



# ***Chronic Otitis Media***

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# Classification of Chronic Otitis Media

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- Chronic Non Suppurative Otitis Media
  - Otitis media with effusion “OME”
  - Adhesive otitis media
- Chronic Suppurative Otitis Media “CSOM”
  - Tubotympanic (Safe)
  - Atticoantral (Unsafe)



# Chronic MEE

- MEE middle ear effusion
- Previously thought sterile
- 30-50% grow in culture
- over 75% PCR +





# AOM → OME

- Estimates of residual effusion
  - 70% @ 2 wks
  - 40% @ 4 wks
  - 20% @ 8 wks
  - 10% @ 12 wks
- Use of antibiotics does not seem to affect this



# Diagnosis

- Pneumatic otoscopy
- Color opaque, yellow, red
- Position bulging, retracted







# Diagnosis

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- Audiogram
  - CHL
  - SNHL
- Impedance
  - Tympanogram
  - Acoustic reflexes



# CSOM: Definition

## 3D Duration, Discharge and Deafness

- **D**uration > 3 months despite treatment
- **D**ischarge Purulent otorrhea
- **D**eafness Perforation or PET
- Distinguish between CSOM with or without **cholesteatoma**





# CSOM - Epidemiology

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## More common

- Lower socioeconomic groups
  - Children
  - Otitis media
- 
- Some children eventually outgrow.



# CSOM - Pathogenesis

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- ET dysfunction
- Poor aeration
- Mucosal edema and ulceration
  - Capillary proliferation
  - Osteitis



# Bacteriology

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- Mix organisms
- *P. aeruginosa*
- *S. aureus*.
- Proteus
- Anaerobes
- Fungi
  - Aspergillus, Candida



# S/S

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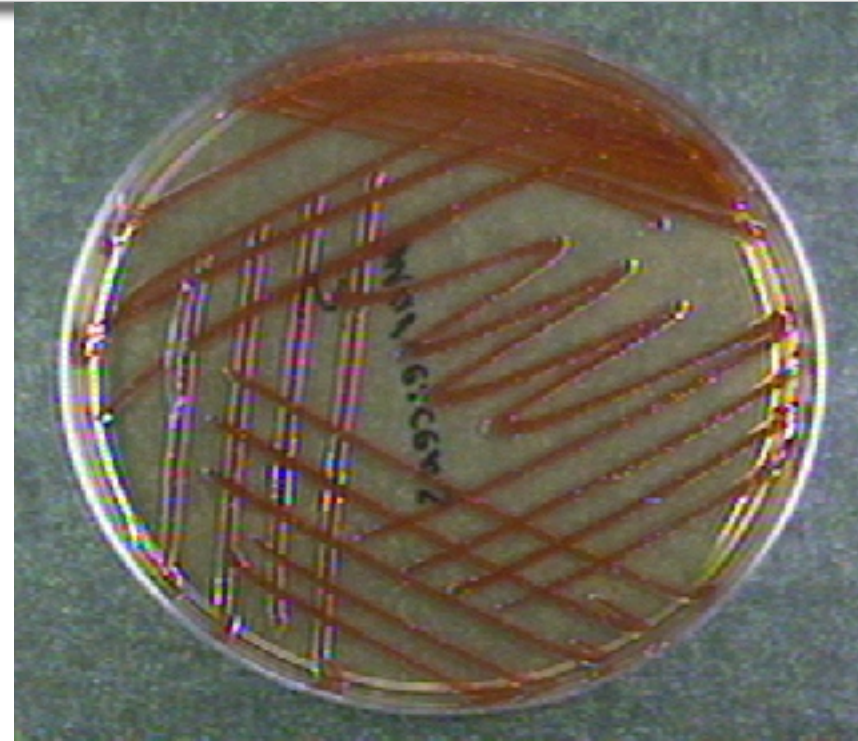
## 4D

- Deafness (Hearing loss)
- Discharge
- Defect TM (perforation)
- Duration



# CSOM & TB

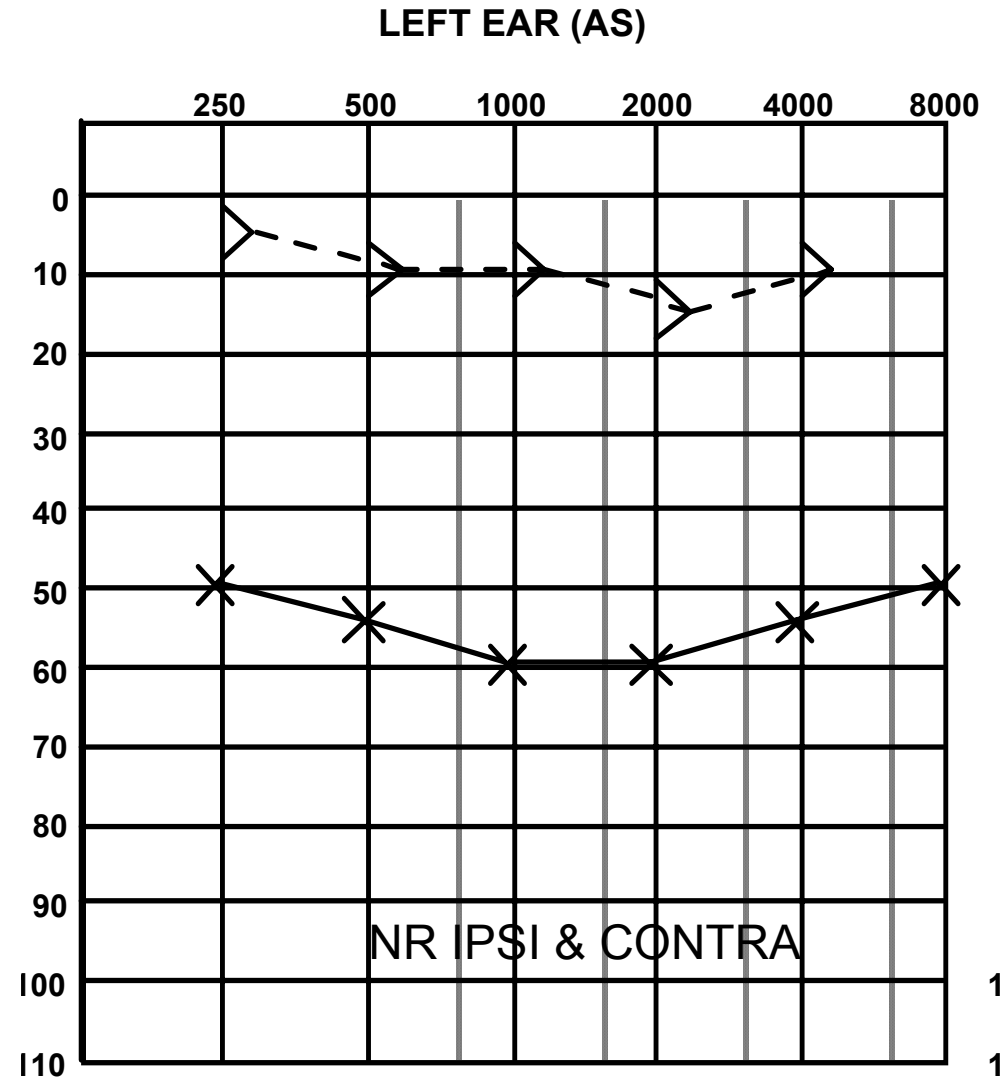
- Uncommon
- Painless
- Odorless
- Scant otorrhea
- Multiple small TM perforation
- From pulmonary TB





# Diagnosis

- S/S
- Audiogram CHL
- -/+ CT scan
  - Complication
  - Revision
  - Only hearing





# CSOM - Medical management

- Cleaning
- Water protection
- Acetic acid
  - used for cleansing debris
  - inhibits Pseudomonas





# CSOM - Medical management

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## Topical

- Ciprofloxacin (100% dry @ 21 days)
- Neomycin
- Polymyxin B
- Gentamicin,
- Tobramycin
- Steroid (Dexamethazone hydrocortizone )





# CSOM - Medical management

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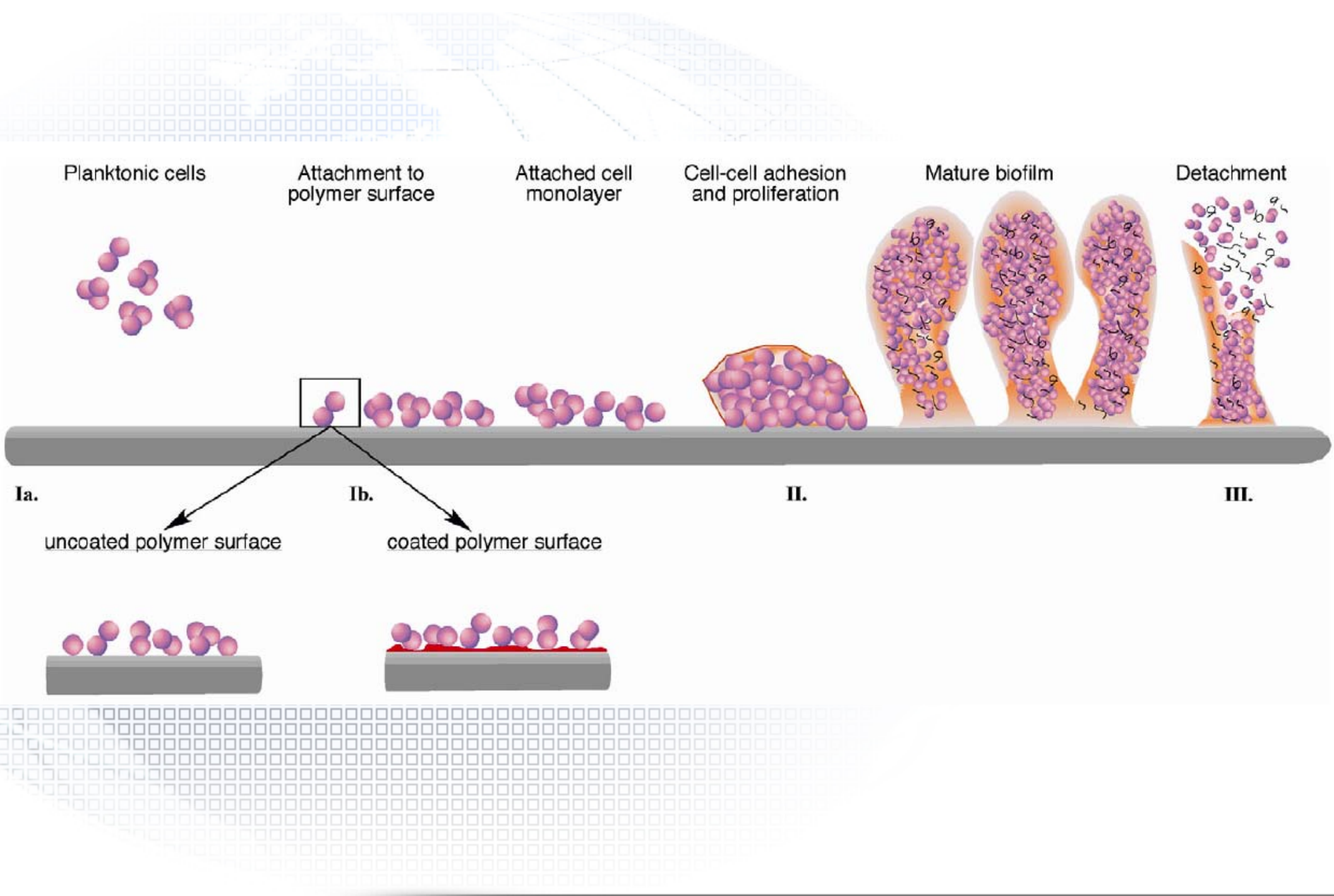
## **Systemics**

- Antistaphylococcal
- AntiPseudo
- Quinolones



# CSOM –biofilms

- What is a biofilm?
  - Polysaccharide matrix surrounding bacteria,
  - Spore-like
  - Communication network for the bacteria
- Failure of anti-microbials (hypothesis)
  - Direct barrier effect
  - Biofilms antagonize abx through gene expression
  - Negative charged surface



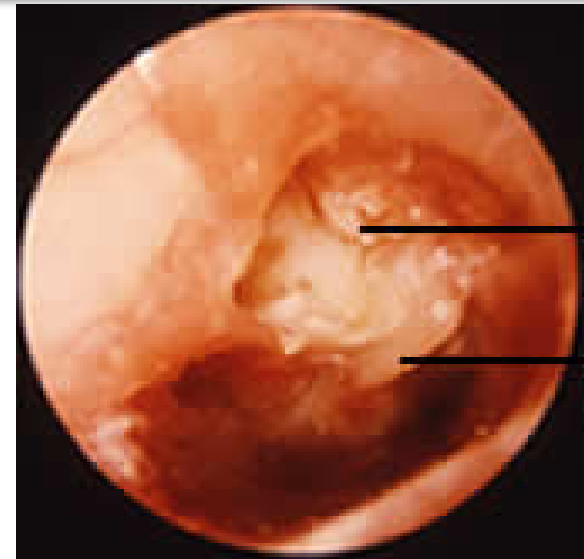


*Cholesteatoma*

**Cholesteatoma**

**Cholesteatoma**

**Cholesteatoma**



Cholesteatoma

Malleus



# Cholesteatoma

Skin growing in the wrong place

- Middle ear cleft
- Mastoid
- Petrous apex.

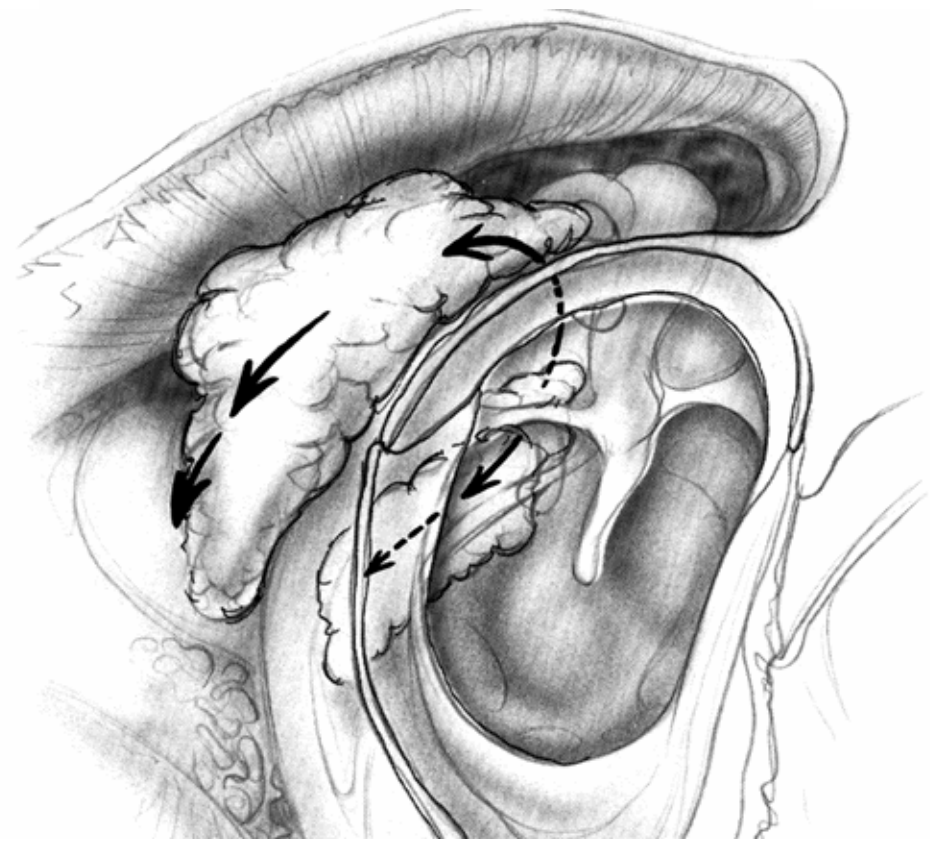
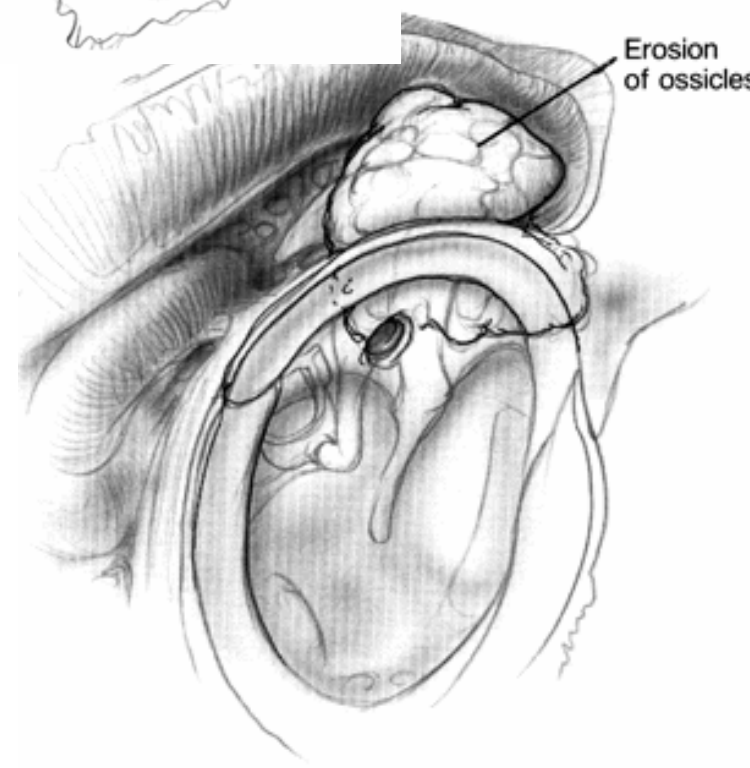
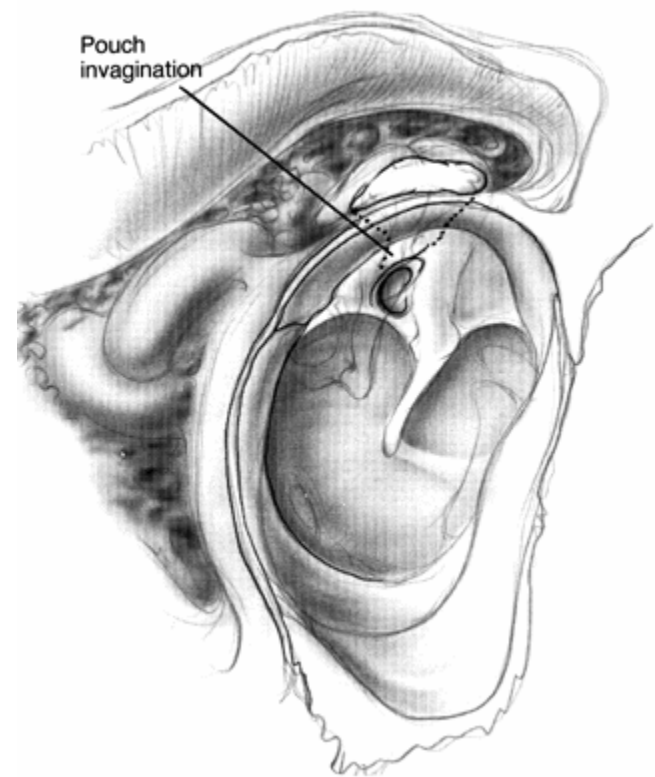
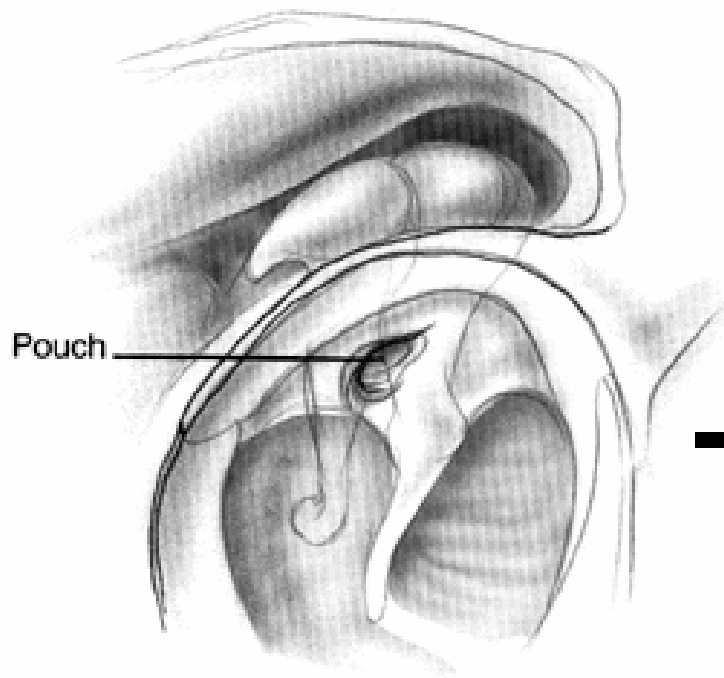




# Cholesteatoma

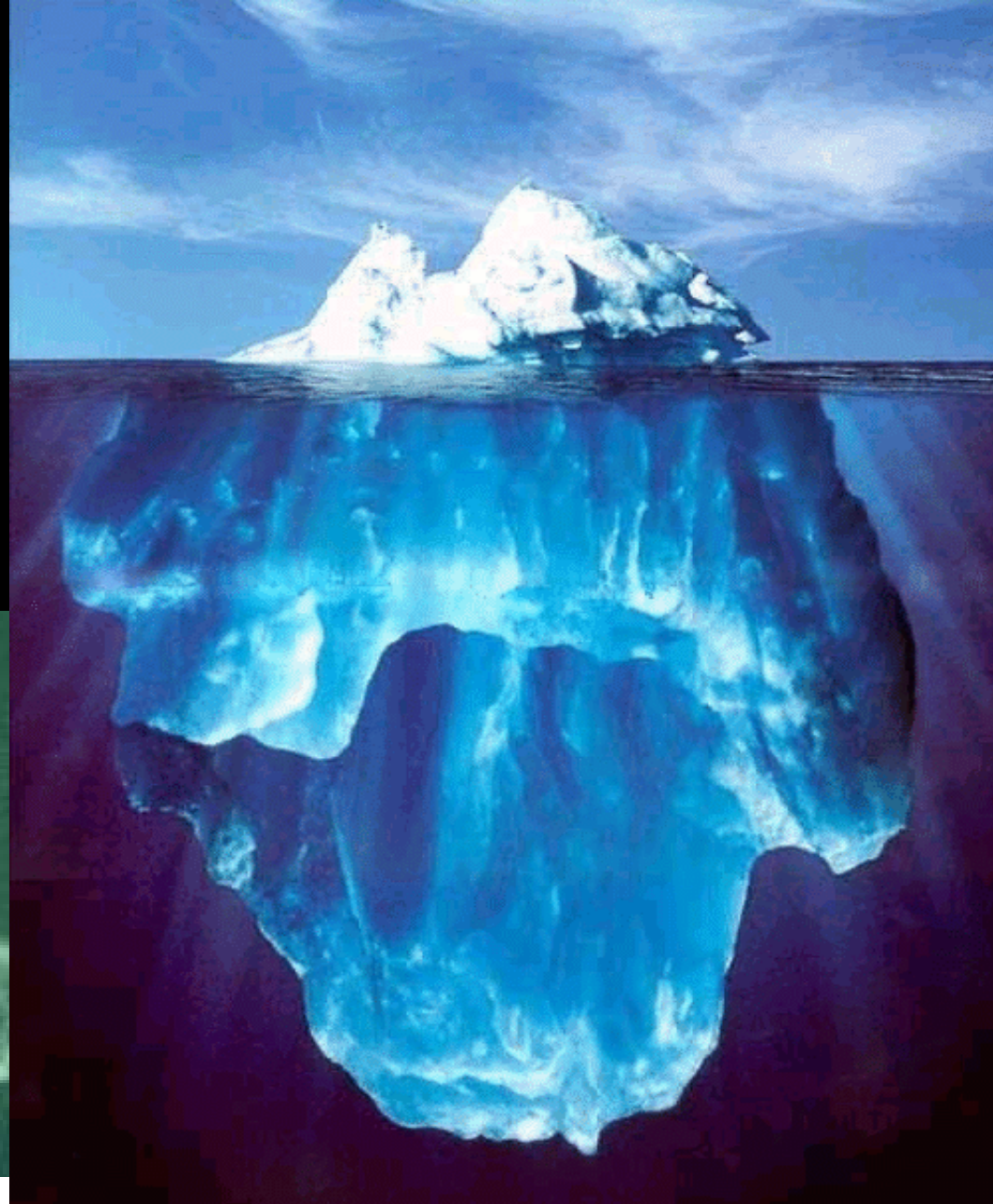
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- 1838 Mueller  
Cholesteatoma “tumor of fat”
- Schuknecht: keratoma
- Granulation tissue in contact with bone  
enzymes “collagenase” → bone destruction.





# What you see is just an Ice-burg





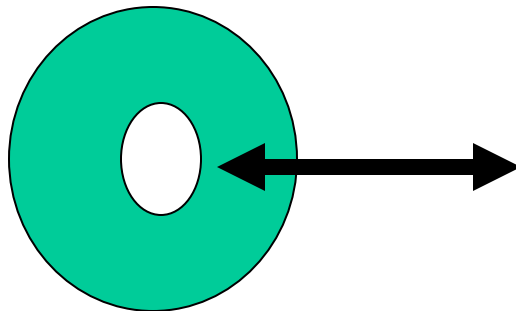


# Congenital cholesteatomas

1. Normal TM
2. No history of otorrhea
3. No history of otologic Sx



- Prior OM without otorrhea are not excluding

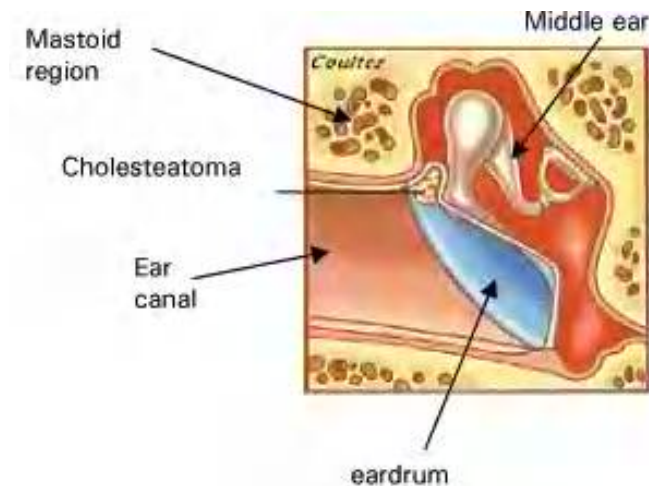




# Pathogenesis of cholesteatomas

## Primary acquired cholesteatomas pocket

- Invagination
- Basal cell hyperplasia
- Otitis media with effusion
- Epithelial invasion



## Secondary acquired cholesteatomas

- Implantation theory
- Metaplasia theory
- Epithelial invasion theory



# **Cholesteatomas**

**=**

# **Surgery**



# Surgical goals for cholesteatoma

1. Treat complications
2. Remove diseased tissue
3. Obtain a dry ear
4. Preserve normal anatomy
5. Improve hearing





# Determinants of operative technique for cholesteatoma

## Local factors

- Presence of a fistula
- Extent of disease
- Eustachian tube function
- Mastoid pneumatization
- SNHL

## General factors

- General medical condition
- Reliability
- Skill of the surgeon

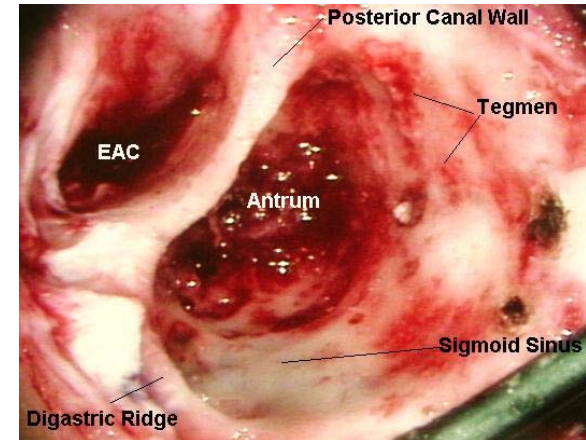




# cholesteatoma Surgery

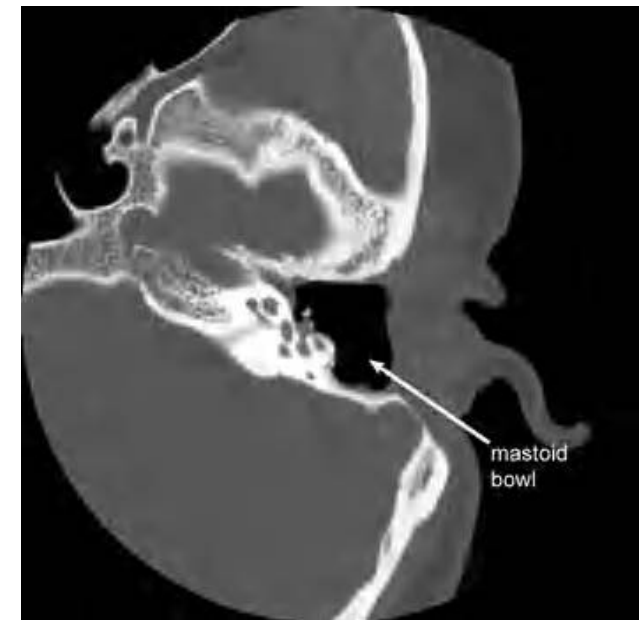
## Canal wall up (CWU)

- Complete mastoidectomy



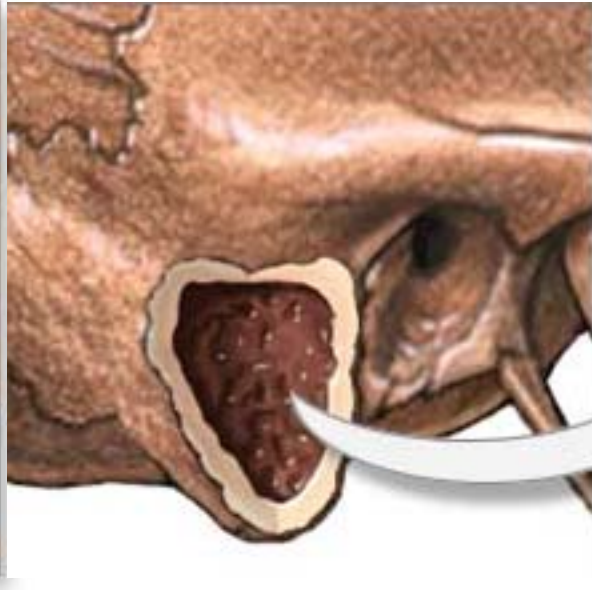
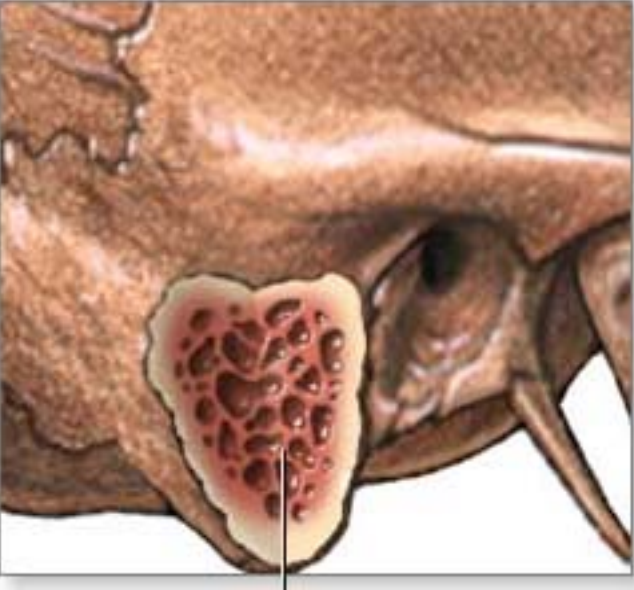
## Canal wall down (CWD)

- Modified radical mastoidectomy
- Radical mastoidectomy





# CWU Mastoidectomy





# **Complications**

## **CSOM**





# COM Complications

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## Intratemporal

1. Hearing loss (SNHL/CHL)
2. Facial paralysis
3. Mastoiditis
4. Petrositis
5. Inner ear Fistula
6. Labyrinthitis
7. Tympanosclerosis
8. Ossicular dyscontinuity and fixation



# COM Complications

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## Intracranial

1. Lateral sinus thrombosis
2. Epidural abscess
3. Subdural abscess
4. Meningitis
5. Brain abscess
6. Otitic hydrocephalus



# Hearing loss

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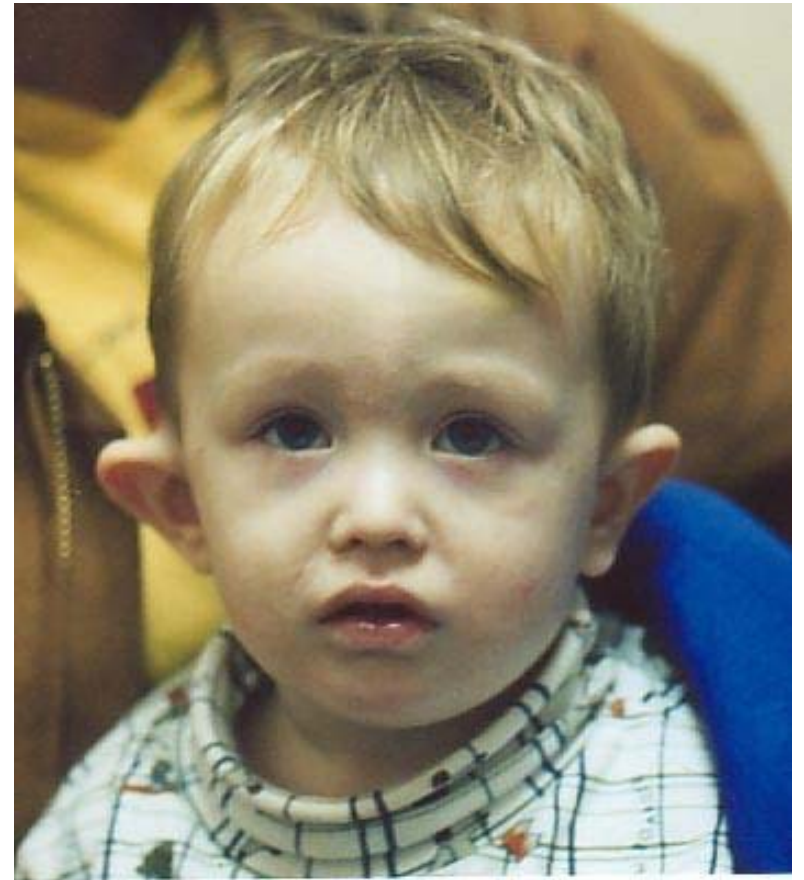
- SNHL
- Conductive hearing loss common
- Ossicular chain erosion
- Severity of loss varies despite extent of disease
- Silent cholesteatoma?

**Sound conductor**



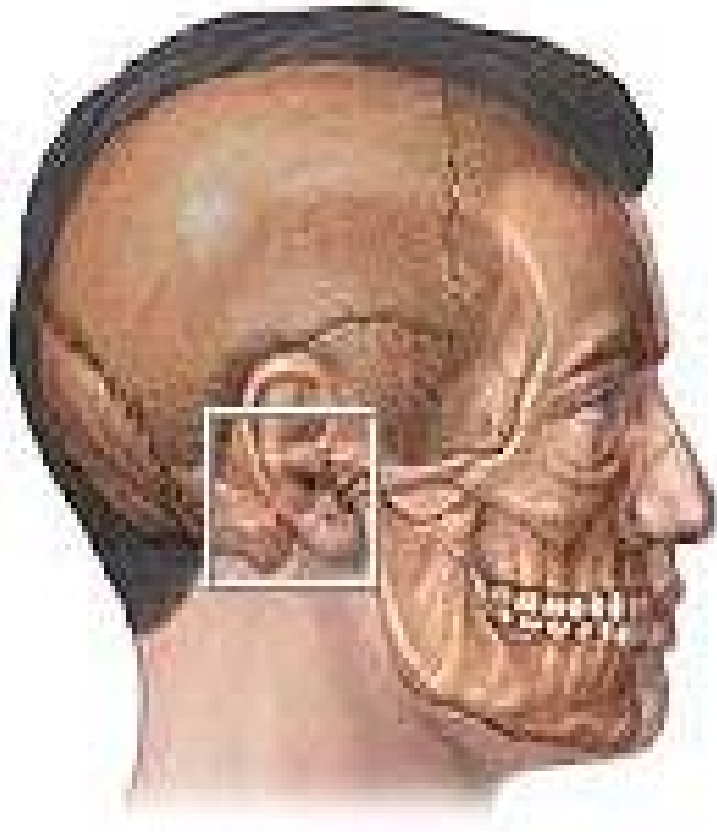
# Mastoiditis

- Inflammation of mastoid air cells
- Acute vs Chronic
- Fever
- 2 weeks after OM
- Earache
- Irritability





# Mastoid = الخشاء



الخَشَاءُ : مكان النحل

(وأوحى ربك الى النحل ان اتخذي من الجبال بيوتا ومن الشجر  
ومما يعرشون)



# Labyrinthitis

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- Infection of the inner ear
- SNHL
- Vertigo
- Nausea and vomiting



# التيه = Labyrinth



(قالَ فَإِنَّهَا مُحَرَّمَةٌ عَلَيْهِمْ أَرْبَعِينَ سَنَةً **يَتِيهُونَ** فِي الْأَرْضِ فَلَا تَأْسَ عَلَى الْقَوْمِ الْفَاسِقِينَ )



# Tympanosclerosis

- Asymptomatic
- Indicator of OM
- Ear drum stiffness
- Ossicular fixation







# Labyrinthine fistula

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- Suspect with
  - longstanding disease,
  - SNHL
  - vertigo
- Fistula test



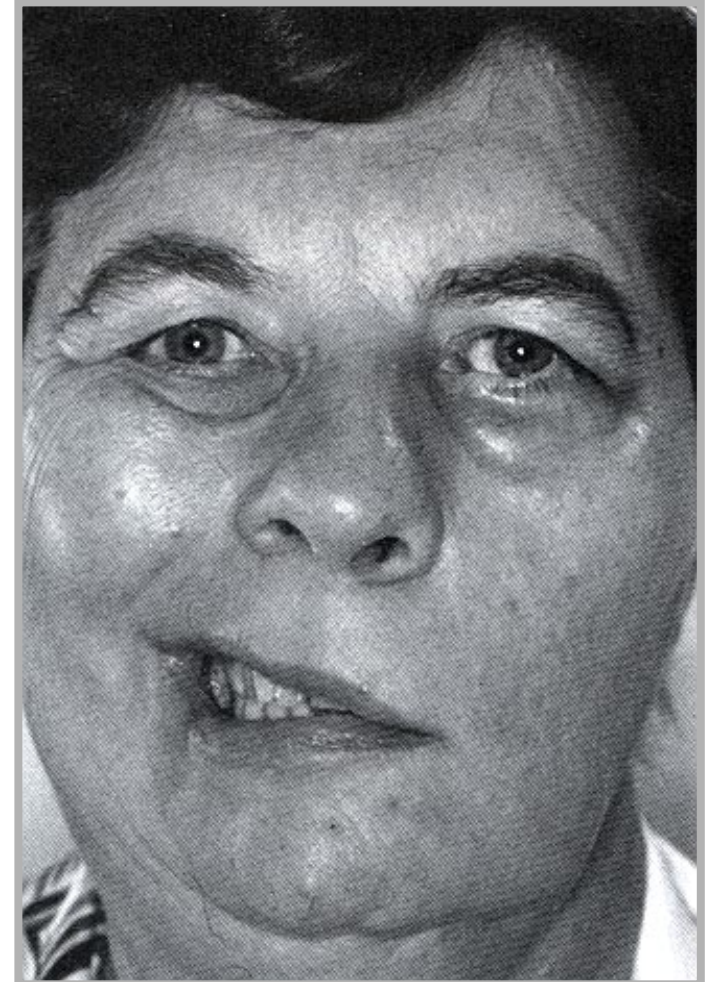
# Labyrinthine fistula

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- CT should be obtained
- Most common horizontal canal
- Requires CWD mastoidectomy



- 56 y
- Earache
- Chronic Discharge





# Facial paralysis

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- Slow – chronic expansion of disease
- Rapid – infected cholesteatoma
- With cholesteatoma requires immediate surgery
- CT localizes involved portion
- Decompression
- Do not open the nerve sheath



# Facial paralysis

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- Management

- Mastoidectomy

- Remove cholesteatoma and infected debris

- Acute OM

- Tube, IV antibiotics and +/- steroids +/- mastoidectomy



# ***Petrositis***

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Only in pneumatised petrous pyramids ( 30 % normal subjects)

- Infected petrous cells
- Poor drainage
- Bony coalescence → symptoms



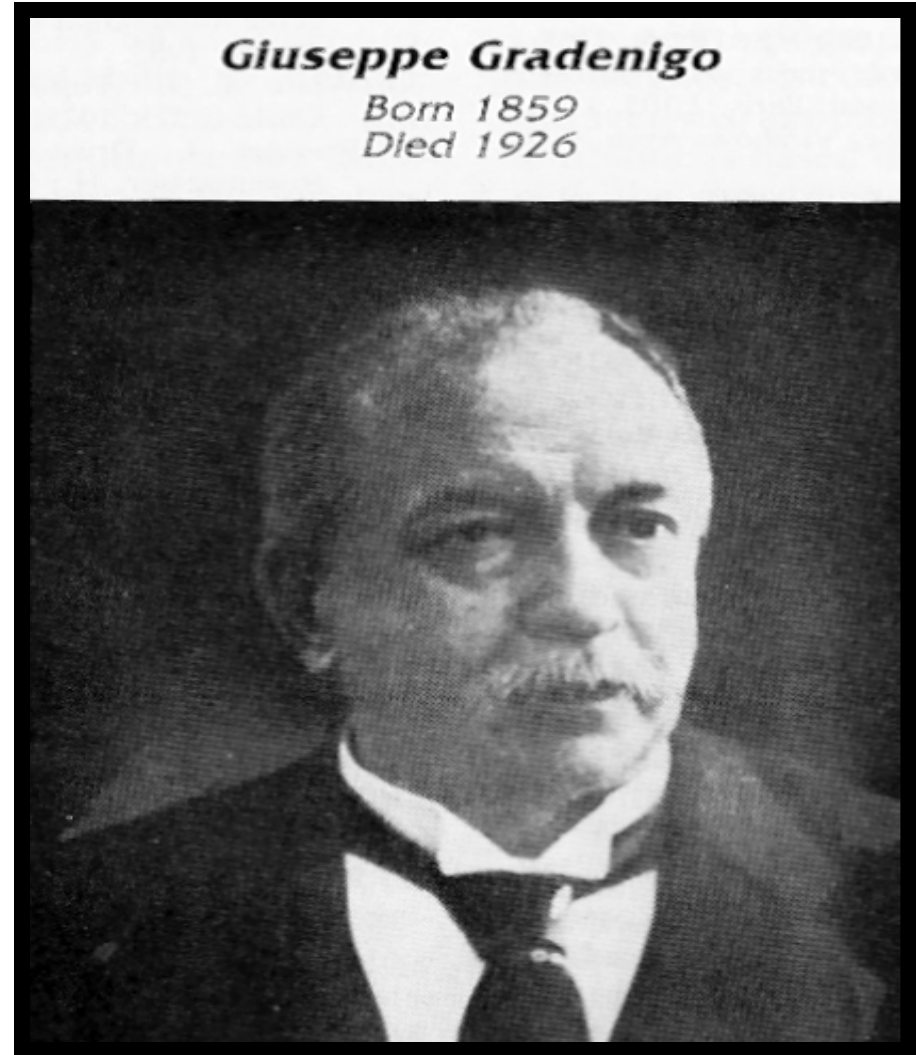
# SYMPTOMS

## **GRAD**enigo

- **R**etro-orbital Pain
- **A**bducent →  
Diplopia
- **D**ischarge

*Giuseppe Gradenigo*

*Born 1859  
Died 1926*





**CNS**

***Infections***





# Impending S/S

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- Decreased mental status
- Stiff neck
- Ataxia
- Visual changes
- Seizures
- Other

Headache, lethargy, fever, N&V



# Anatomic Relationships

## Barriers penetration

### 1. Bone

- Epidural Abscess
- LST

### 2. Dura Mater

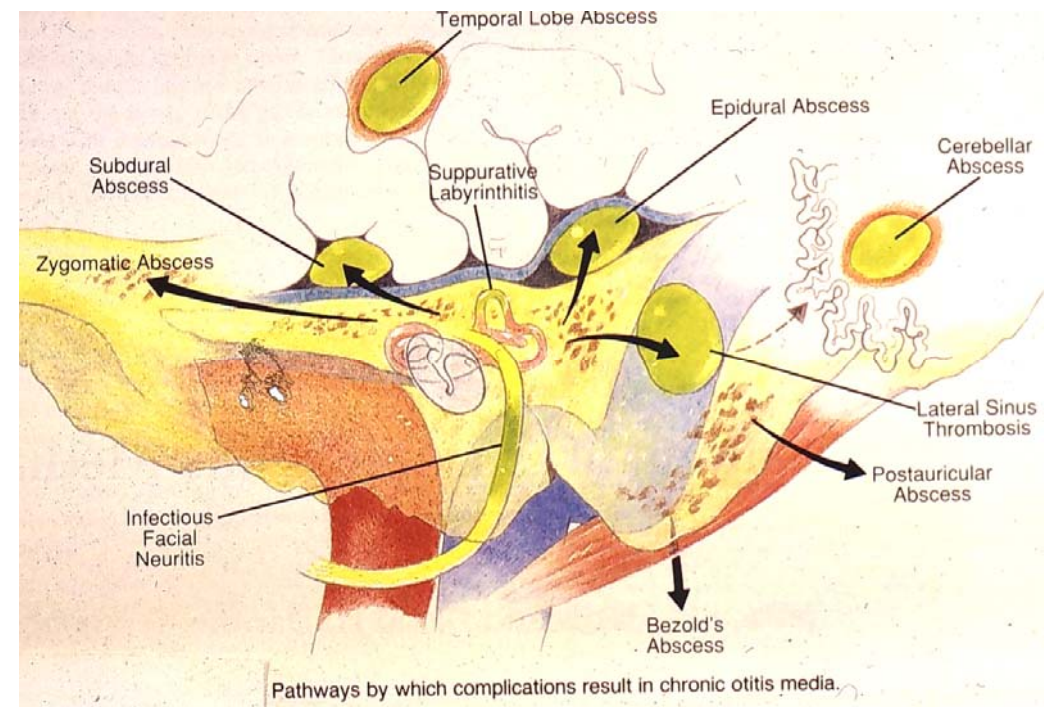
- Subdural Abscess

### 3. Arachnoid

- Meningitis

### 4. Pia Mater

- Brain Abscess
- Ventricles OHC





# COM Complications

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## Intracranial

1. Lateral sinus thrombosis
2. Epidural abscess
3. Subdural abscess
4. Meningitis
5. Brain abscess
6. Otitic hydrocephalus



# **Lateral Sinus Thrombosis (sigmoid sinus)**

Spread of infection by direct extension or  
via mastoid emissary vein



Pus and granulation adjacent to sigmoid  
sinus



Reactive thrombophlebitis



intraluminal thrombus



CSF obstruction



# Signs of LST

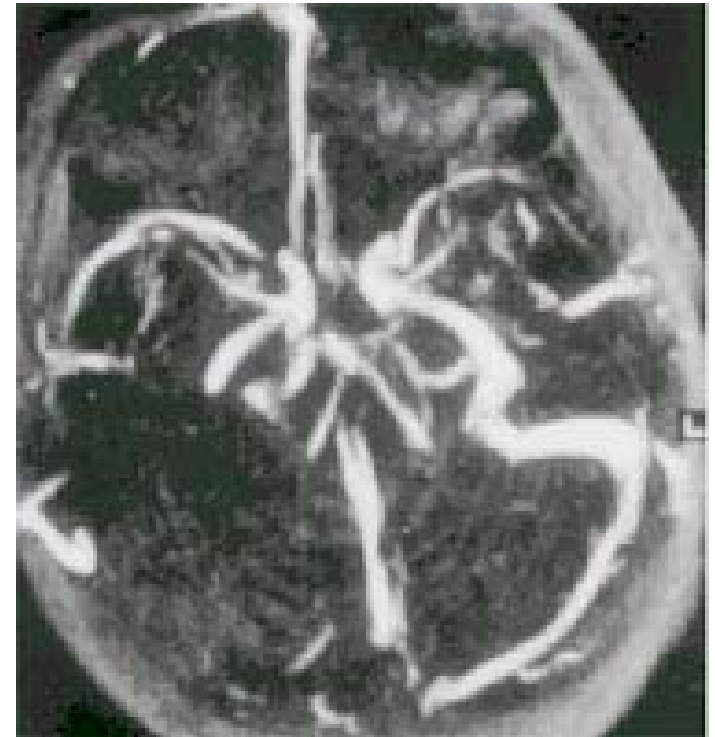
- Picket-fence fever →
- Jugular Foramen syndrome
- Papilledema
- Torticollis
- Greisinger sign →





# Lateral Sinus Thrombosis

- 👂 LST rare complication of AOM
- 👂 CT
- 👂 Angio
- 👂 MRI- MRV





# Lateral Sinus Thrombosis

## Treatment

👂 Empiric broad coverage until C&S  
antibiotic with good CSF penetration

### 👂 Surgery

👂 Mastoidectomy

👂 Decompression

👂 Thrombus evacuation



# Intracranial Epidural Abscess

- Localized between dura and bone
- Sharply defined
  - dural adherence to bone at suture lines
- Focal osteomyelitis
- Associated with subdural empyema
- Management and etiology same as subdural empyema

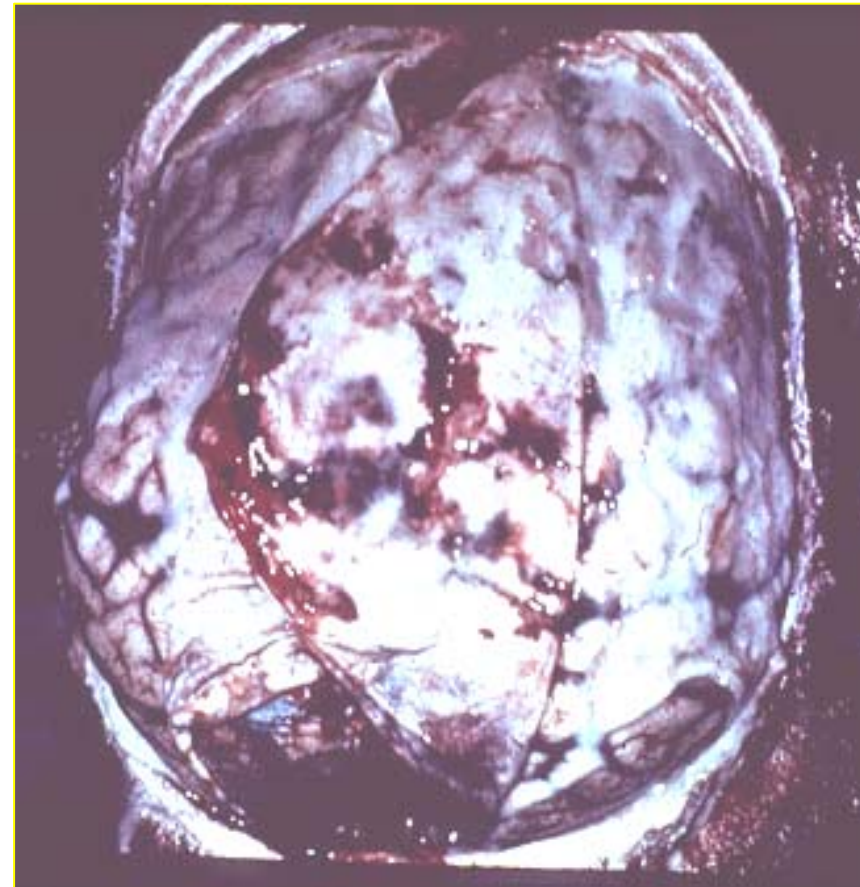






# Subdural Empyema

- Between the dura and the arachnoid.
- Potential space
- Lack of anatomical boundaries  
→ spread rapidly
- Ear 14%  
(paranasal sinusitis 75%)





# Subdural Empyema - clinical

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- Fever
- Focal neurological deficit
- Nuchal rigidity
- Headache
- Seizures
- Forehead or eye swelling from emissary vein thrombosis
- Vomiting



# Subdural Emphyema - evaluation

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- CT of head both with and without contrast
- LP - hazardous - risk of transtentorial herniation



# Management of Subdural empyema

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- Antibiotics - initially
  - Vancomycin
  - Chloramphenicol
  - Flagyl
  - Modify based on culture results
- Craniotomy
  - relatively emergency
  - Wide craniotomy
    - because of septations / loculations

# Meningitis





# Meningitis: Clinical Manifestations

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- Headache
- Nuchal rigidity
- Fever and chills
- Photophobia
- Vomiting
- Seizures
- Focal neurologic symptoms
- Altered sensorium (confusion, delirium, or declining level of consciousness)
- Rash

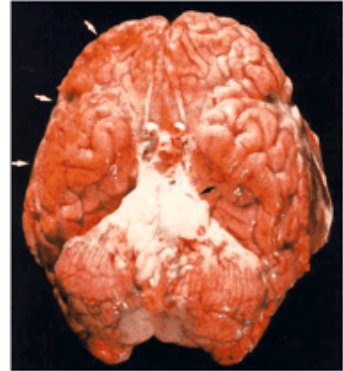


# Pathophysiology of Clinical Findings in Meningitis

Pathophysiology	Clinical features
Systemic infection	Fever, myalgia, rash
Meningeal inflammation	Neck stiffness, Kernig's sign, Brudzinski sign, cranial nerve palsies
Cerebral vasculitis	Focal neurologic abnormalities, seizures
↑ICP due to meningeal inflammation & cerebral edema	Change in mental status, headache, cranial nerve palsies, seizures



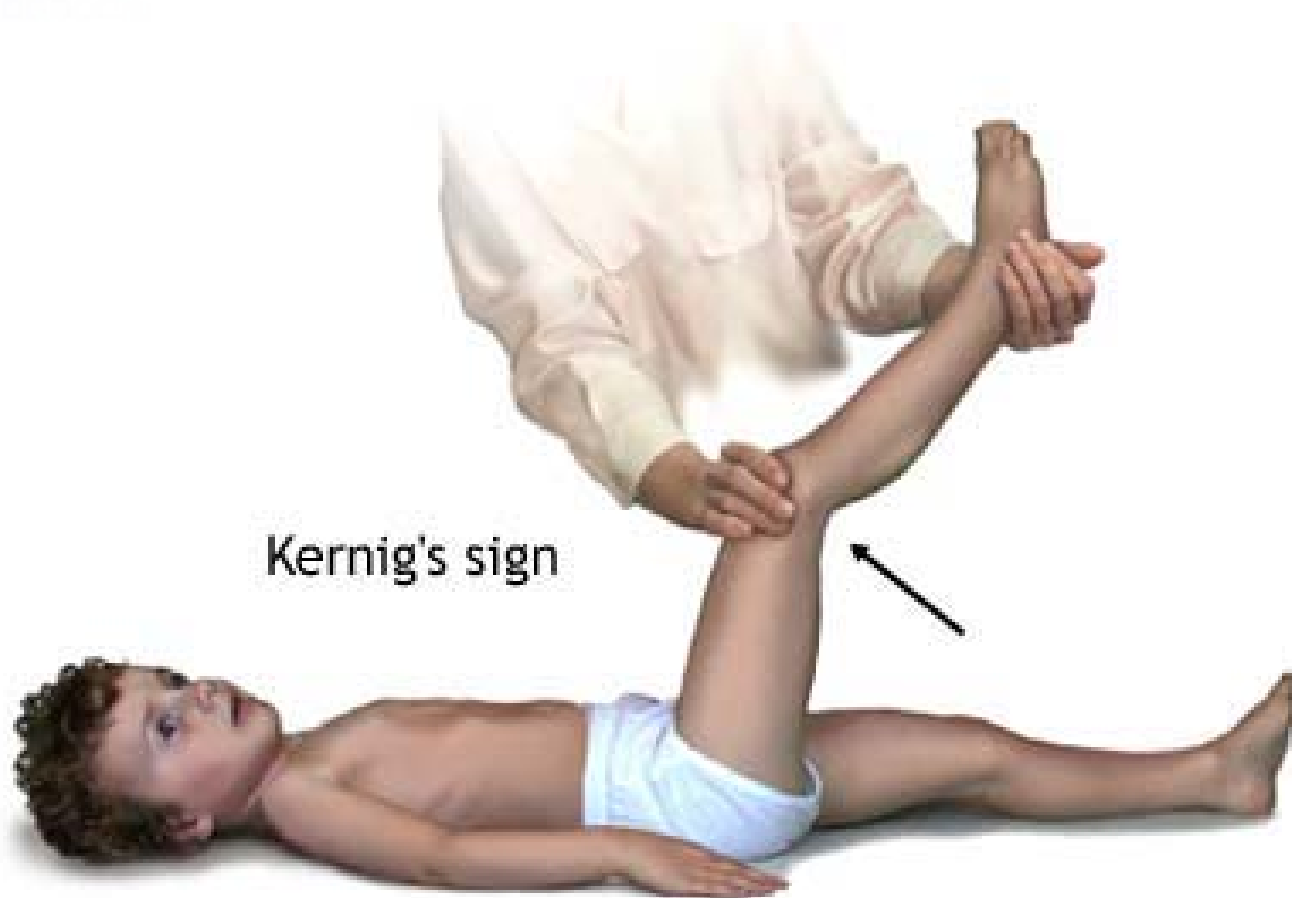
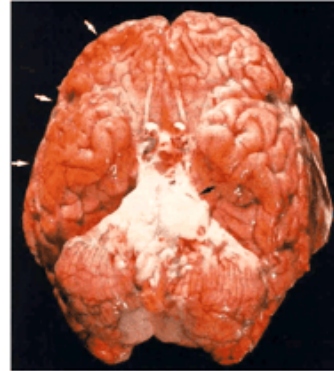
# Physical Examination Nuchal Rigidity







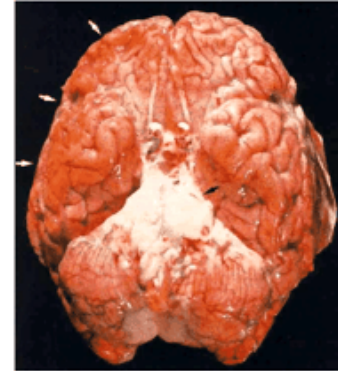
# Physical Examination



Kernig's sign



# Physical Examination



Kernig & Brudzinski signs have low sensitivity but high specificity



# CSF Findings in Meningitis

	Normal	Bacterial	Viral	Fungal/ TB
WBC	0-5	<b>&gt;1,000</b>	<b>100-1,000</b>	<b>100-500</b>
%PMNs	0-15	<b>90</b>	<50	<50
Glucose	45-65	<b>&lt;40</b>	45-65	30-45
CSF:Blood glucose	0.6	<b>&lt;0.4</b>	0.6	<b>&lt;0.4</b>
Protein	20-45	<b>&gt;150</b>	50-100	<b>100-500</b>

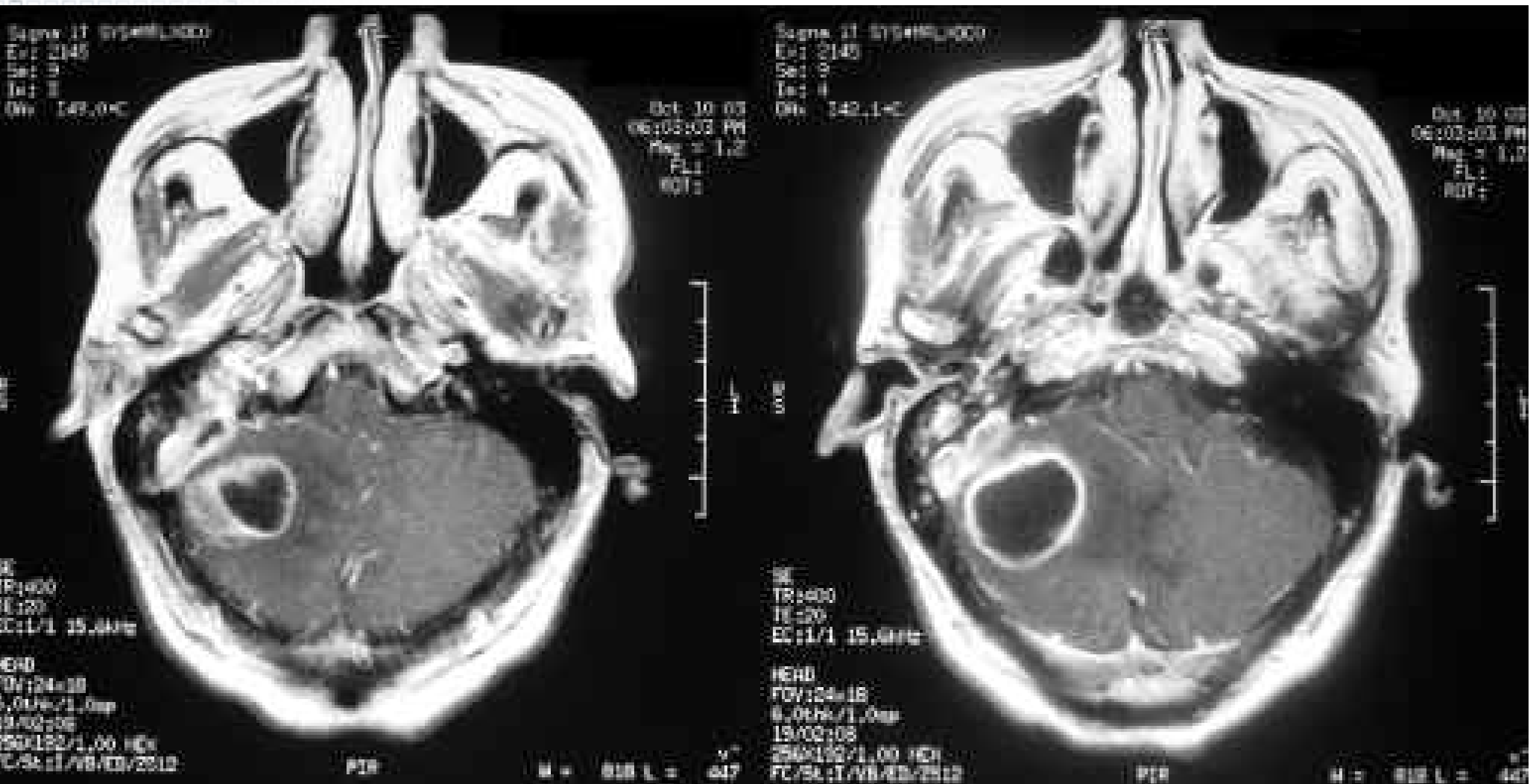


# CSF Microbiology

- Gram stain:
  - Sensitivity 60-90%
  - Specificity nearly 100%
  - In pts who received an antibiotic: 40-60% (+)
- Culture (+) in 70-85%
  - <50% (+) in those partially treated
- False-negatives may occur in patients who are partially treated



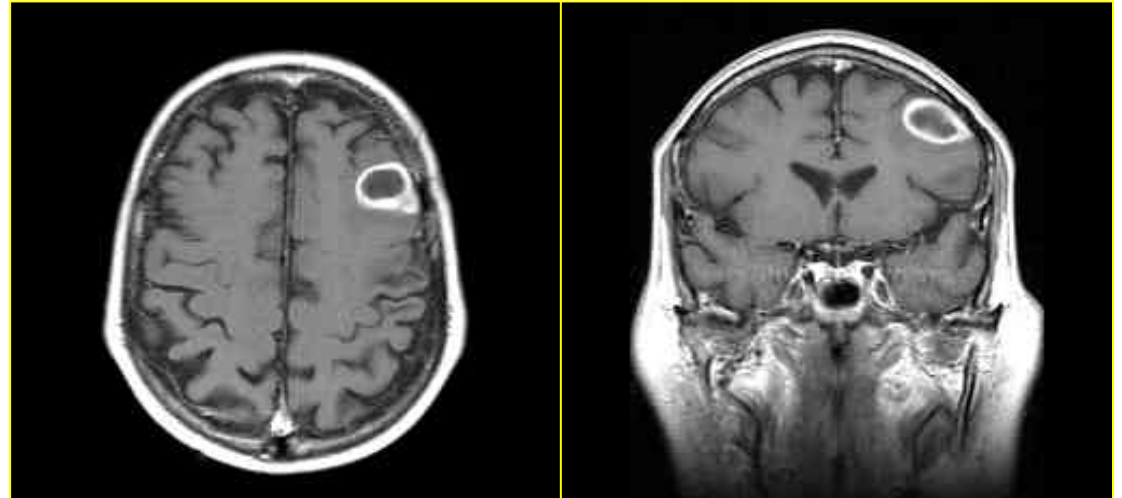
# Intraparenchymal abscess



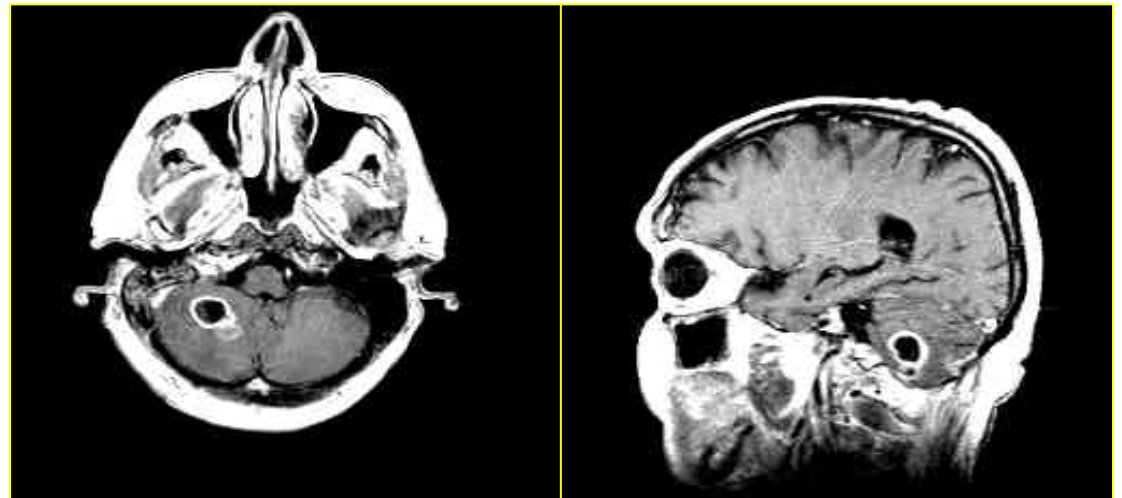


# Brain infection

- Temporal Lobe



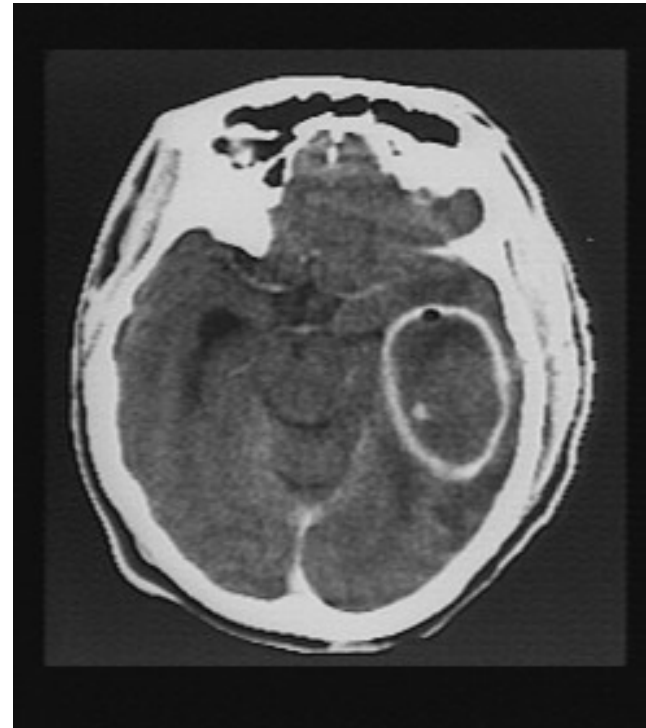
- Cerebellum

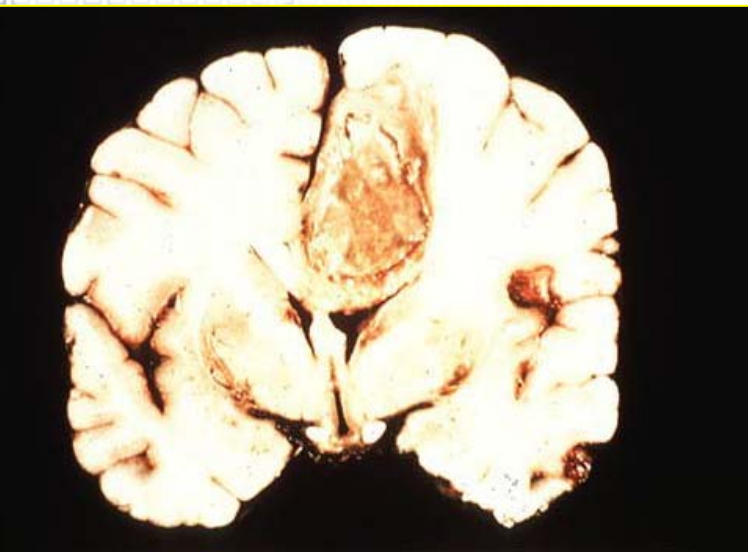




# Stages of Brain Abscess

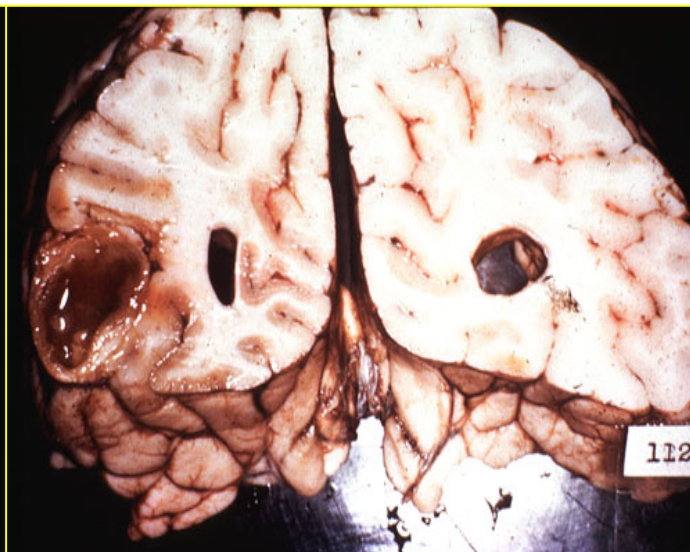
1. Encephalitis
2. Latency
3. Expanding
4. Rupture





## ***Encephalitis***

*Poorly localized area of discoloration and softening.*



## ***Latency***

*Early Abscess Stage – increasing necrosis of center with beginnings of capsule formation*



## ***Expanding***

*(Late Stage) - dense fibroglial capsular wall and purulent center*





# Brain Abscess - Clinical Presentation

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- non-specific Symptoms for abscess
- increased intracranial pressure
  - Headache,
  - Nausea/Vomiting
  - Lethargy.
  - Seizures.



# ***Otic hydrocephalus***



# ***Otitic hydrocephalus***

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- Misnomer (no ventricular dilatation)
- Many terms used including
  - pseudotumour cerebri
  - Benign intracranial hypertension
  - idiopathic intracranial hypertension
  - serous meningitis
  - angioneurotic hydrocephalus
  - meningeal hypertension



# Symptoms

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- Non-specific
- Headache
- Tinnitus
- Nausea / vomiting
- Visual disturbance
- Others – lethargy, dizziness, mood change



# Headache

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- Frontal worse on lying down
- Raised intracranial pressure
- Papilloedema
- $\pm$  VI n. palsy



# Management

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- Goals of treatment are
  - Treat underlying disease
  - symptom relief
  - preservation of vision
- Various treatment modalities including
  - medication
  - repeated lumbar punctures
  - surgery



# Cont;d

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- Oral corticosteroid
- Repeated lumbar punctures
- Lumboperitoneal shunting



# Prognosis

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- High variable course
- May resolve within months to years
- 10% recur (weeks to years)
- 10 % serious visual loss





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# Cases



# COM

- 45 Y
- Rt Ear Hearing loss
- Discharge





# Cholesteatoma

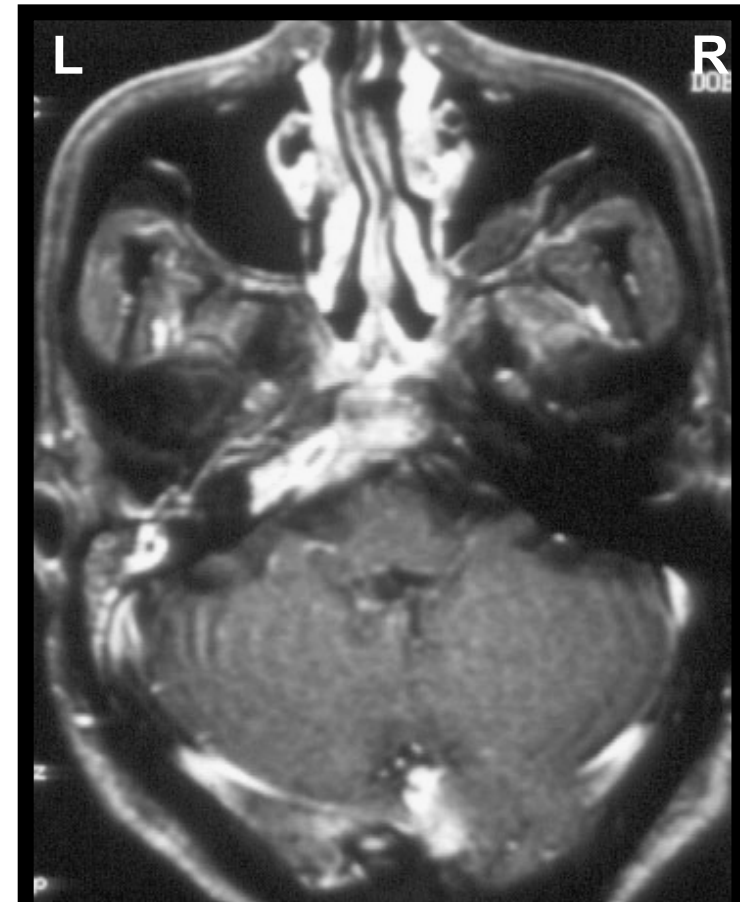
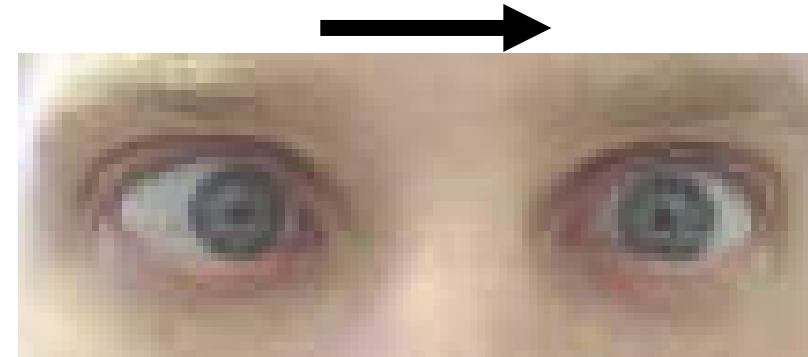
- **35 Y**
  - **Left ear**
  - **Discharge**
  - **Deafness**
- 
- **Diagnosis?**
  - **Treatment?**





# ***Petrositis***

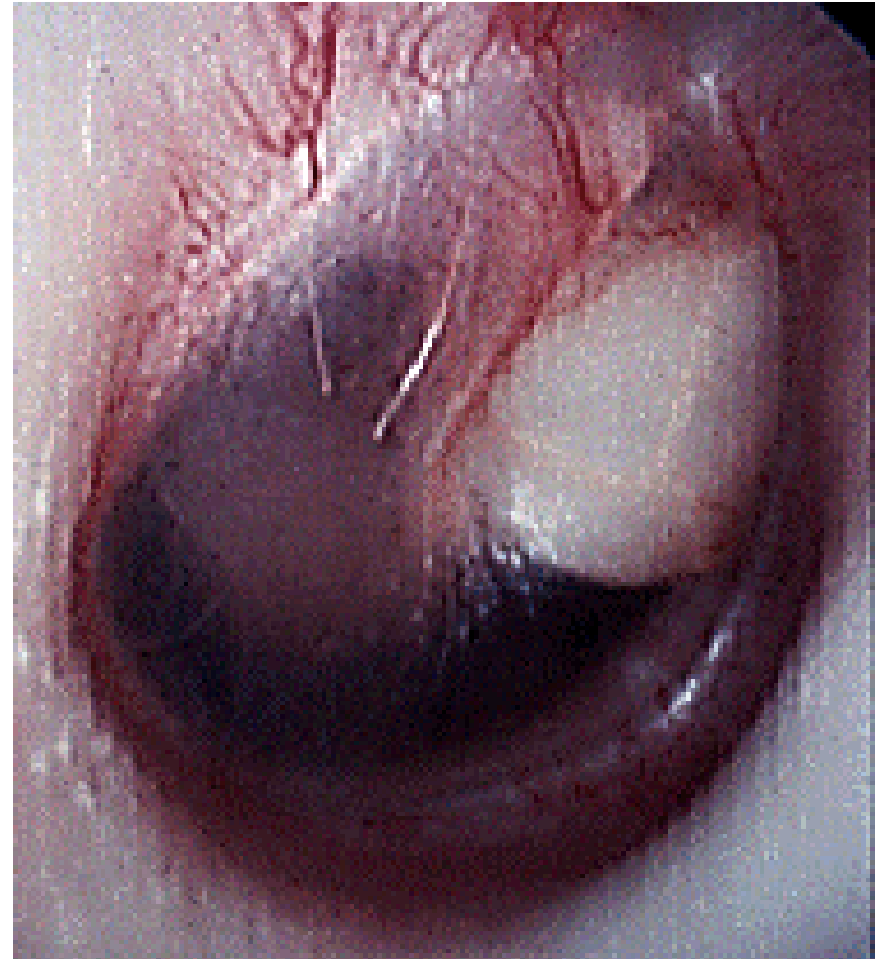
- 50 Y
- Headache
- Persistent ear discharge
- Diplopia





# Congenital cholesteatoma

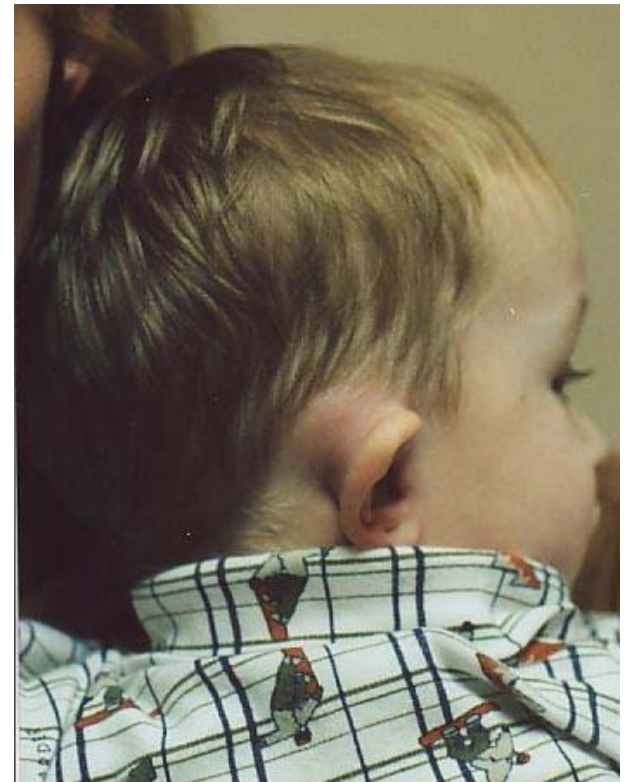
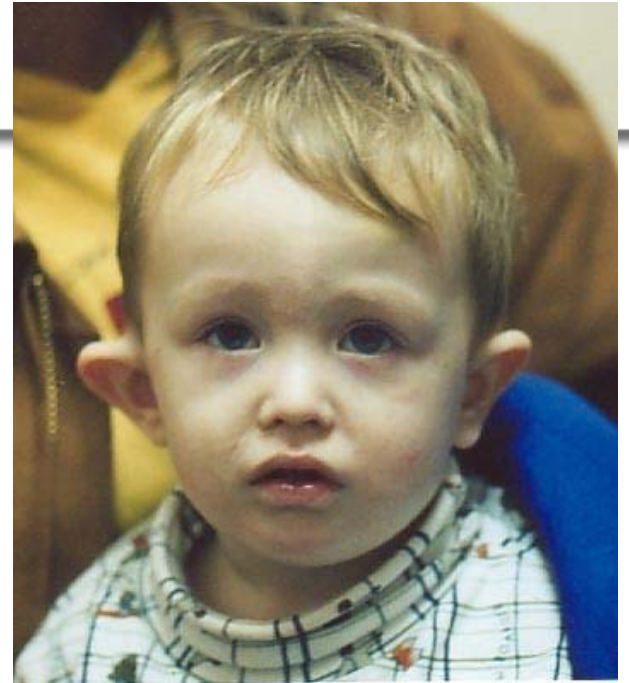
- **3 Y**
- **Healthy**
- **Incidental finding →**





# Mastoiditis

- 3.5 Y
- 2 weeks ago OM
- Fever
- Earache
- Exam →





# Brain abscess

- 35 Years
- PMHx Rt CSOM
- Fever
- Headache





***The***

***End***