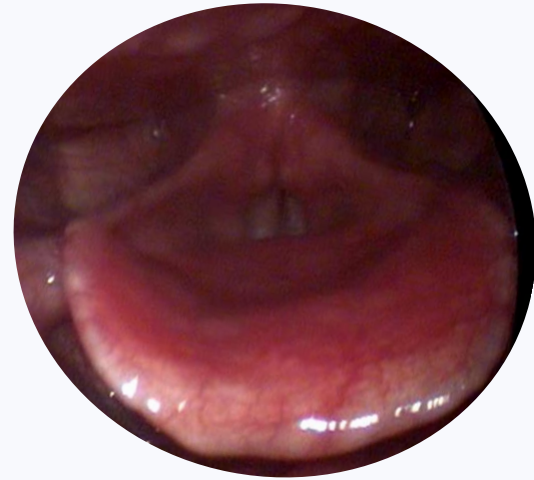
Nasal Endoscopy: No nasopharyngeal mass, adenoids not enlarged

# ORAL CAVITY EXAM



Pink oral mucosa  
Tongue and uvula midline

# INDIRECT LARYNGOSCOPY



Fully mobile vocal cords  
No masses noted



# HEAD & NECK EXAMINATION



No cervical lymphadenopathy  
No neck masses

# HEAD & NECK EXAMINATION



No cervical lymphadenopathy  
No neck masses



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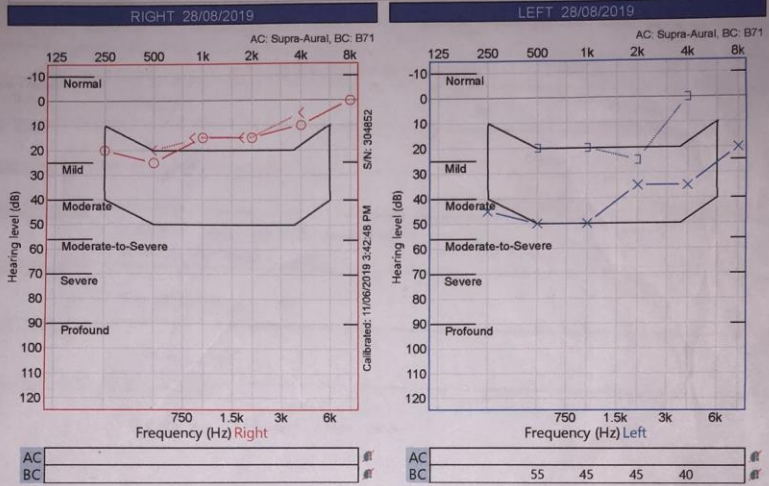
# DIAGNOSTICS



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# PURE TONE AUDIOMETRY (08/28/2019)

Report Date: 28/08/2019  
 Tester: J. Ong  
**Report Comments:**  
 Normal hearing threshold, AD  
 Moderate conductive hearing loss, AS  
 SRT conforms with PTA, AU  
 WRS 96%, AD/ 100% AS  
**Machine used: Astera2 Diagnostic Audiometer**



PTA (dB HL) / AI (%)		
	AC	BC
Right	18	17
Left	45	22

**Reliability**  
 Good

**Legend**

L	R	Masked
X	O	AC
>	<	BC
S	S	SF
M	M	MCL
U	U	UCL
↓	↓	NR

PTA AC: 500, 1k, 2k  
 BC: 500, 1k, 2k  
 Aud Method:

	Speech	SDT		SRT		WRS / SRS 1		WRS / SRS 2		MCL UCL		
		dB HL	(m)	dB HL	(m)	% HL	(m)	S/N %	dB HL	(m)	S/N %	dB HL
Right				20		96	50					
Left				45		100	75					
Bin												
Note				1 Live				2 Live				
Aided												

Signed by: *J. Ong*  
 JACOB EPHRAIM D. SALLIO, MD

- Normal Hearing Threshold, AD
- **Moderate Conductive Hearing Loss, AS**
- SRT conforms with PTA, AU
- WRS 96%, AD; 100%, AS



# Primary Working Impression

- Chronic Suppurative Otitis Media with Cholesteatoma, AS



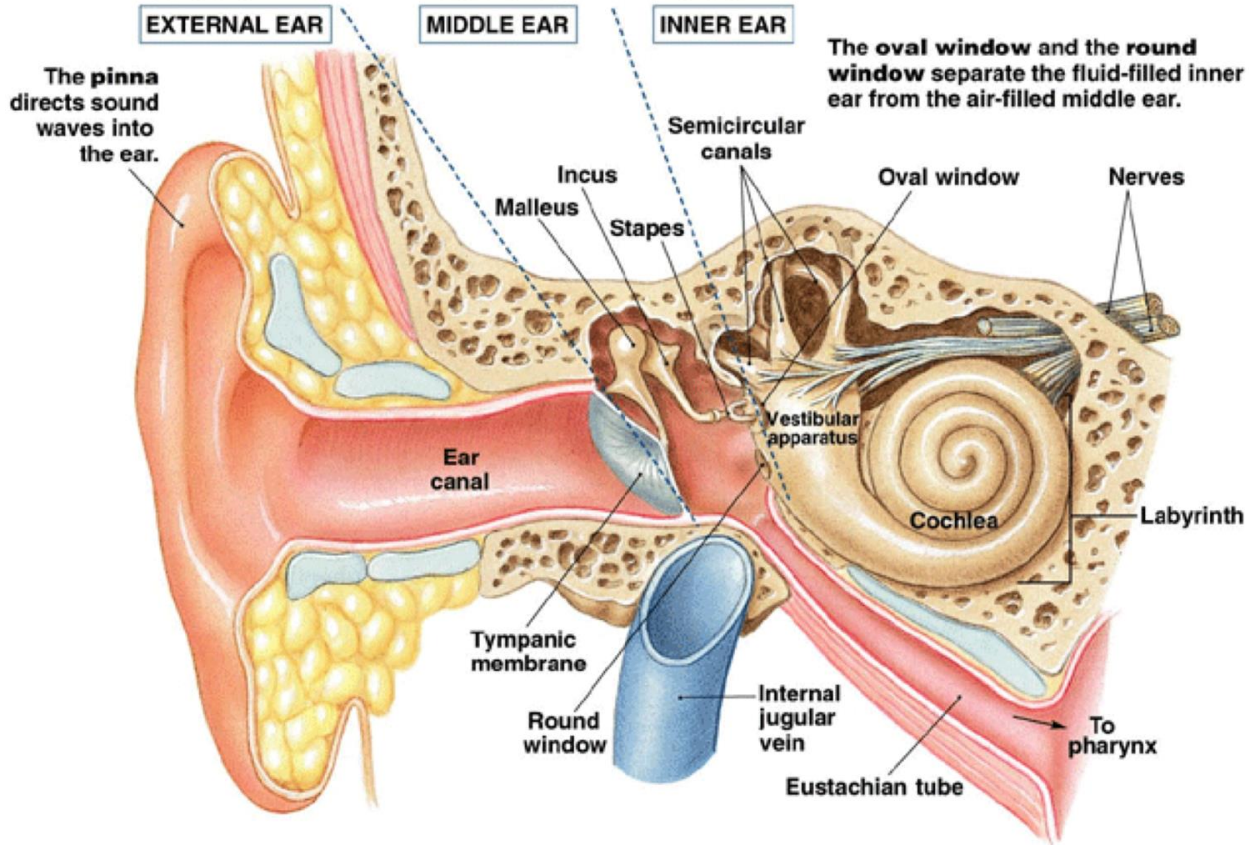
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# DISCUSSION

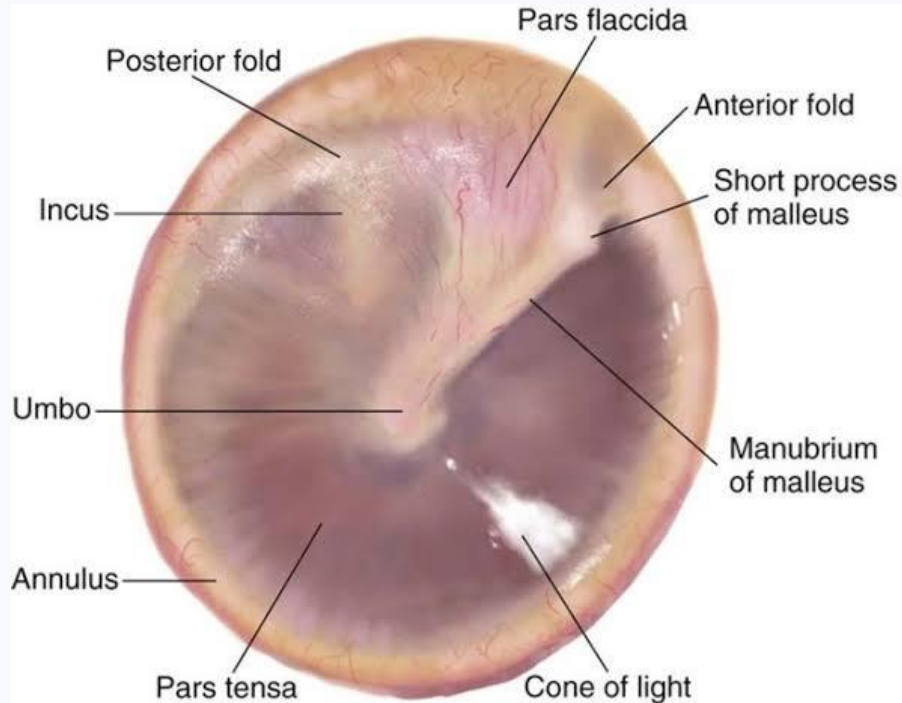


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# Basic Ear Anatomy



# Middle Ear – Tympanic Membrane



TYMPANIC MEMBRANE

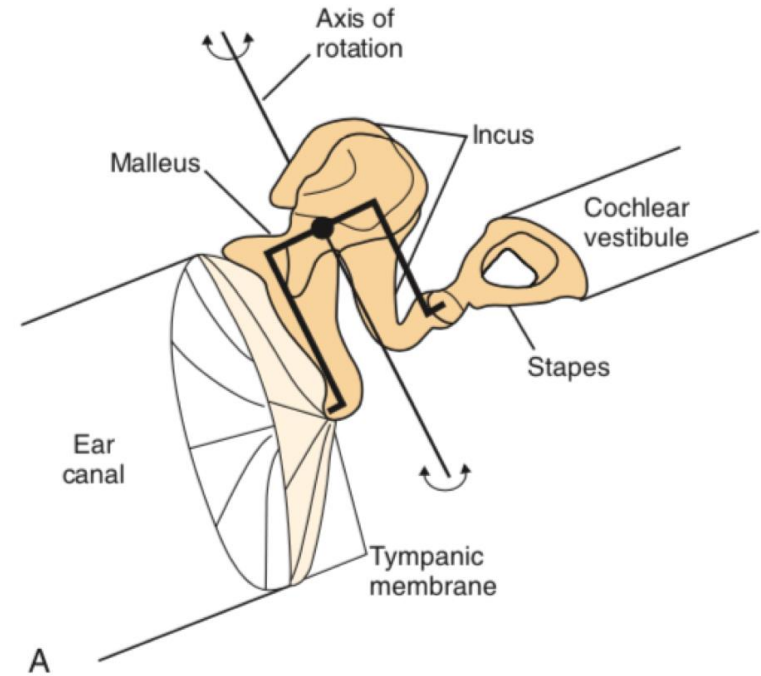
- Normal Appearance: semitranslucent, pearly white oval presenting obliquely 55 degrees with the floor
- Two parts:
  - Pars flaccida (Shrapnel's membrane) - above the maleolar folds
  - Pars tensa - below maleolar fold tensed by manubrium of malleus

Caparas et al., Basic Otorhinolaryngology. 1993.



# Middle Ear Mechanics

- AIR Filled
- Ossicular Coupling
- Acoustic Coupling
- Impedance Matching
- Area Ratio (20:1)
- Lever Ratio (1.3:1)



Cummings, Otolaryngology Head and Neck Surgery 6th Ed, 2015

# Chronic Suppurative Otitis Media: Definition

- Persistent inflammation of the middle ear or mastoid cavity which presents with persistent or recurrent ear discharge over 3 months, through a perforation in the tympanic membrane

PSO-HNS (2005). Chronic Suppurative Otitis Media in Adults.

# CSOM: Diagnosis

## Benign (Safe Ear)

- Central perforation of any size, shape
- Edematous middle ear mucous membrane
- Non-foul smelling mucoid or mucopurulent discharge
- Conductive hearing loss
- No cholesteatoma on mastoid X-ray

Caparas et al., Basic Otorhinolaryngology. 1993.

# CSOM: Diagnosis

## Dangerous (Unsafe Ear)

- Attic, marginal or total perforation of the tympanic membrane
- Mucosal transformation to squamous epithelium around the perforation
- Cholesteatomatous debris surrounding perforation
- Foul-smelling and purulent discharge

Caparas et al., Basic Otorhinolaryngology. 1993.

# CSOM: Diagnosis

## Dangerous (Unsafe Ear)

- Granulation polyps seen at the canal obscuring drainage
- Presence Postauricular subperiosteal abscess or fistula
- Mild conductive hearing loss to sensorineural hearing loss
- Radiographic presence of cholesteatoma on mastoid antrum

Caparas et al., Basic Otorhinolaryngology. 1993.

# CSOM: Etiology

- Mixed culture of microorganisms
  - *Proteus mirabilis*
  - *Proteus vulgaris*
  - *Pseudomonas aeruginosa*
  - *Staphylococcus aureus*
  - *Escherichia coli*
  - *Klebsiella sp.*

Caparas et al., Basic Otorhinology. 1993  
Ricciardello et al., (2009). *Notes on the microbiology of cholesteatoma: clinical findings and treatment.* Acta Otorhinolaryngologica Italica.

# Cholesteatoma: Definition

- Accumulation of squamous epithelial debris acting like a tumor enlarging and causing destruction by pressure necrosis or by enzymatic action produced by epithelial cells in its matrix

Caparas et al., Basic Otorhinolaryngology. 1993.

# Cholesteatoma: Types

- Congenital Cholesteatoma
- Acquired Cholesteatoma
  - Primary Acquired or Retraction Pocket Type
  - Secondary Acquired

Cummings, Otolaryngology Head and Neck Surgery 6th Ed, 2015  
Caparas et al., Basic Otorhinolaryngology. 1993.



# Cholesteatoma: Theories of Formation

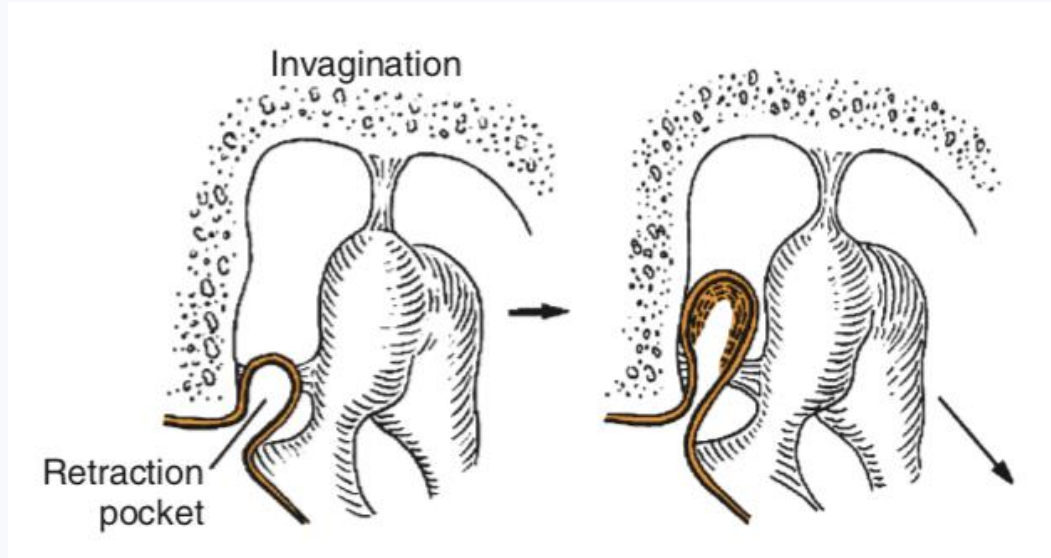
1. Invagination Theory
2. Basal Cell Hyperplasia Theory
3. Epithelial Invasion Theory
4. Squamous Metaplasia Theory



Cummings, Otolaryngology Head and Neck Surgery 6th Ed, 2015

# Cholesteatoma: Theories of Formation

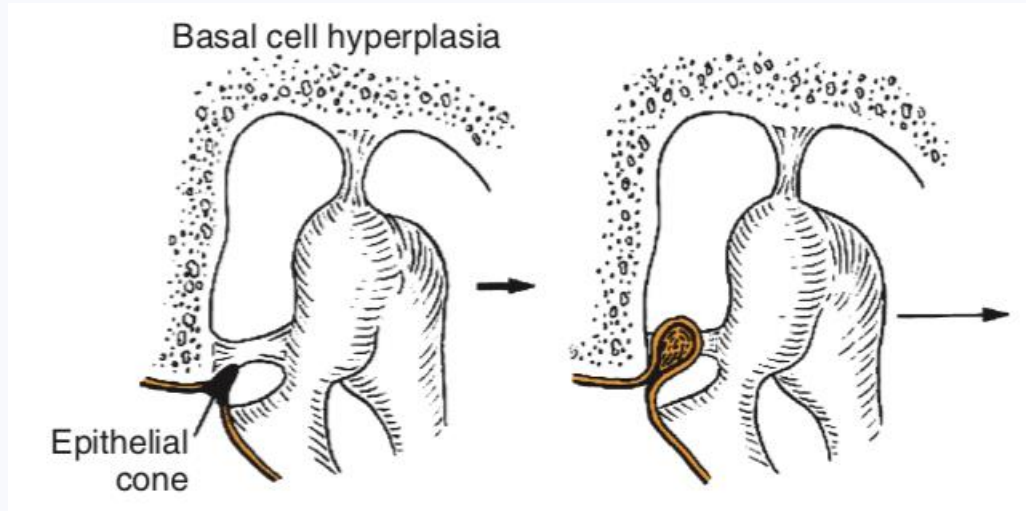
## 1. Invagination Theory



Cummings, Otolaryngology Head and Neck Surgery 6th Ed, 2015

# Cholesteatoma: Theories of Formation

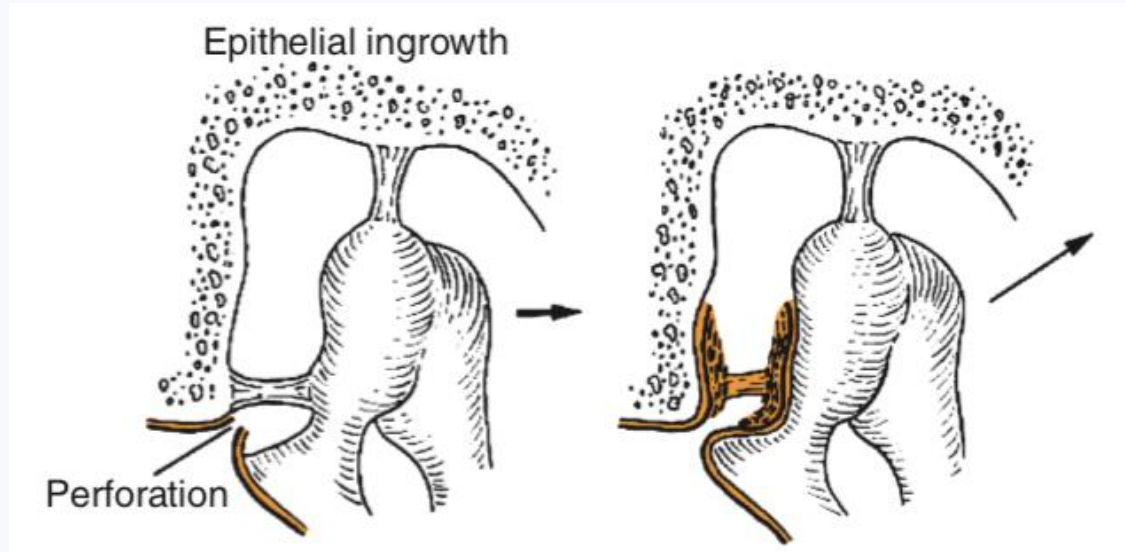
## 2. Basal Cell Hyperplasia Theory



Cummings, Otolaryngology Head and Neck Surgery 6th Ed, 2015

# Cholesteatoma: Theories of Formation

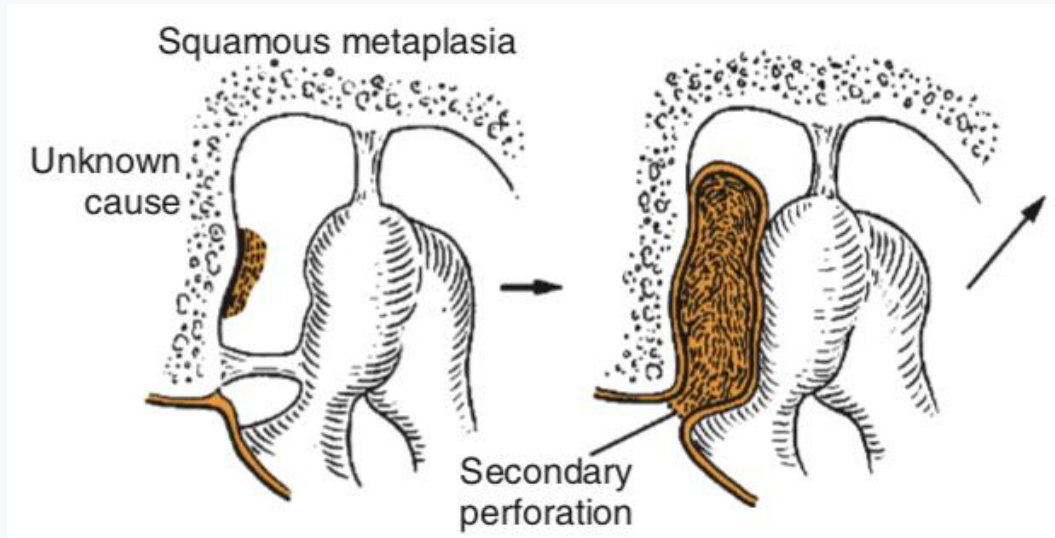
## 3. Epithelial Invasion Theory



Cummings, Otolaryngology Head and Neck Surgery 6th Ed, 2015

# Cholesteatoma: Theories of Formation

## 4. Squamous Metaplasia Theory



Cummings, Otolaryngology Head and Neck Surgery 6th Ed, 2015

# CSOM: Complications

- Extracranial
  - Facial Nerve Paralysis
  - Labyrinthitis
  - Apical Petrositis
  - Subperiosteal Abscess
  - Sensorineural Hearing Loss

Caparas et al., Basic Otorhinolaryngology. 1993.

# CSOM: Complications

- Intracranial
  - Extradural Abscess
  - Subdural Abscess
  - Lateral Sinus Thrombophlebitis
  - Meningitis
  - Brain Abscess
  - Otitic Hydrocephalus

Caparas et al., Basic Otorhinolaryngology. 1993.



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# MANAGEMENT



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# Goals

- Eradication of disease
- Improved middle ear ventilation
- Dry ear
- Hearing rehabilitation

Flint, P. et. al. (Ed.) (2010). Cummings otolaryngology head & neck surgery. Philadelphia: Elsevier Saunders.



# Surgery depends on the following:

- nature and extent of disease
- existence of complications
- mastoid pneumatization
- ET function
- hearing status of both ears
- reliability of the patient
- experience and skill of the surgeon

Flint, P. et. al. (Ed.) (2010). Cummings otolaryngology head & neck surgery. Philadelphia: Elsevier Saunders.



# Canal Wall Up Mastoidectomy in Cholesteatoma

## ADVANTAGES

- Physiologic position of tympanic membrane
- Enough middle ear space
- No mastoid cavity problem

## DISADVANTAGES

- Residual and recurrent cholesteatoma may occur
- Incomplete exteriorization of facial recess
- Second-stage operation often required

Flint, P. et. al. (Ed.) (2010). Cummings otolaryngology head & neck surgery. Philadelphia: Elsevier Saunders.

# Canal Wall Down Mastoidectomy in Cholesteatoma

## ADVANTAGES

- Residual cholesteatoma easily found on follow-up evaluation
- Recurrent cholesteatoma rare
- Total exteriorization of facial recess
- Eradicating disease and preserving or restoring auditory function may be done in a single operation

## DISADVANTAGES

- Mastoid cavity problem (frequent)
- Middle ear shallow and difficult to reconstruct
- Position of pinna may be altered; second-stage operation sometimes required

Flint, P. et. al. (Ed.) (2010). Cummings otolaryngology head & neck surgery. Philadelphia: Elsevier Saunders.

# Problems with a large cavity

- Chronic discharge from open cavity
- Collection of debris in the cavity
- Dizziness due to exposure of semicircular canals to direct caloric stimulation by cold air/water entering the cavity
- Dependence on the surgeon for regular cleaning of the cavity
- Unsightly appearance due to large meatoplasty

Chhapola S, Matta I. Mastoid obliteration versus open cavity: a comparative study. Indian J Otolaryngol Head Neck Surg. 2014;66(suppl 1):207-213. doi: 10.1007/s12070-011-0429-x

# Mastoid Obliteration

- Leaves a smaller surface which epithelializes easily and rapidly
  - reduced likelihood of developing cavity granulations
- Smaller cavity is also more likely to retain its epithelial migratory potential and be self-cleaning
- Exposed bone following mastoidectomy secretes tissue fluid, which is a rich medium for bacterial proliferation
  - When the bony walls are covered with obliteration material, process of secretion is reduced → reduction in the risk of infection

Chhapola S, Matta I. Mastoid obliteration versus open cavity: a comparative study. Indian J Otolaryngol Head Neck Surg. 2014;66(suppl 1):207-213. doi: 10.1007/s12070-011

# Mastoid Obliteration

- Open mastoid cavity is physiologically and anatomically unsatisfactory
- Skin does not readily grow on the bare bone
- Naturally moist environment tends to favor growth of mucosa and granulation tissue

Chhapola S, Matta I. Mastoid obliteration versus open cavity: a comparative study. Indian J Otolaryngol Head Neck Surg. 2014;66(suppl 1):207-213. doi: 10.1007/s12070-011

# Mastoid Obliteration

- Argument against: risk of trapping microscopic islands of cholesteatoma deep to the obliteration material
  - meticulous surgical approach with removal of the entire cavity lining in continuity will reduce this risk
  - if there is any doubt then this should not be obliterated but left exteriorized

Chhapola S, Matta I. Mastoid obliteration versus open cavity: a comparative study. Indian J Otolaryngol Head Neck Surg. 2014;66(suppl 1):207-213. doi: 10.1007/s12070-011



# Meatoplasty

- Helps ventilate the additional volume of the cavity
- Easy access for cleaning

Flint, P. et. al. (Ed.) (2010). Cummings otolaryngology head & neck surgery. Philadelphia: Elsevier Saunders.



# Ossicular Discontinuity

- Cholesteatoma is the most common cause
- Chronic otomastoiditis without cholesteatoma can also cause erosion of the ossicles
- Complete ossicular discontinuity
  - Near-maximum (55-60 dB) conductive hearing loss across all frequencies
  - Sound input to the cochlea depends entirely on acoustic coupling
  - Hearing may be improved by 10-15 dB if with significant TM perforation

Flint, P. et. al. (Ed.) (2010). Cummings otolaryngology head & neck surgery. Philadelphia: Elsevier Saunders.

# Ossiculoplasty

## Materials:

- Autografts: bone or cartilage removed from the patient and sculpted to serve as an interposition graft
  - Immediate availability, biocompatibility, low cost, low extrusion rate
- Concerns with disease recurrence in patients with cholesteatoma, potential for fixation to adjacent bone of the promontory/canal wall, ossicle unsuitability owing to demineralization or erosion

Flint, P. et. al. (Ed.) (2010). Cummings otolaryngology head & neck surgery. Philadelphia: Elsevier Saunders.

# Ossiculoplasty

## Materials:

- Allografts: manufactured prosthetics
  - PORP – Partial Ossicular Replacement Prosthesis
    - If with stapes superstructure
  - TORP – Total Ossicular Replacement Prosthesis
    - If without stapes superstructure
- Advantage: sterility, availability (in other countries), some have ability to bond to tissues
- Disadvantage: extrusion, cost

Flint, P. et. al. (Ed.) (2010). Cummings otolaryngology head & neck surgery. Philadelphia: Elsevier Saunders.

# Ossiculoplasty

- No one implant is perfect
- Closure of the air-bone gap to less than 20 dB is a commonly used index for successful ossiculoplasty
- Severity of pathologic changes in the middle ear likely have more influence on the hearing outcome than the prosthesis material itself

Flint, P. et. al. (Ed.) (2010). Cummings otolaryngology head & neck surgery. Philadelphia: Elsevier Saunders.



# Ossiculoplasty in Cholesteatoma

Same surgery or delayed?

- Status of middle ear mucosa
  - Middle ear mucosa that is thickened, infected, traumatized or partially missing is likely to heal with fibrous tissue formation that may displace a perfectly placed prosthesis
  - Silastic sheet placement may be done to decrease postoperative middle ear fibrous tissue formation
- Amount of bleeding
  - Bleeding obscures visualization and makes surgery more difficult and increases the risk for unfavorable fibrosis
- Advisability of reoperation for possible Cholesteatoma recurrence
- ET function in the involved ear and contralateral ear
  - If middle ear is not aerated, conductive hearing loss may persist
- Economic conditions may prevent a second-look surgery

Flint, P. et. al. (Ed.) (2010). Cummings otolaryngology head & neck surgery. Philadelphia: Elsevier Saunders.

# Type III Tympanoplasty

May be done:

- When there is a CWD Mastoidectomy
- Stapes superstructure is present
- Footplate is mobile

Principles

- Retaining ossicles/placing a strut between stapes head and the manubrium, some ears showed atelectasis/retraction of the TM graft around the ossicles, which are minimized by this technique

Merchant, S., Rosowski, J., McKenna, M. (2003). Tympanoplasty. Operative Techniques in Otolaryngology - Head and Neck surgery, 14(4), 224

# Type IV Tympanoplasty

May be done:

- When there is a CWD Mastoidectomy
- Stapes superstructure is missing
- Footplate is mobile
- Oval window niche is shallow

Principles

- Exteriorize the footplate and cover it with a very thin STSG
- Acoustically separate the oval window from the round window
- Shield the round window with a sufficiently stiff tissue graft

Merchant, S., Rosowski, J., McKenna, M. (2003). Tympanoplasty. Operative Techniques in Otolaryngology - Head and Neck surgery, 14(4), 224-235



# Plan

- Tympanoplasty, Canal Wall Down Mastoidectomy, Ossicular Chain Reconstruction, Mastoid Obliteration, Meatoplasty AS/GA