

Otology I

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Table of Contents - Otology I and II

1. Temporal bone anatomy and pathophysiology of hearing
2. Examination methods
3. External ear diseases
4. Middle ear diseases
5. Complications of middle ear infections
6. Inner ear disease

7. Temporal bone surgery
8. Surgical treatment of hearing disorders

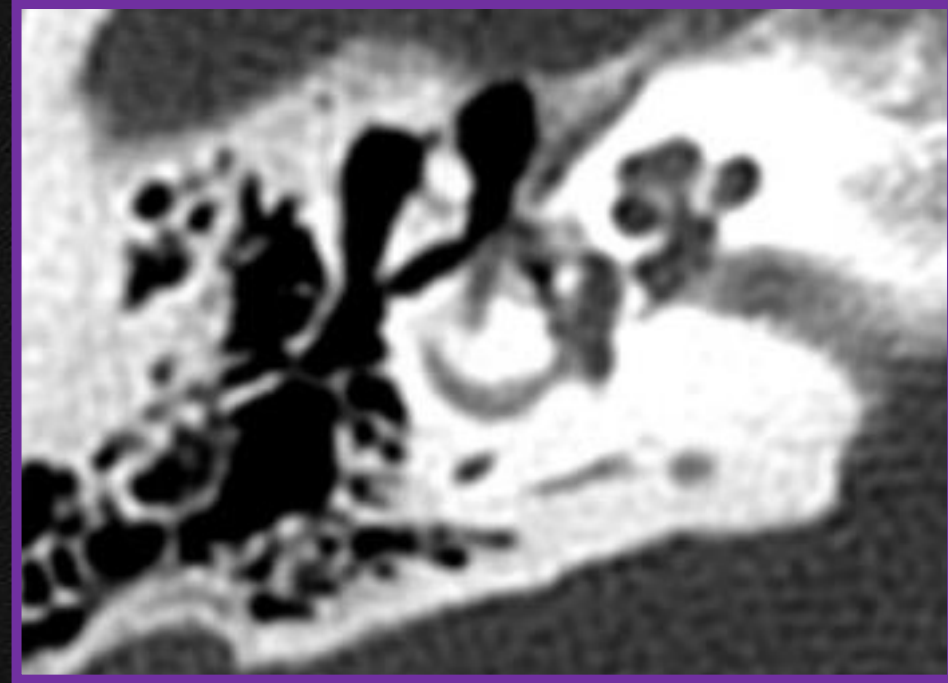
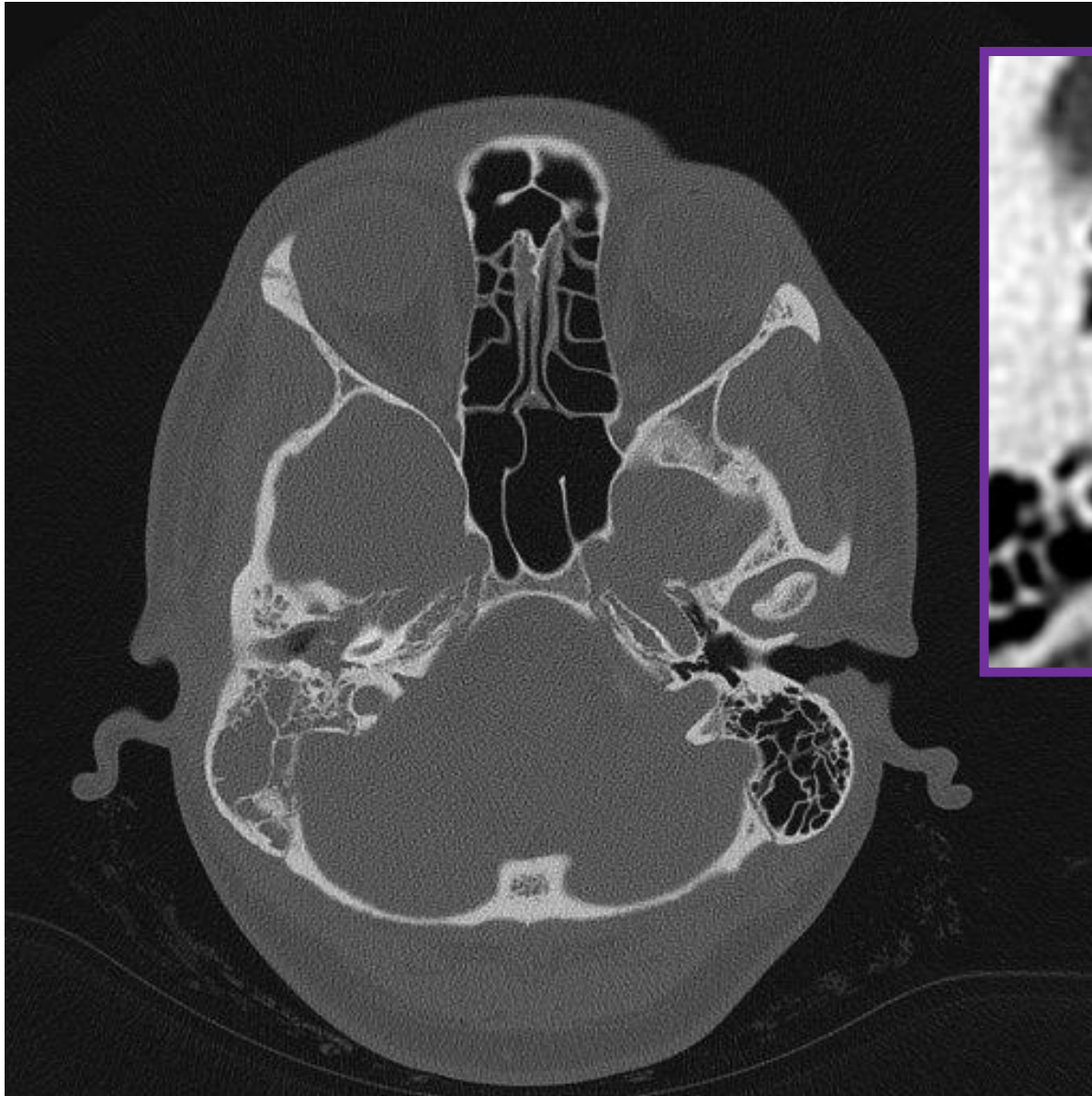
Temporal bone tumors?

-> Skull base lecture

Vestibular disorders?

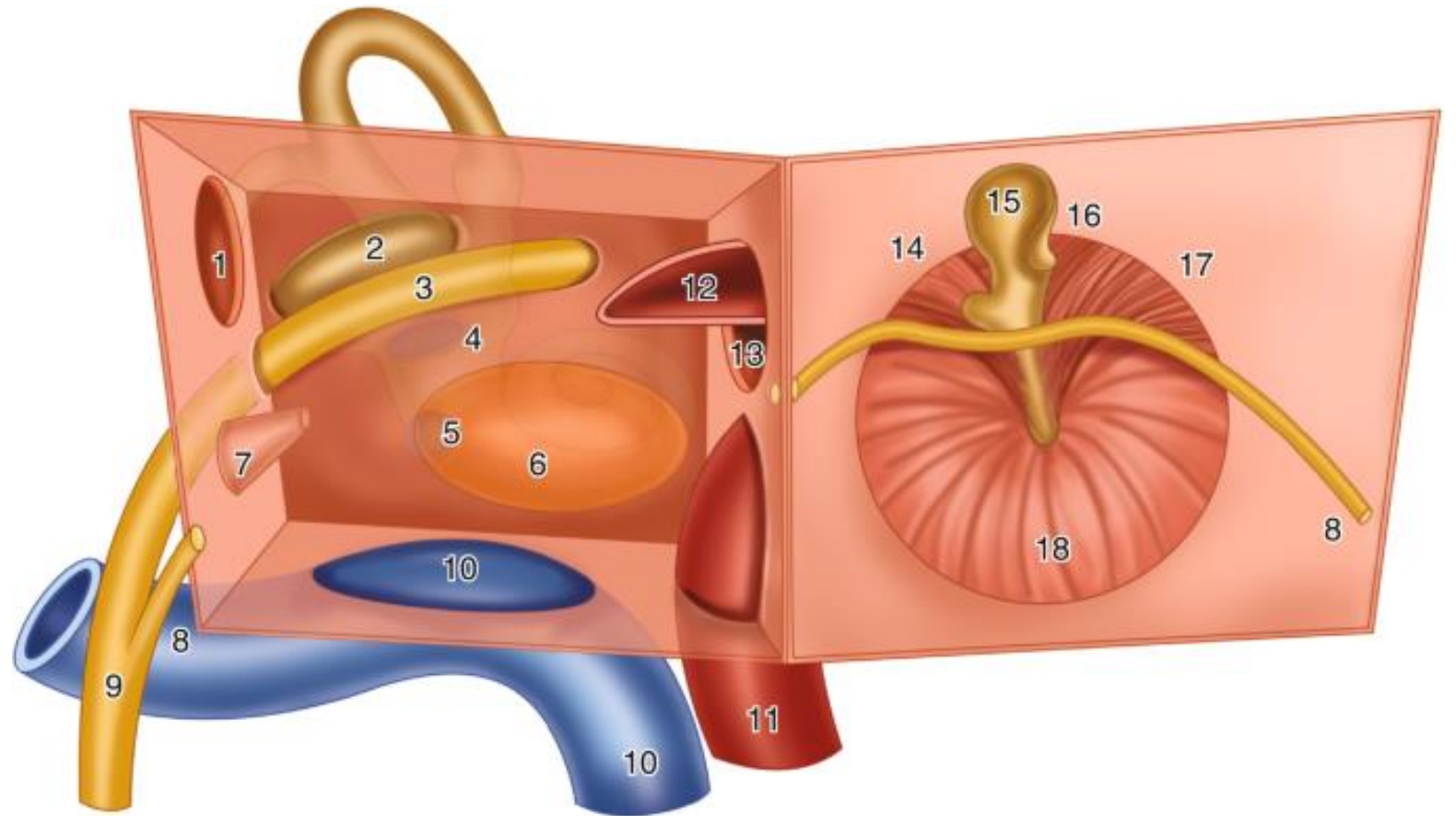
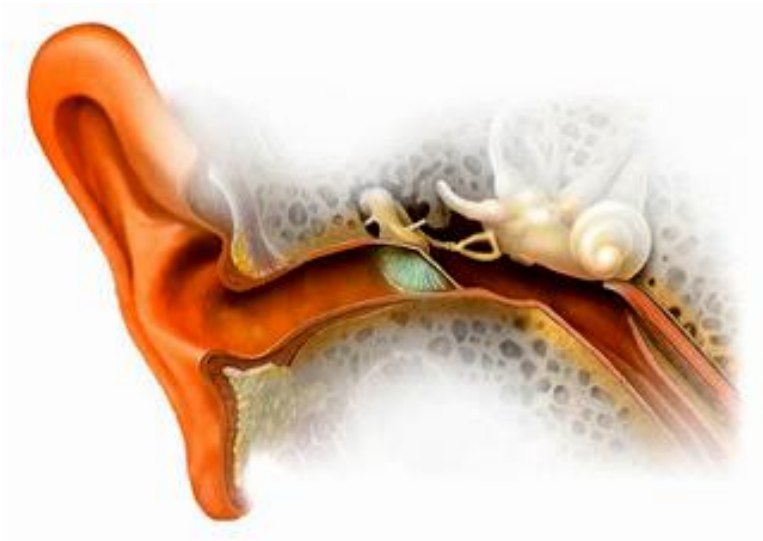
-> Otoneurology lecture

Temporal bone anatomy



- The most complicated bone
- Many important vascular and neural structures in a very small space

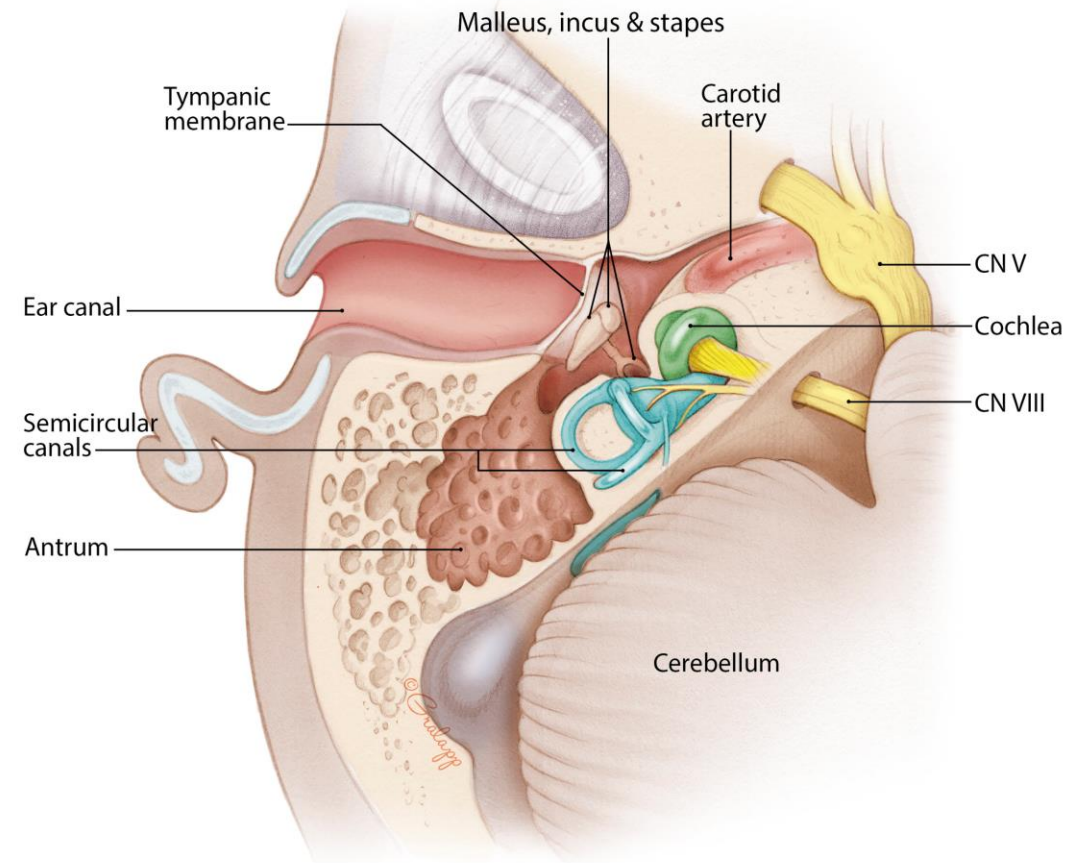
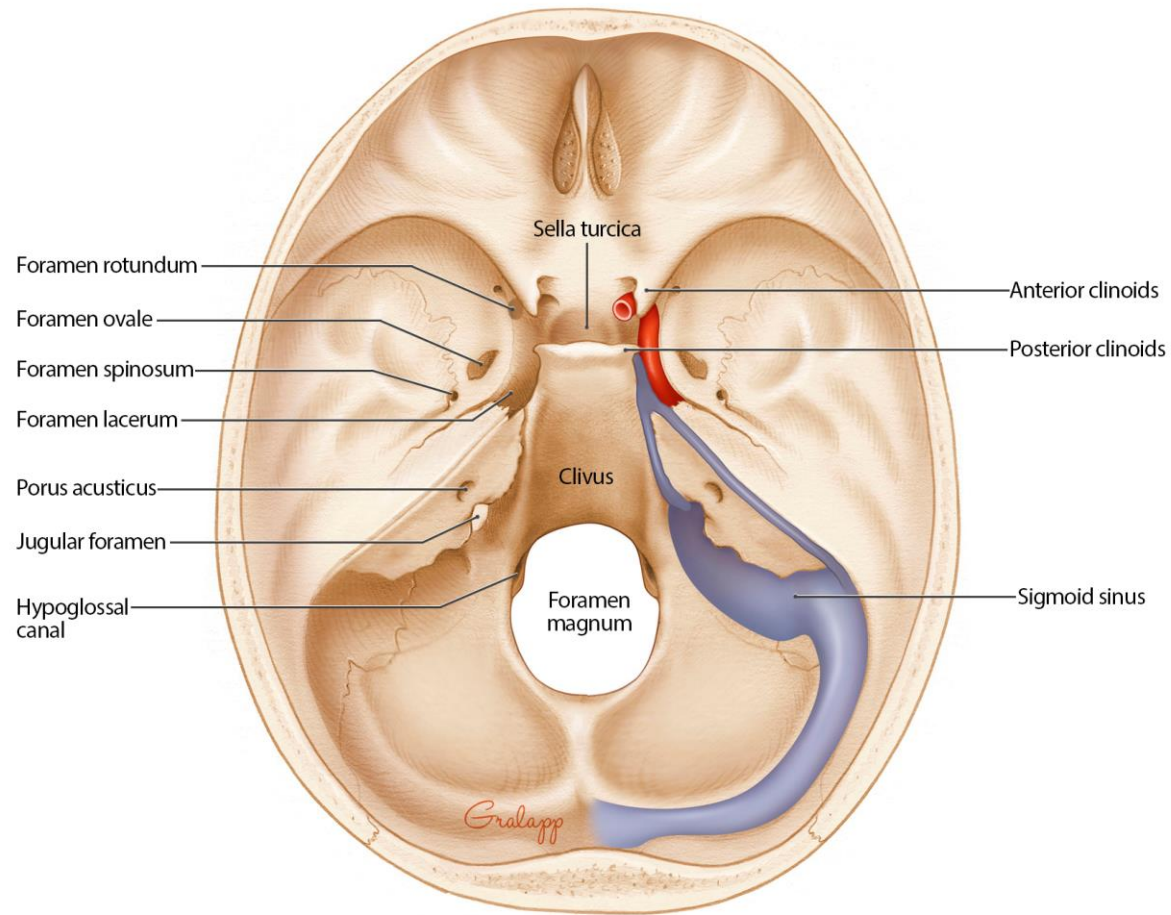
Temporal bone anatomy



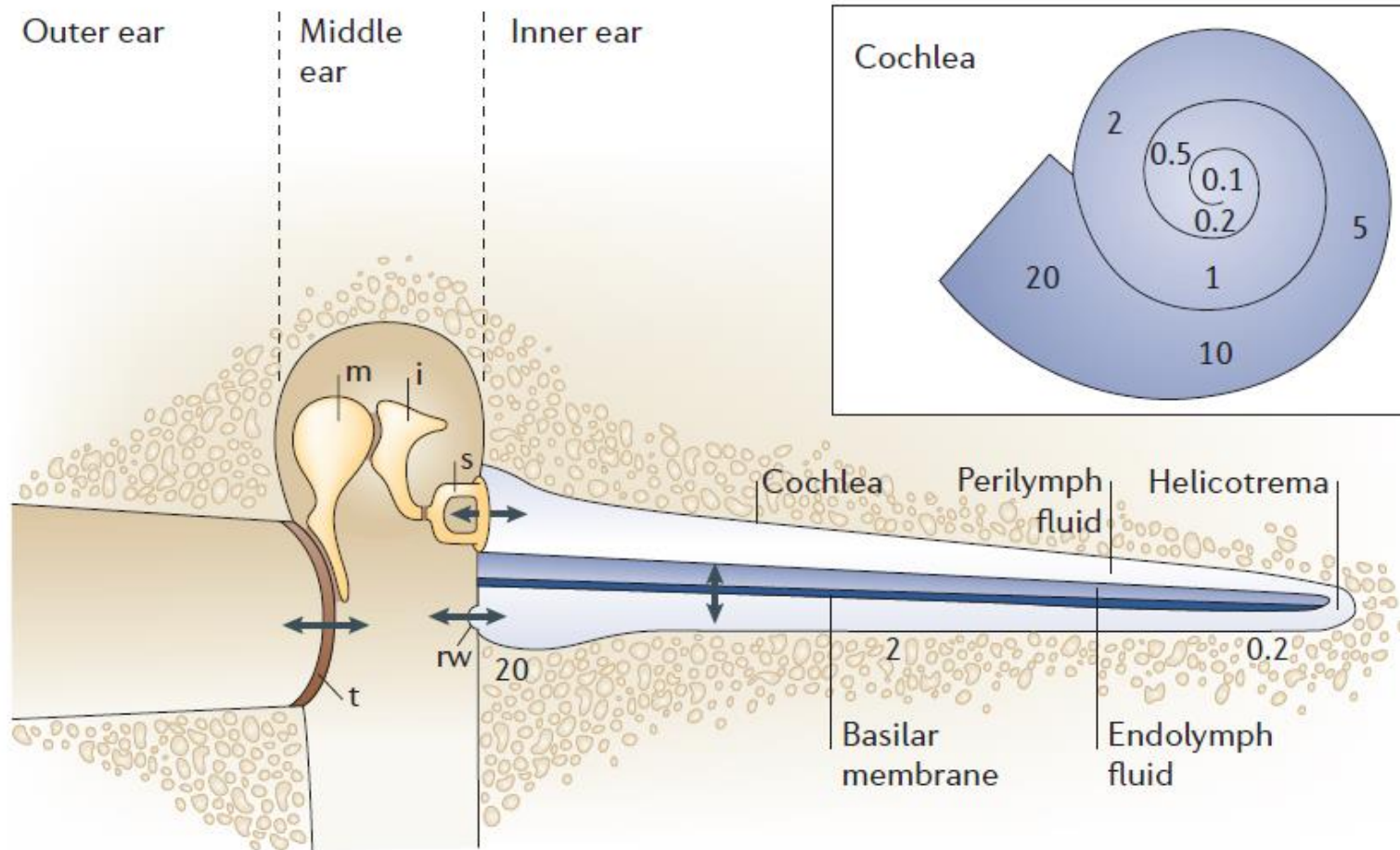
Ear

- External
- Middle
- Inner

Temporal bone anatomy



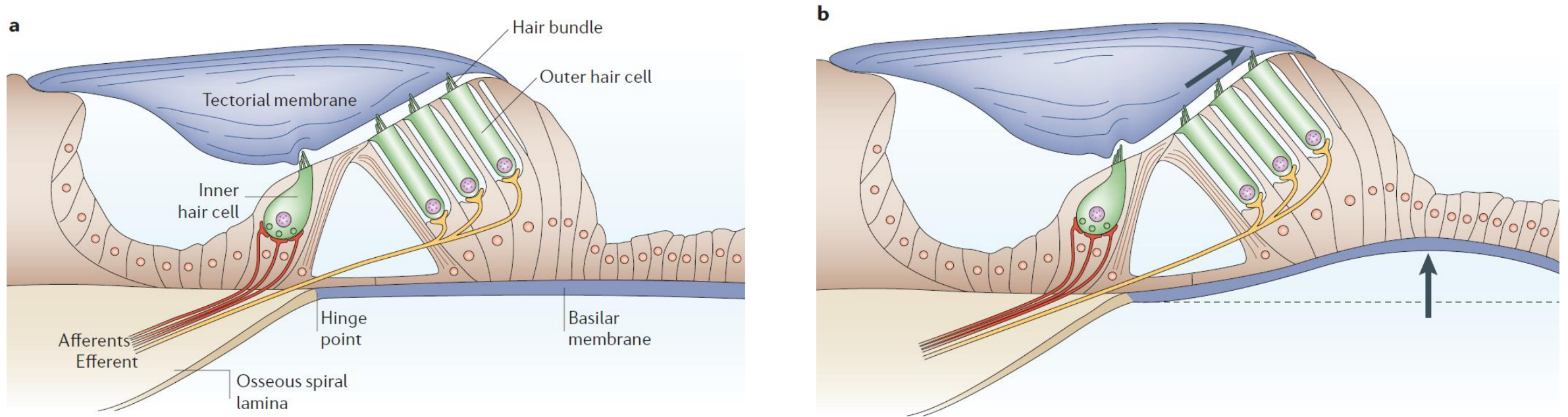
Physiology and pathophysiology of hearing



Hearing disorder

- > conductive
- > sensorineural
- > combined

Physiology and pathophysiology of hearing



Zdroj: Fettiplace, 2006, Nature review, Neuroscience

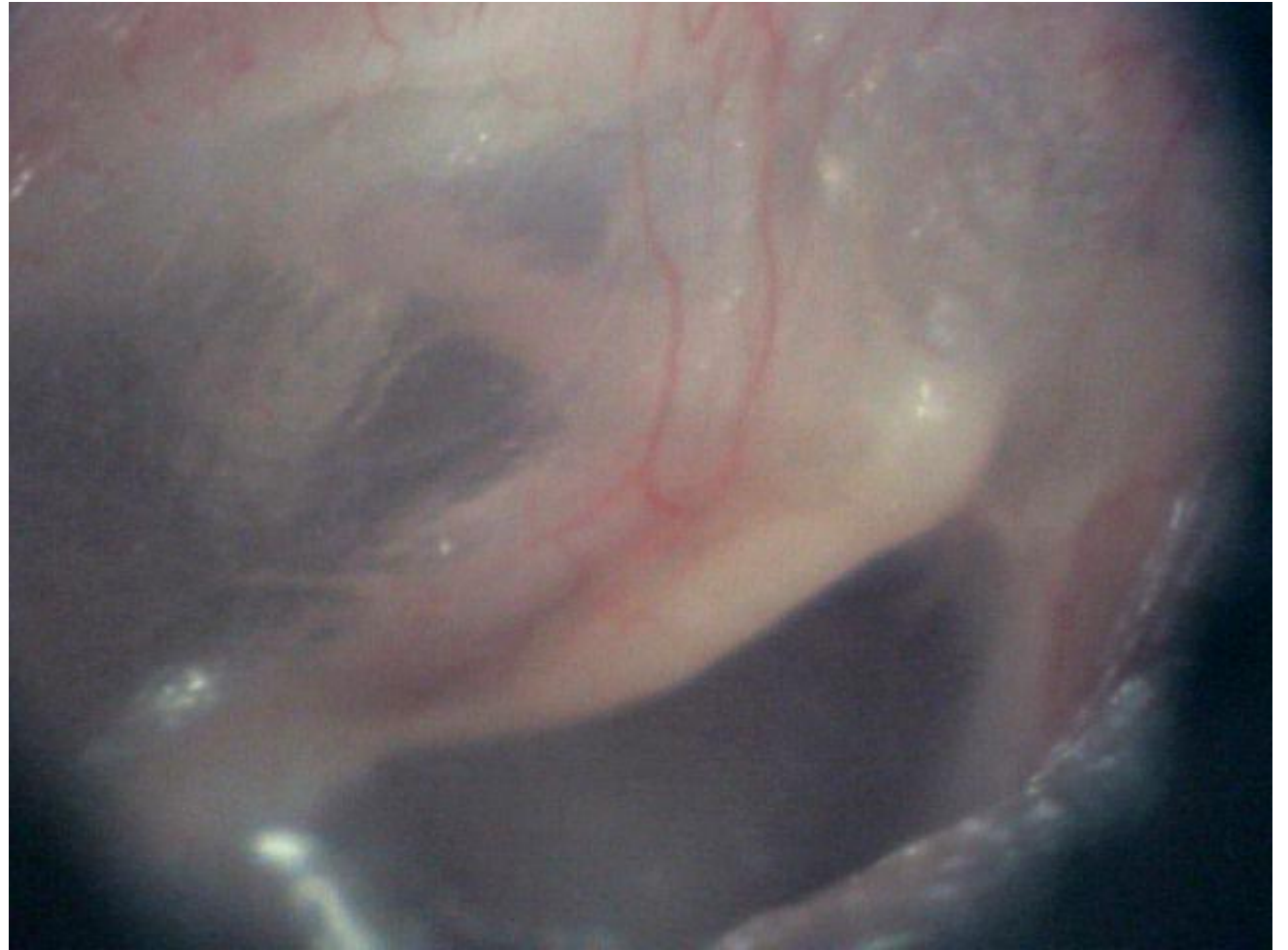
Outer hair cell movement -> otoacoustic emissions

Deterioration of outer hair cells -> loudness recruitment

Examination methods in otology

- Otoscopy/ otomicroscopy / otoendoscopy
- Audiological testing
- Imaging methods

Otoscopy



Basic audiological testing

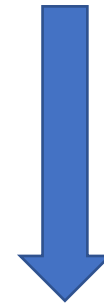
- Tuning forks
- Pure tone audiometry
- Speech audiometry
- Tympanometry + Stapedial reflexes
- Otoacoustic emissions
- Auditory brainstem response (ABR, BERA)

Subjective

Objective

Hearing problem?

Sensorineural x Převodní vada ?



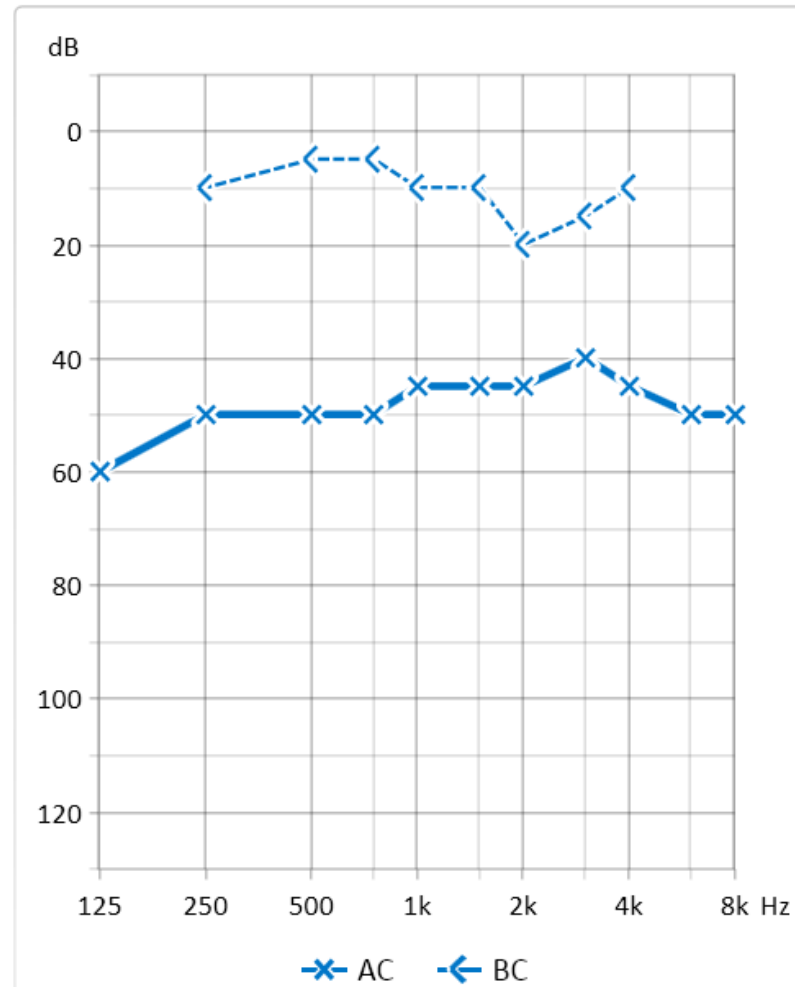
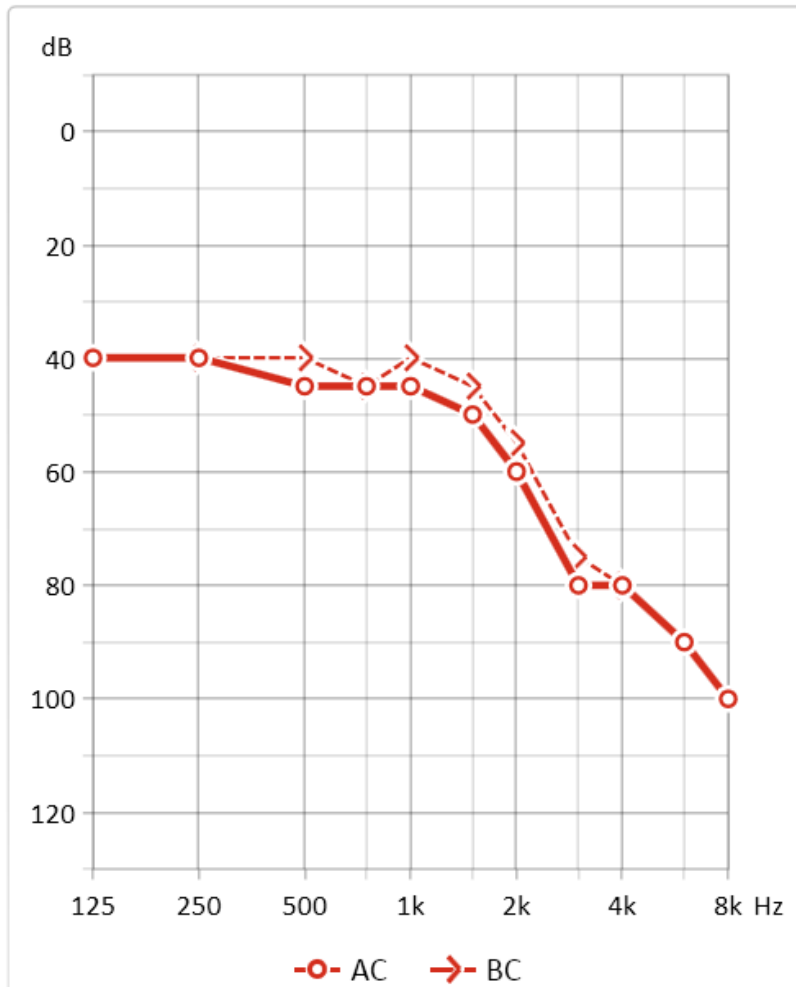
Cochlear x retrocochlear ?

Pure tone audiometry

Pravé ucho

Audiogram (dB sluchová ztráta)

Levé ucho



Imaging methods

- **HR CT**

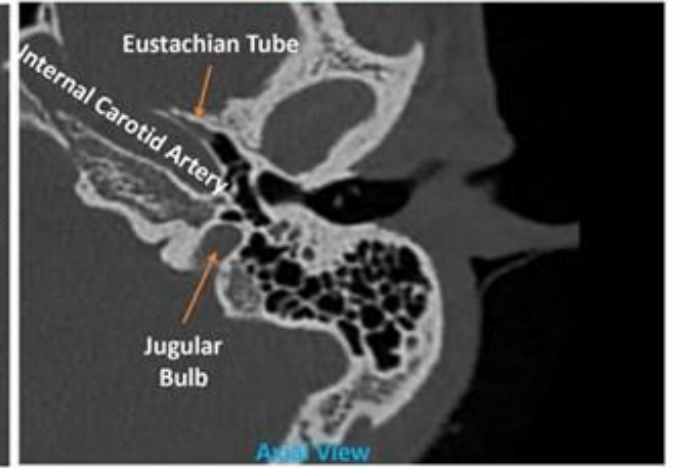
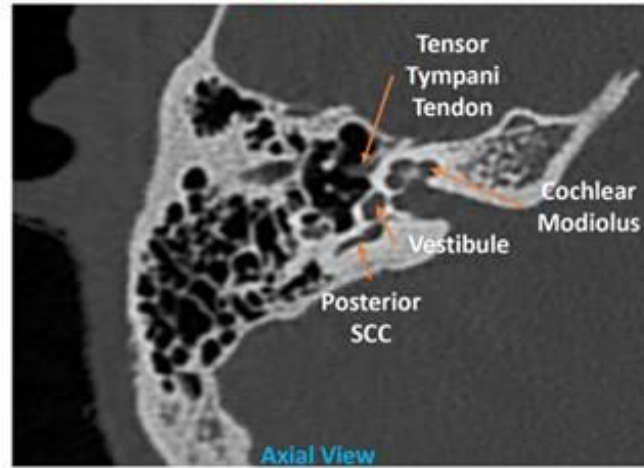
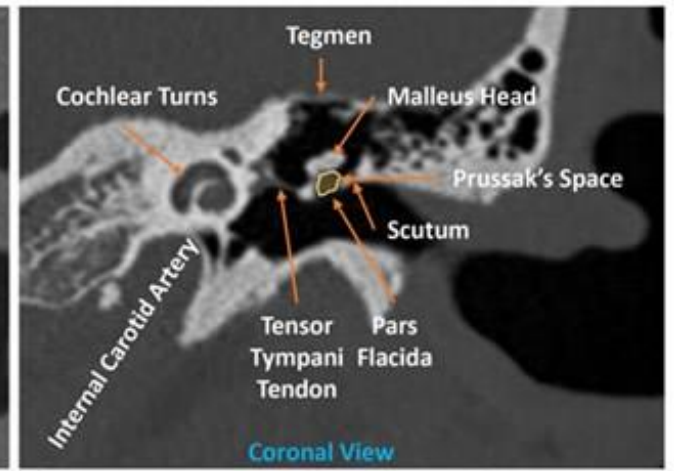
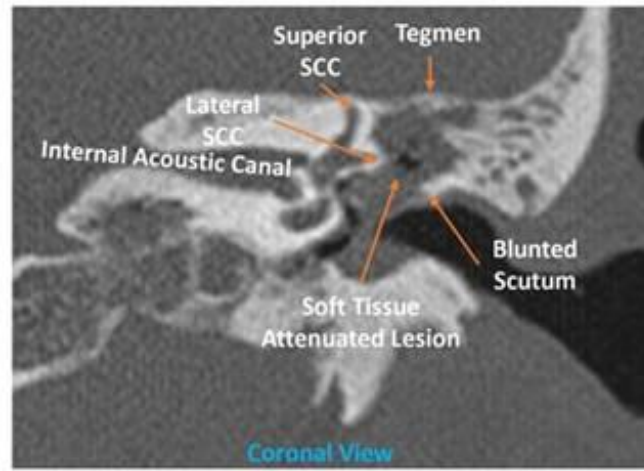
- > 0,5 – 1 mm slices

- **MRI**

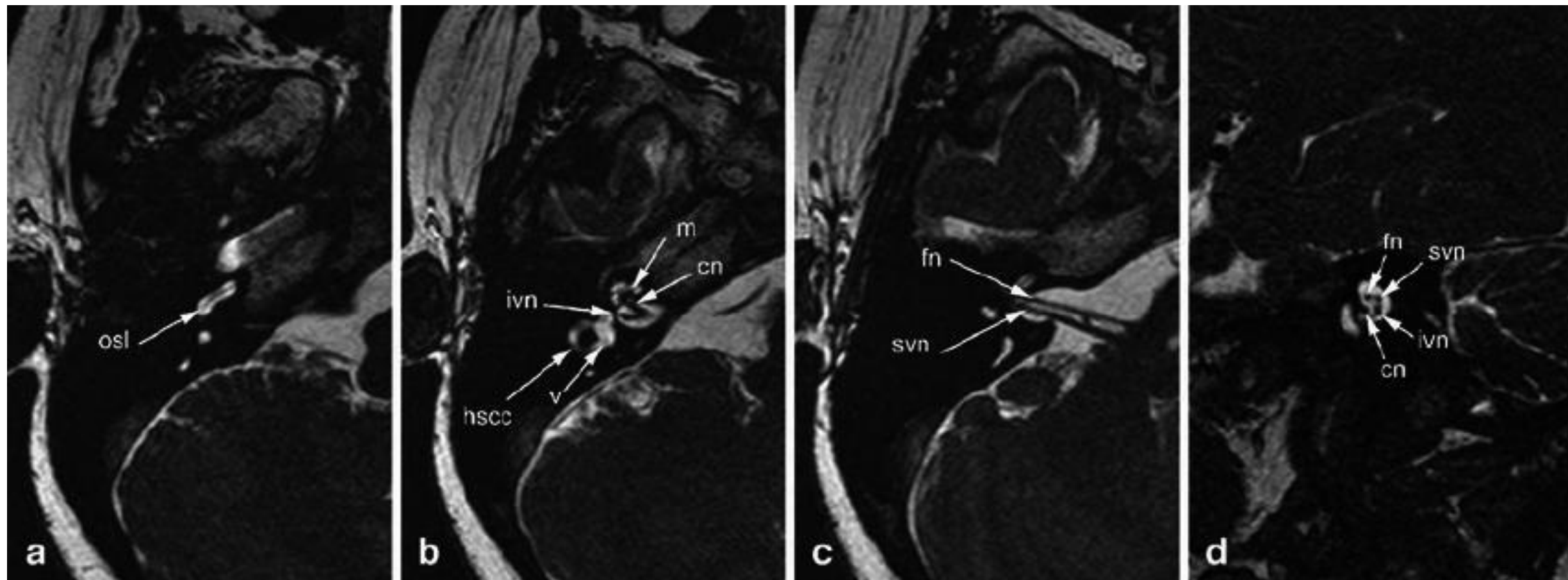
- > T1 a T2 sequections

- > for inner ear T2 high resolution sequences (FIESTA, FISP)

- > non-echoplanar DWI sequence (HASTE) for cholesteatoma



MRI



External ear diseases

- Developmental disorders
- Trauma
- Infectious/Inflammatory
- Tumors

Developmental disorders

- Apostasis
- Microtia a anotia
- Preauricular appedage
- Stenosis / atresia of externa ear canal



Trauma

- Foreign bodies



- Othaematoma



Ear wax— obturated cerumen



Infectious diseases (otitis externa)

- **Infections of pinna/auricle** : erysipelas x perichondritis, systemic ATB
- **Infections of ear canal**: **bacterial** (P.aeruginosa, S. aureus) x mycotic x viral
 - Pain, hearing problem, secretion
 - Summer disease - „swimmer’s ear“
 - Local treatment in most of the cases - ATB
 - Herpetic dermatitis + n VII palsy + - inner ear impairment = **Ramsey Hunt sy**
 - **Otitis externa maligna** = temporal bone osteomyelitis, DM II

Mycotic external otitis



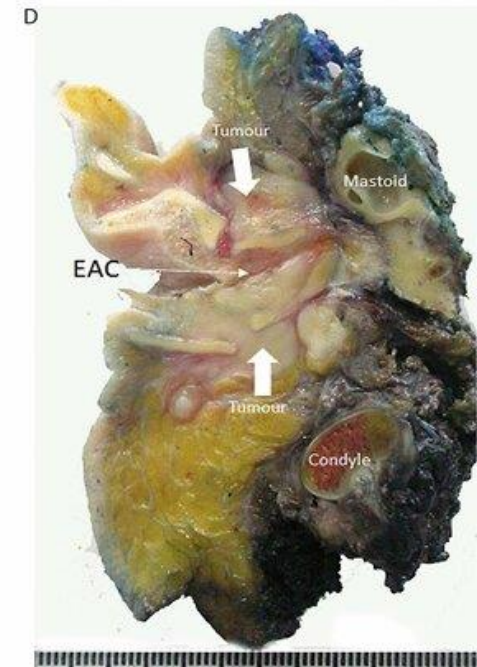
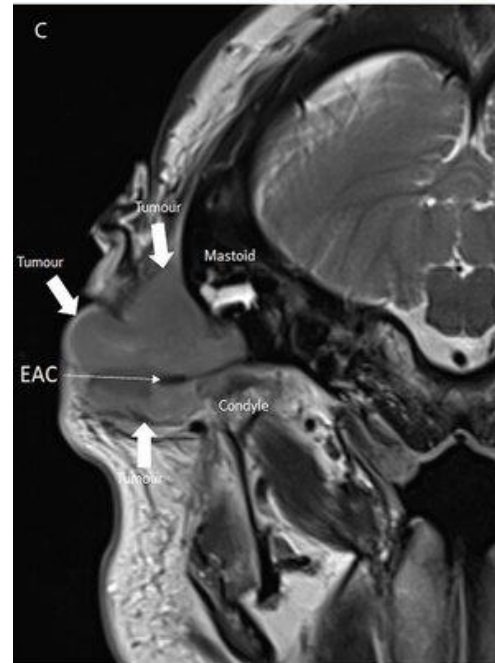
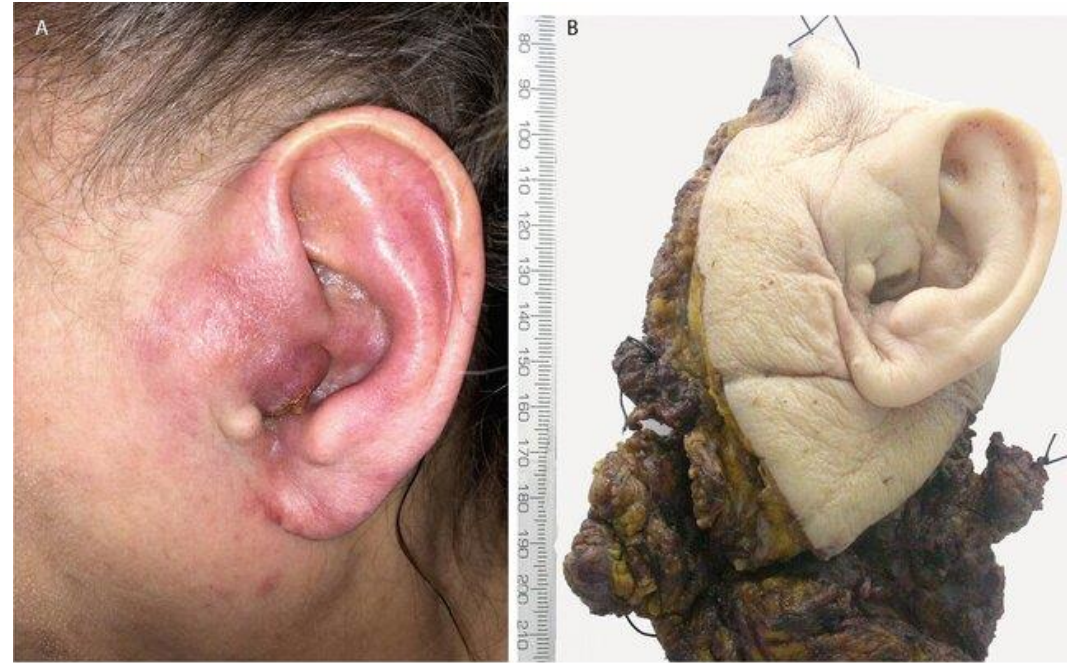
Tumors

- Basalioma -> radical excision
- SCC -> radikální excize + staging regionálních LU (USG)
- **SCC of external ear canal** -> late dg, poor prognosis
extensive surgery + RT
- Exostosis / osteoma of ear canal -> recurrent inflammations

Basalioma → resection + reconstruction



SCC of external ear canal - lateral temporal resection



Middle ear disease

- Trauma
- Acute inflammatory diseases = acute otitis media
- Chronic inflammatory disease (> 6 weeks) = chronic otitis media
- Complications of middle ear inflammatory diseases

Traumata

- Tympanic membrane perforation – mechanical x barotrauma
 - spontaneous healing x myringoplasty
- Middle ear ossicles fracture / disconnections
- **Temporal bone fractures** – division based on the affection of otic capsule
 - mostly non surgical treatment
 - *indication of surgery : acute n VII palsy, major bleeding
prolonged liquorrhea*

Acute otitis media (AOM)

- Common in children 6m – 6y
- More than 80% °of children < 3y have at least 1 attack of AOM
- Follows infections of the upper airways

- Predisposition in children: shorter and more horizontally oriented ET, adenoid vegetation, immunological predispositions

- Etio: bacterial– Strp. pneumonie, H. influenza, Strp. group A

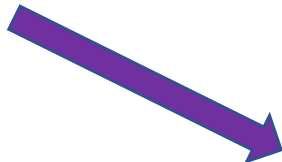
Acute otitis media

Stages

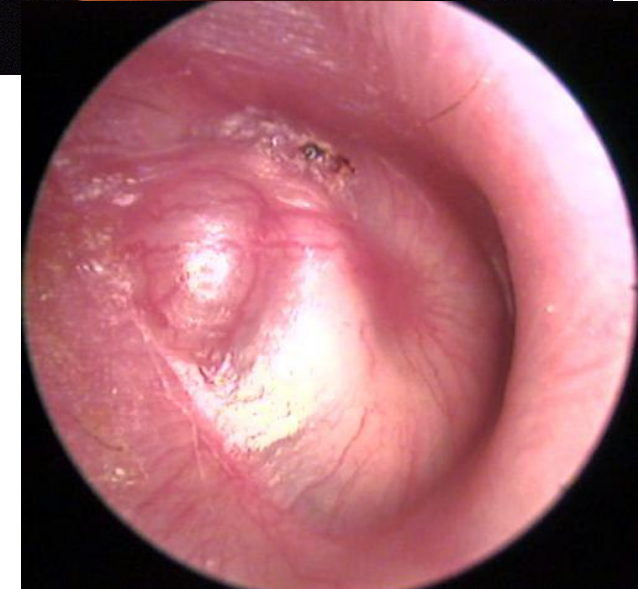
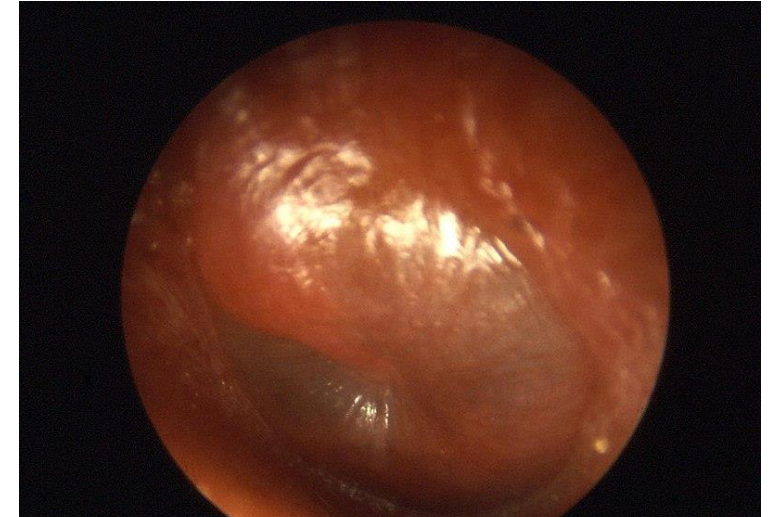
- Tubar occlusion
- Exsudation
- Suppuration
- Reparation



Therapy – local analgetic ear drops, nasal drops, painkillers



Therapy – Paracentesis + - ATB / Systemic ATB, + - local ATB



Chronic otitis media

Classification:

- Chronic secretory otitis media
- Chronic suppurative otitis media
 - Active
 - **With cholesteatoma**
 - **Without cholesteatoma**
 - Non-active = retraction pocket, adhesions, fixation of ossicles



Chronic secretory otitis media

- Organizing effusion in the middle ear cavity due to dysfunction of ET
- Slow progression, typically sensation of „ear plug“
- Longterm consequences-> tympanosclerosis, cholesteatoma, developmental disorders in children

Etiology:

Children: adenoid vegetations, developmental malformations (cleft)

Adults: **tu on nasopharynx**, chronic inflammations, functional

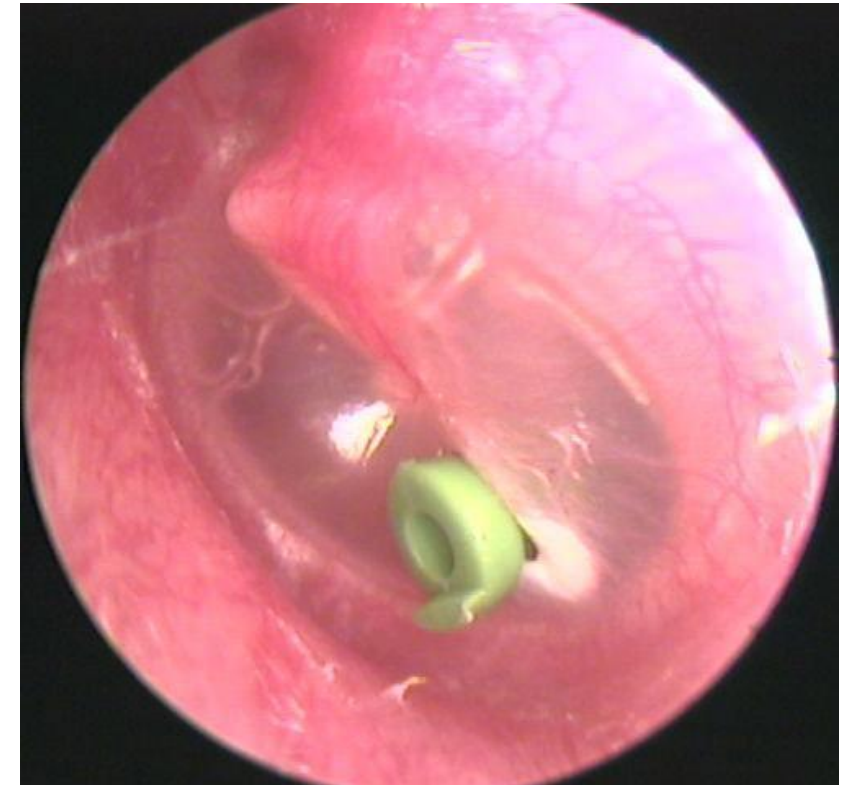
Chronic secretory otitis media



Chronic secretory otitis media

Therapy

- Upper airways treatment (adenotomy, tumor management)
- Nasal decongestion, local corticosteroids
- Tympanostomy - drainage, ventilation



Chronic otitis media with cholesteatoma

Cholesteatoma

= Squamous cell epithelium in the middle ear („skin on a wrong place“, *Robinson JM, J Royal Society of Med. 90:93-96, Feb 1997*)

Histology:

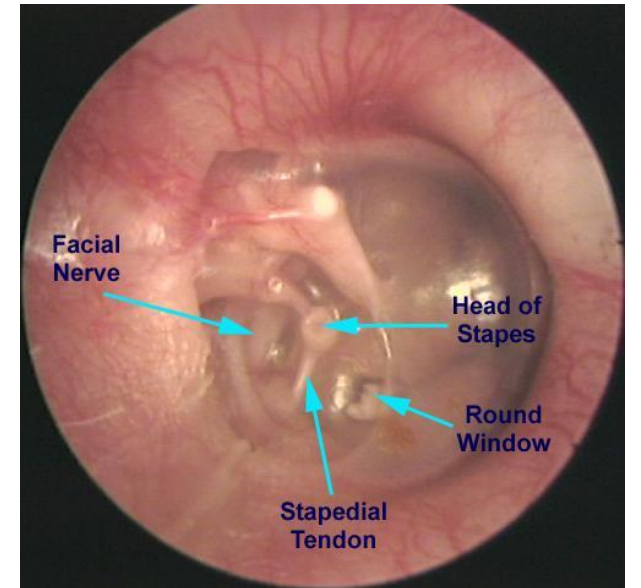
- Cystic content – keratine layes
- Matrix – keratinizing epithelial layer
- Perimatrix – granulation tissue on the surface (production of osteolytic enzymes)

Epitympanal inflammation is typically associated with cholesteatoma development

Chronic otitis media with cholesteatoma

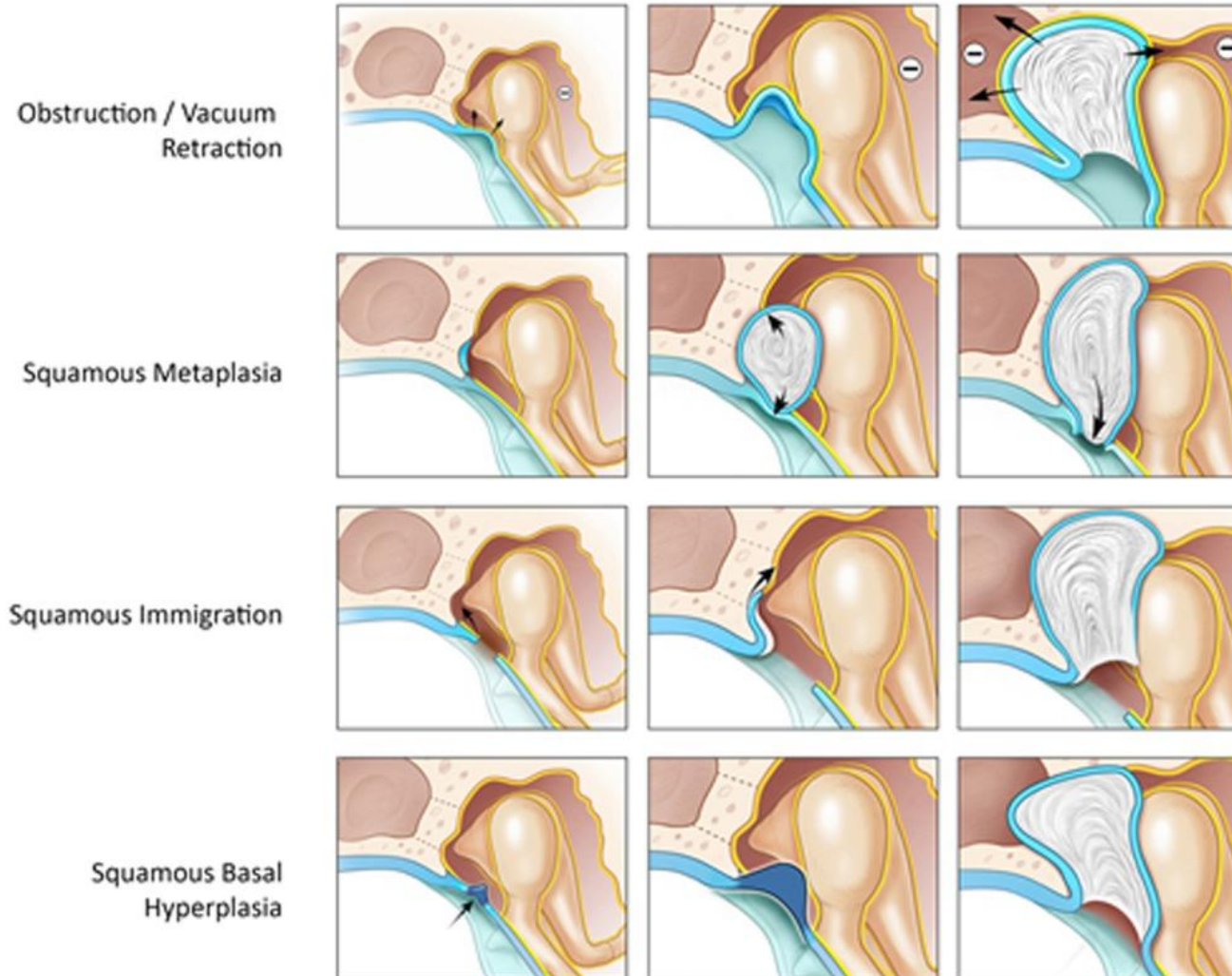
Classification

- Congenital (behind compact eardrum)
- Acquired
 - **Primary**
 - from retraction pockets
 - **Secondary**– different theories
 - Implantation (during surgery, trauma)
 - Metaplasia (due to chronic inflammatory irritation)
 - Invasion (through perforations)



Chronic otitis media with cholesteatoma

Existing Theories of Cholesteatoma Pathogenesis



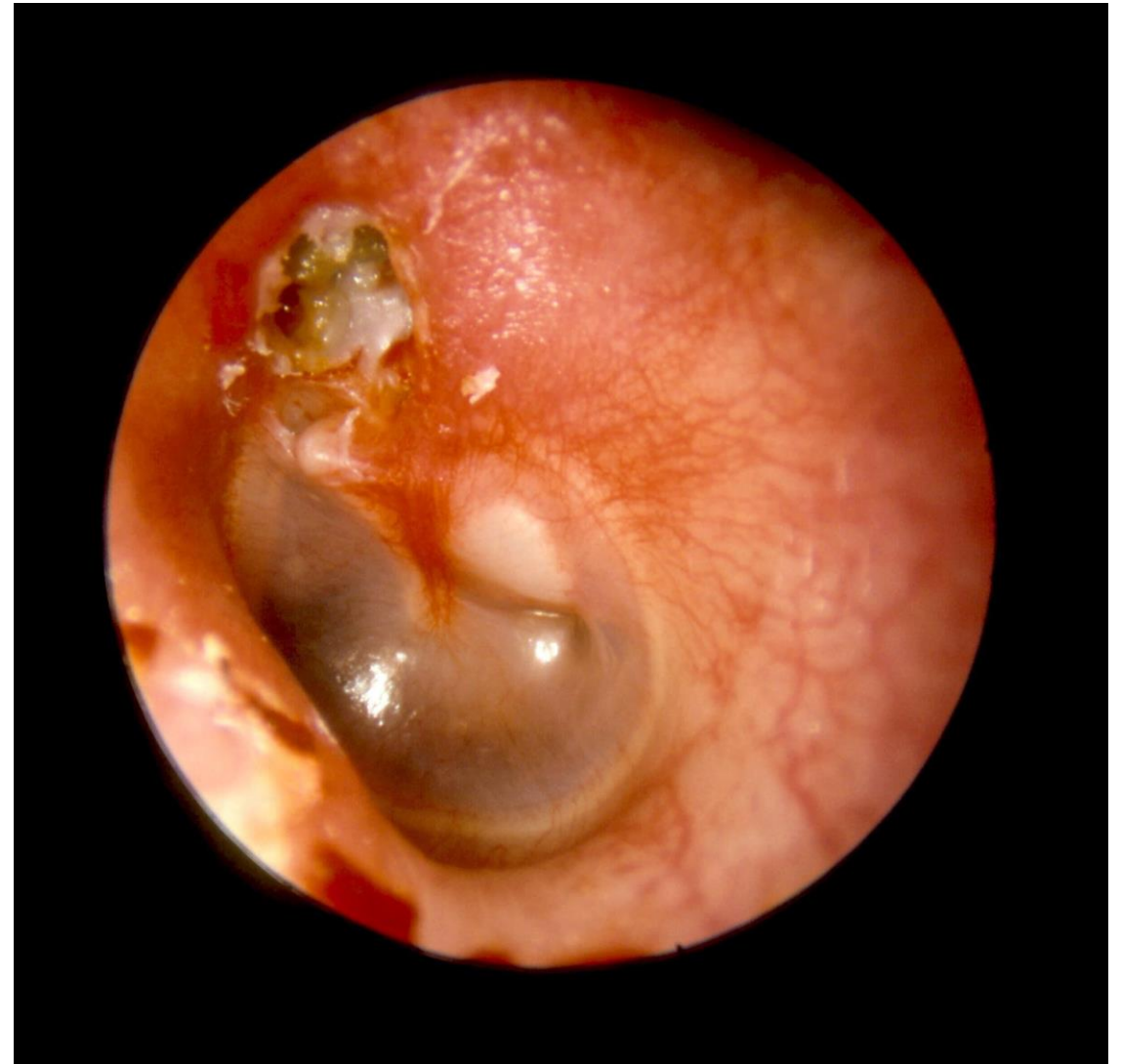
Chronic otitis media with cholesteatoma

Symptoms:

- Continuous/ intermittent secretion
- Pain
- Hearing problem

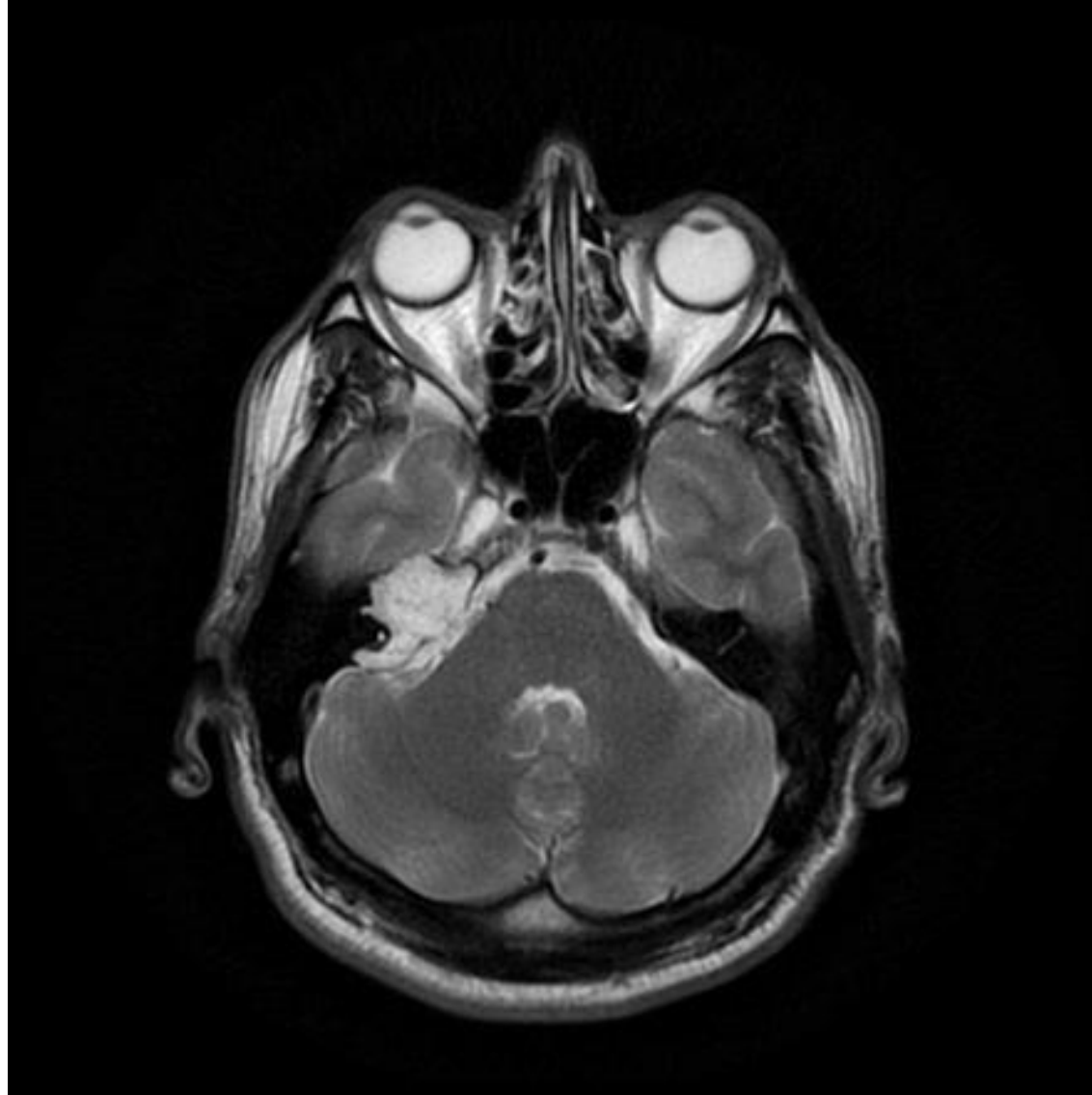
Symptoms of complications

- Vertigo
- Facial nerve palsy
- Meningitis



Chronic otitis media with cholesteatoma

- Cholesteatoma might not be located only in the middle ear cavity...



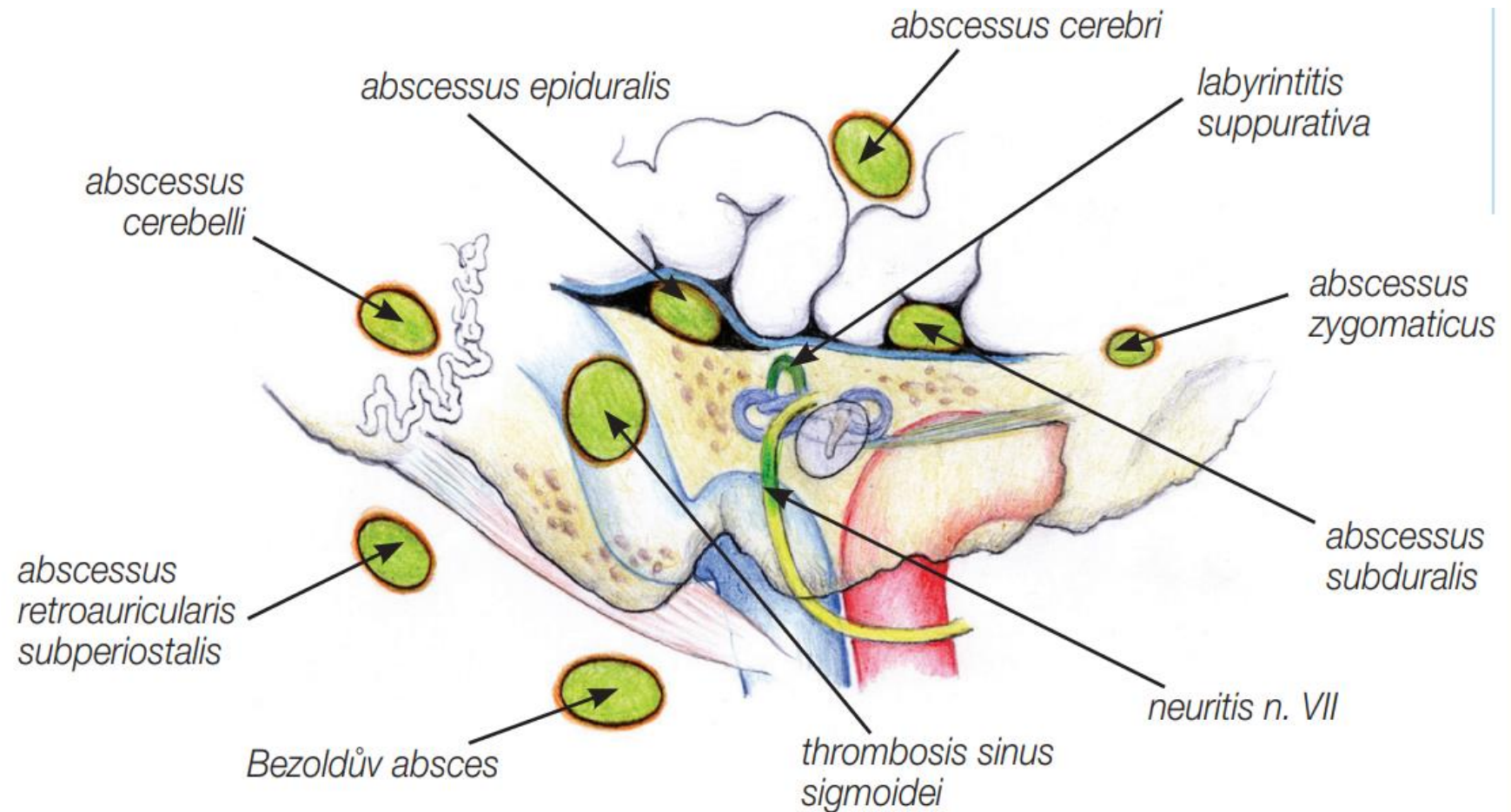
Chronic otitis media with cholesteatoma

- Therapy ?

= surgical removal of the pathological process -> Otology II

Complications of acute and chronic middle ear infections / inflammations

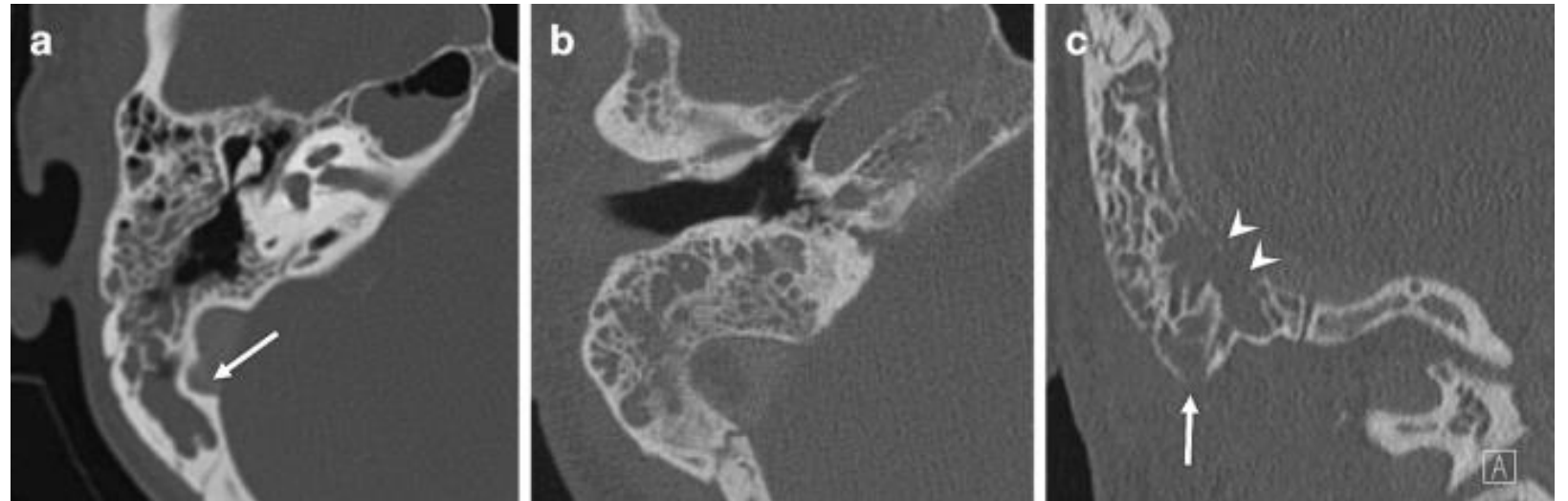
- Intratemporal
- Extratemporal
- Intracranial



Complications of acute and chronic middle ear infections / inflammations

Intratemporal

- Labyrinthitis
- Facial nerve palsy
- **Acute mastoiditis**



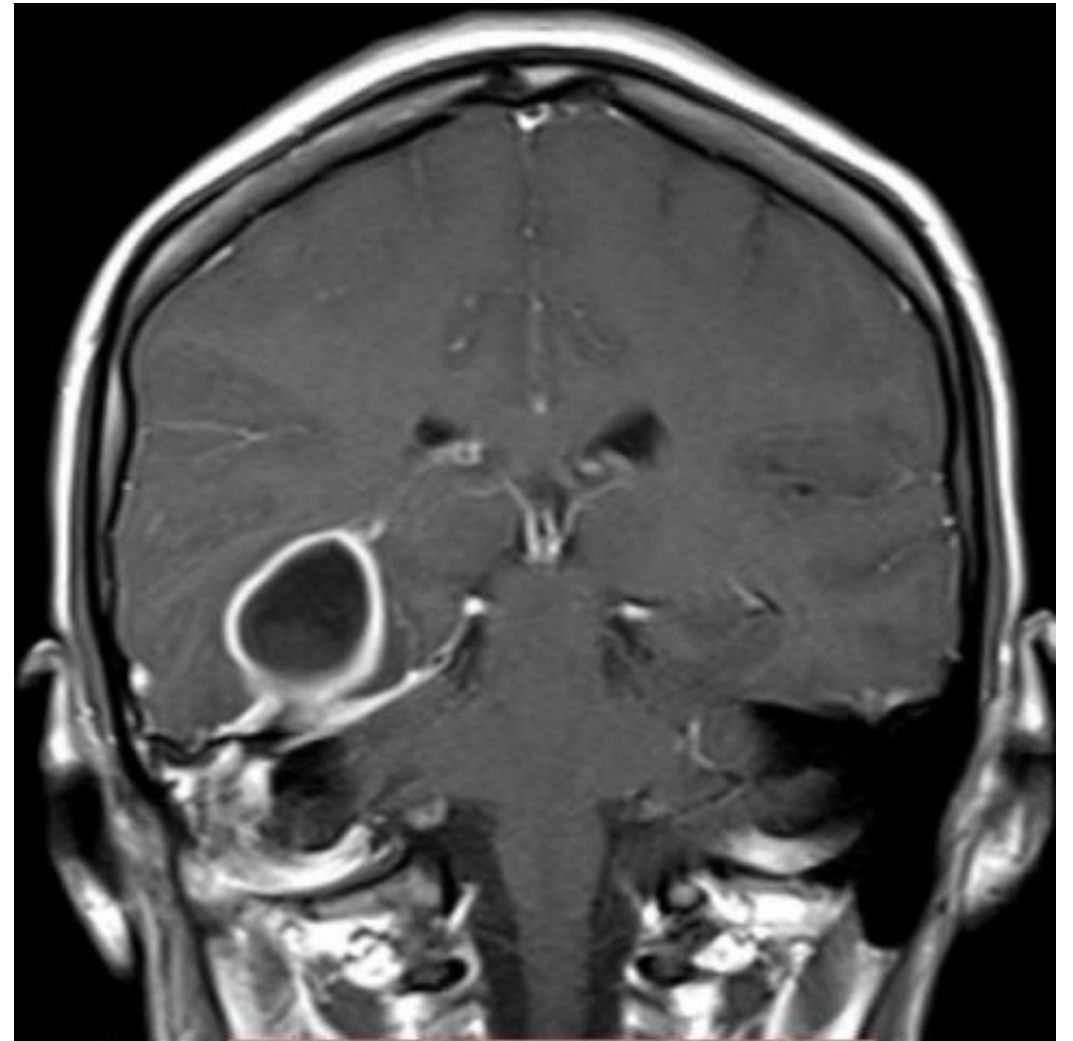
- most common complication in children
- pain and redness of the mastoid, osteolysis of septa of mastoid air cells on CT
- systemic ATB, mastoidectomy

Complications of acute and chronic middle ear infections / inflammations

Intracranial

- Extradural:
epidural abscess

- Intradural:
Meningitis
Subdural emypema
Thrombosis of sigmoid sinus
Brain abscess



Inner ear diseases

- Sensorineural hearing disorder
 - **Presbycusis**
 - **SSNHL**
 - **Genetic** - Connexin 26 (35delG GJB2)
 - **Therapy**: hearing aid, middle ear implant, cochlear implant

