FAKULTNÍ NEMOCNICE U SV. ANNY V BRNĚ

Ear II

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Disorder of the ear

congenital anomalies
inflammations
tumors
injuries

Microotia (3rd degree)

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Microotia
Treacher-Collins syndrome

Most affected individuals have **underdeveloped facial bones**, particularly the cheek bones, and a very small jaw and chin (micrognathia).
Conductive Hearing loss in about half of all affected individuals; - defects or by **underdevelopment of the external meatus**.
People with Treacher Collins syndrome usually have **normal intelligence.**

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Apendices praeauriculares

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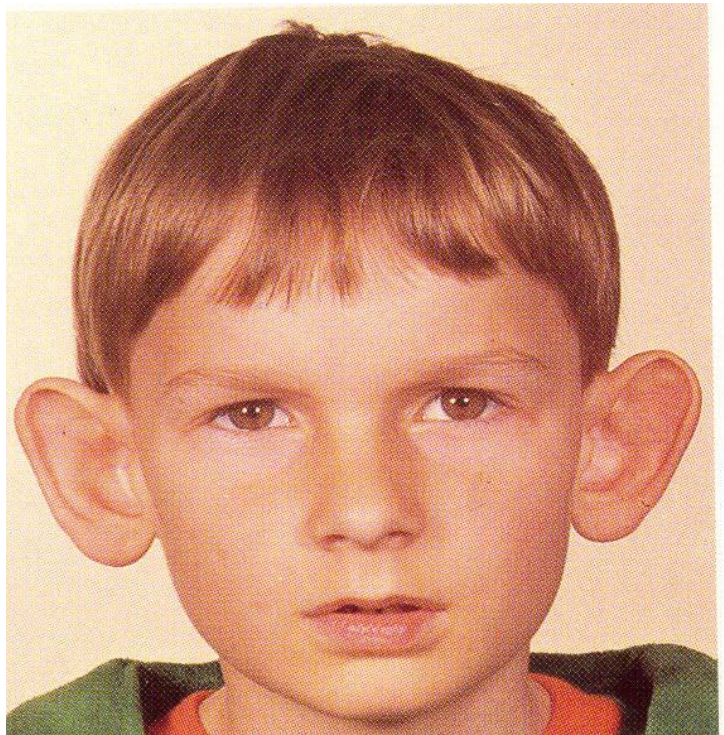
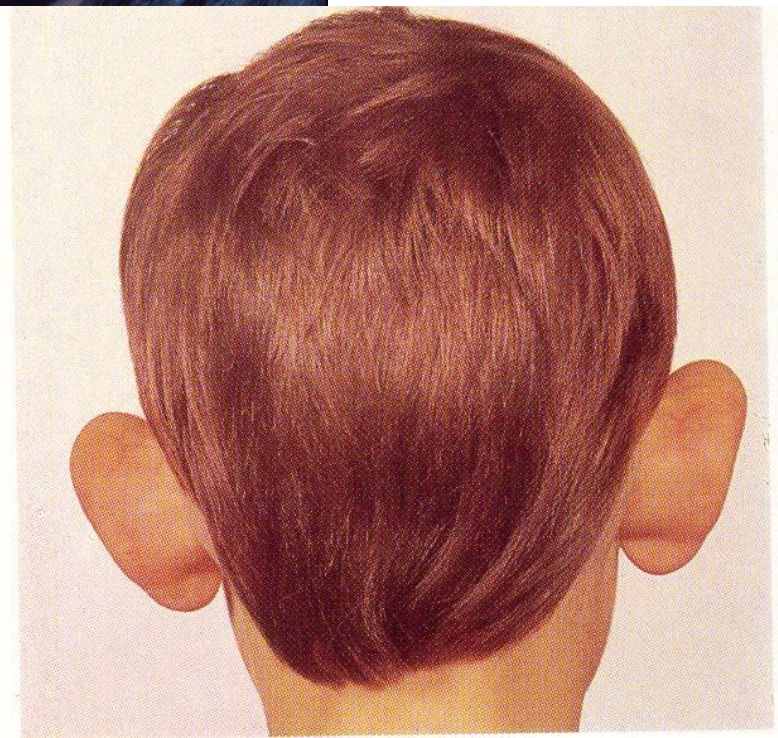
Apostasis auriculae

Blunt attachment angle





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Herpes zoster oticus (part of Ramsey-Hunt syndrome)

acute finding – after 3 days – after 10 days

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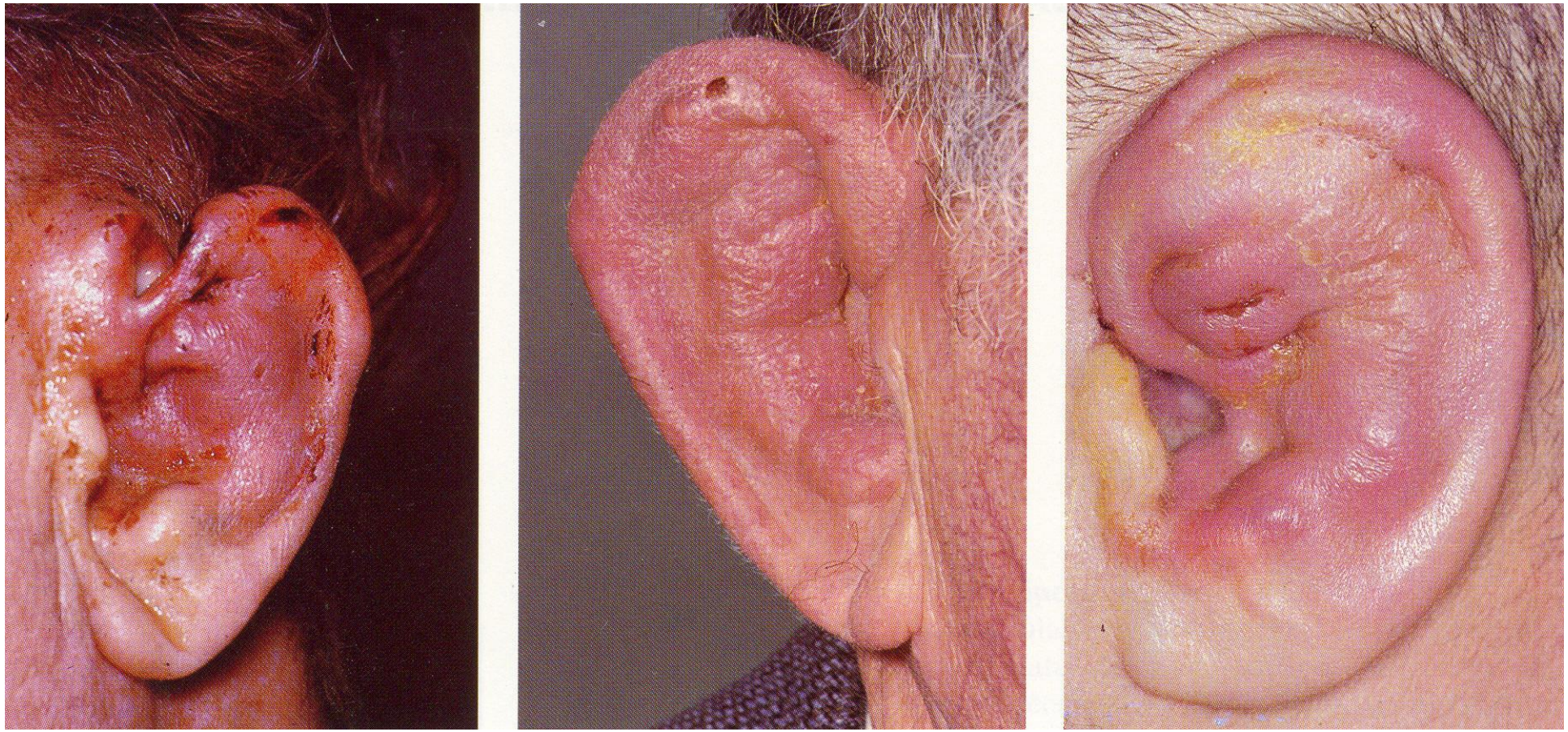
Perichondritis



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Chronic polychondritis – alergy- cauliflower ear

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Spinocellular cancer of auricle

Unhealing laesion (infiltration, ulceration):

- Minimal symptoms
- Itching
- Bleeding

Duration: some weeks to months

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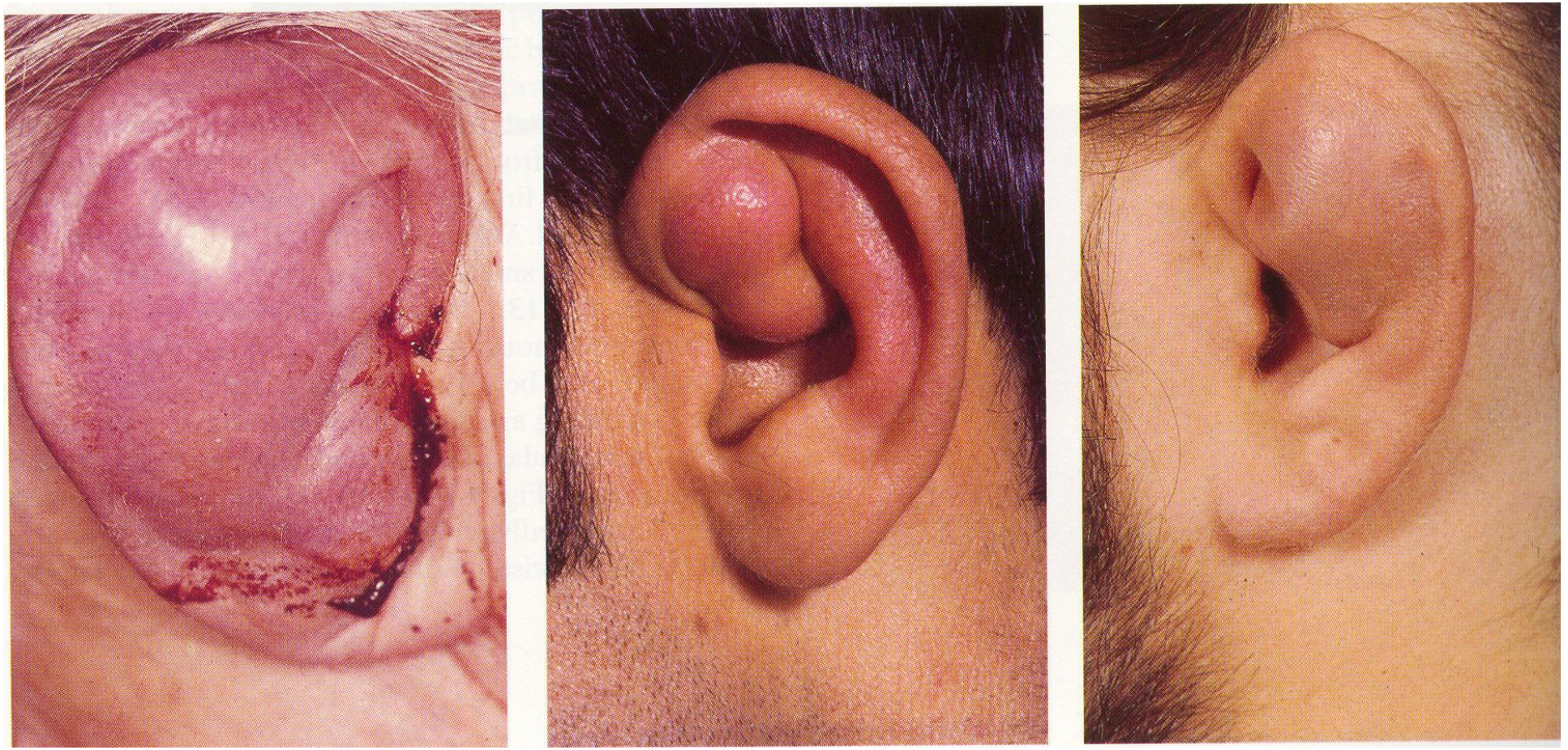
Othematoma

(fresh injury; after 14 days; after some months)



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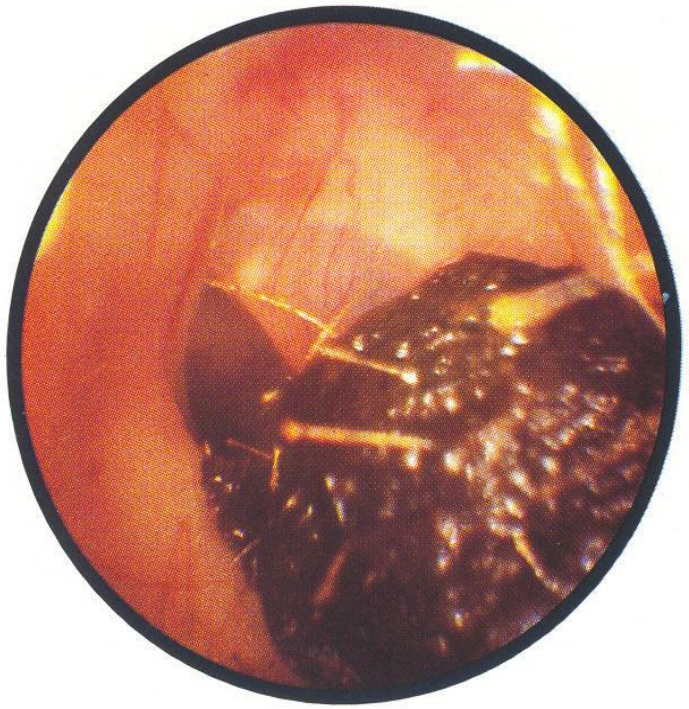
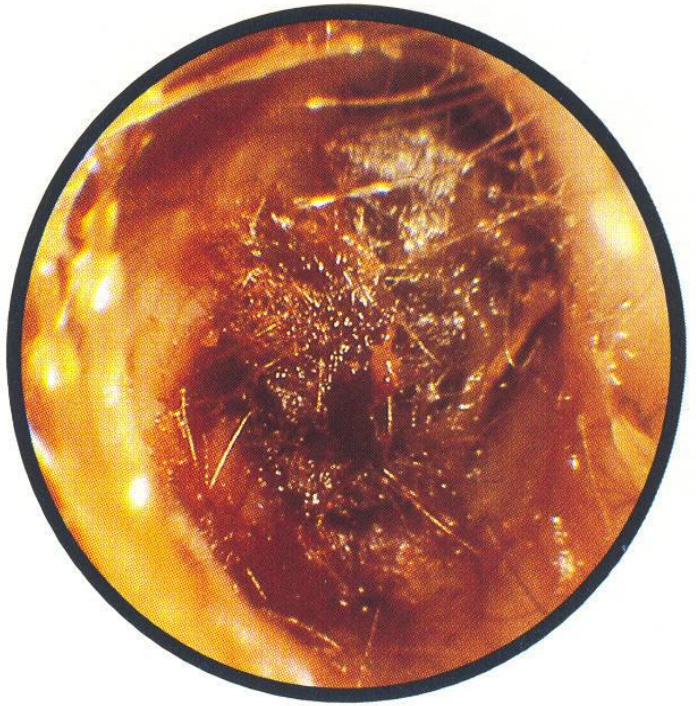
Earwax (Cerumen)





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Foreign body in external meatus - insect

Insect, ventilation tube

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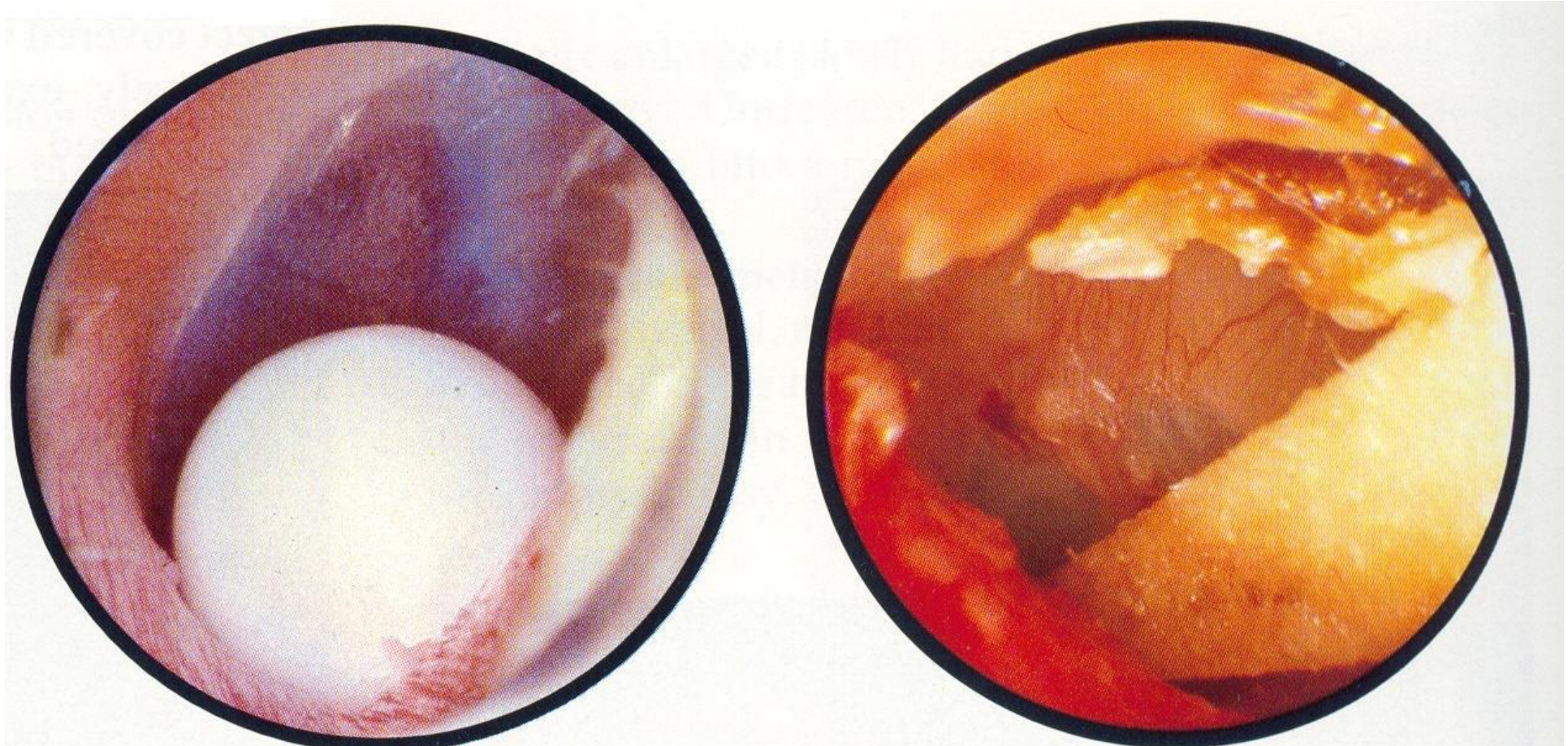
Foreign body in external meatus

bead, piece of wood, blood



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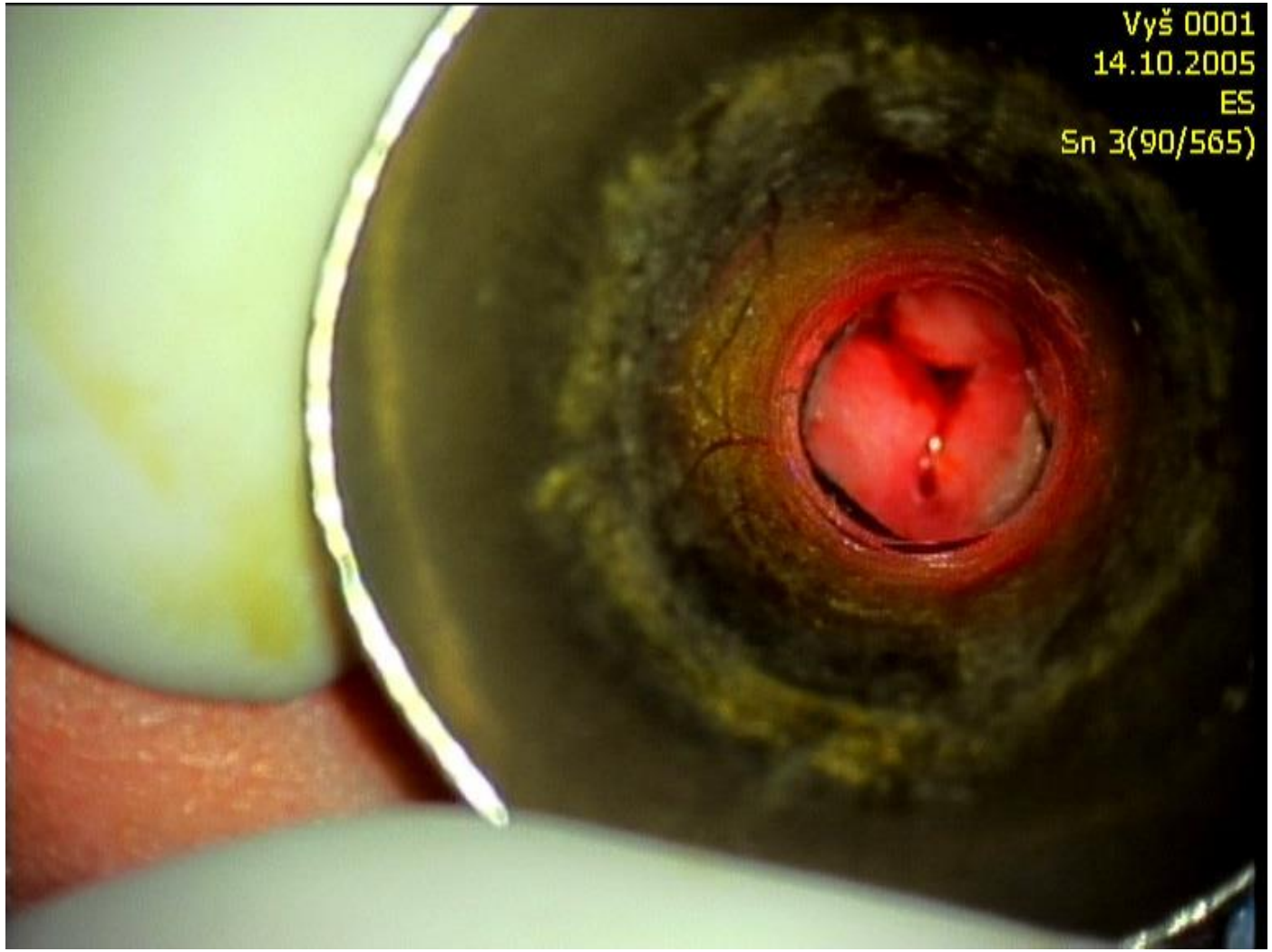
Exostosis in ext. meatus right



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Erysipelas bullosa auricullae

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Inflammation of external meatus

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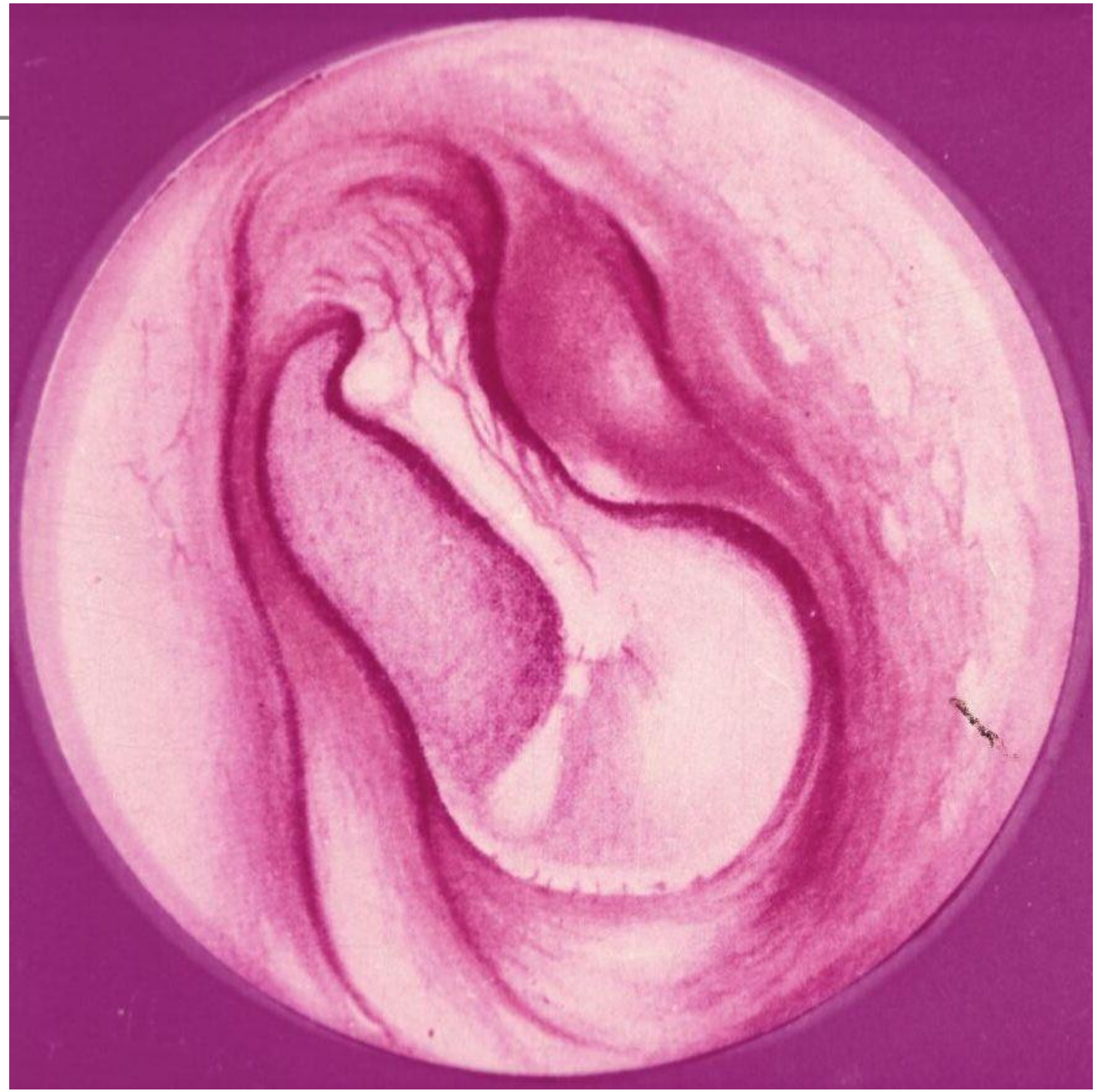
Furunculus of external meatus



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Middle ear cavity inflammations

According to course, extension, localization

Acute

- Catarrhus tubotympanalis acutus
- Otitis media acuta

Chronic

- **Non suppurative** – otitis media chronica secretorica (whole ear drum)
- **Suppurative** (permanent perforation)
  - Otitis media chronica simplex – mostly mesotympanal
  - Otitis media chronica with polyps, granulations
  - Otitis media chronica cum ostitide
  - Otitis media chronica cum cholesteatomate

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Catarrhus tubotympanalis acutus

Symptoms – feeling of fulness in the ear, pressure, hearing disorder.

Retracted ear drum, without perforation, tympanometry curve type C.

Th: treatment of upper airway inflammations, aeration od middle ear cavity.

retracted ear drum

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Otitis media acuta

Infection - way: epipharyngeal, hematogenic, injury. Pneumococcus, haemophilus infl., Moraxella catarrhalis

1. Stage of tubal occlusion
   - Blood vessel injection, without reflex, mild pressure, hearing disorder
2. Stage of exudation
   - Gradual bulging of ear drum, pain, fever, nausea, vomiting
3. Stage of suppuration – ear drum without contours, spontaneous perforation
4. Stage of reparation – small secretion, ear drum with contours, defect healing with scar

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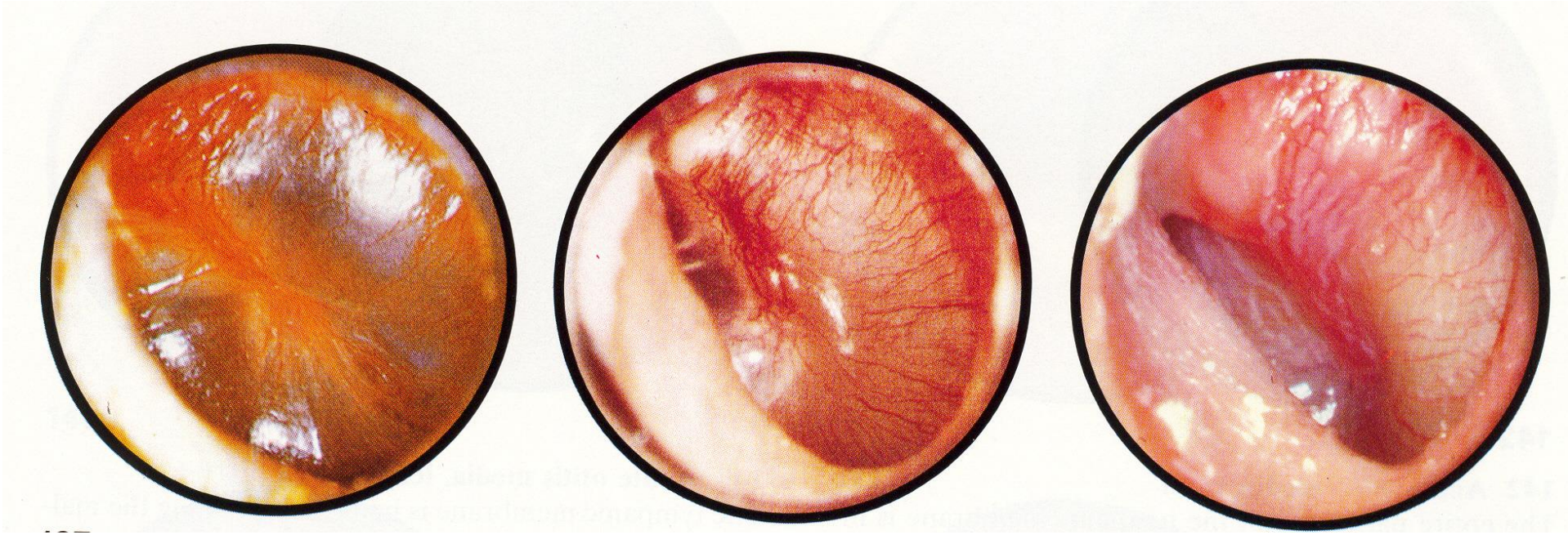
Otitis med. ac. l. sin. – gradual changes on ear drum



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Otitis media acuta

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Paracentesis (myringotomy)

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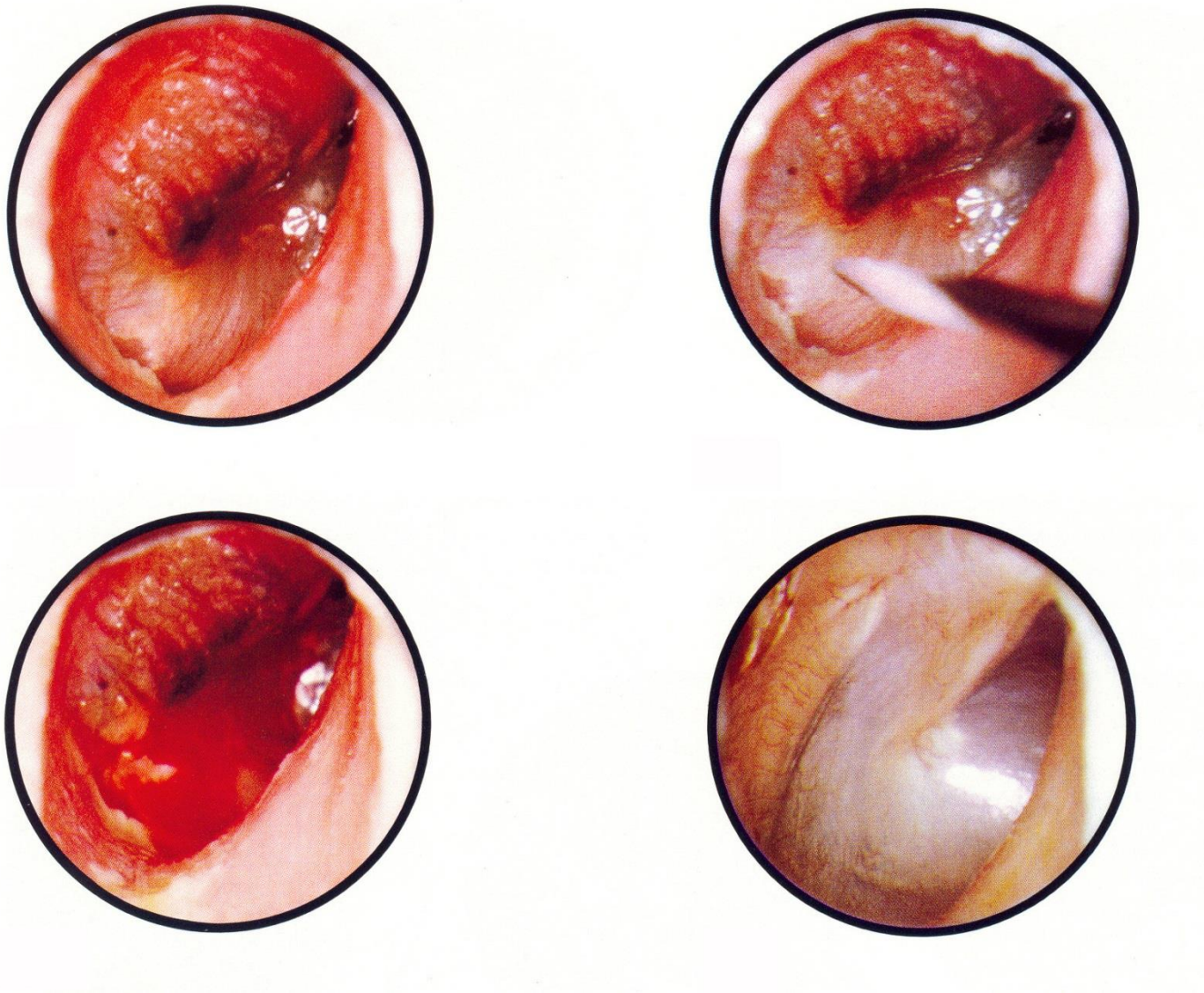
Otitis med. ac. sin. with myringotomy and following restitution



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Otitis media chronica secretorica

- Presence of secretion behind whole ear drum without symptoms of acute inflammations. Time – longer as 3 months.
- Pathogenesis – dysfunction of eustachian tube - restructuring of epithelium middle ear cavity – secretion in middle ear cavity – risk of ear drum retraction.
- Dg – otoscopy, tympano B or C2 curve, conductive hearing loss
- Therapy
  - conservative – stimulation of palate muscles, aeration of middle ear cavity, antihistaminic, treatment of inflammations of upper airway
  - surgery. – adenectomy, myringotomy, pressure equalizing tube

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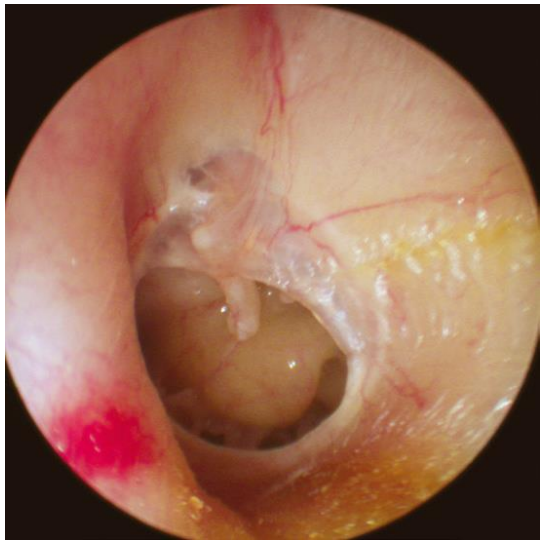
Otitis media chronica suppurativa

Form

- Mesotympanal
- Epitympanal
- Mixed

Causes

- Recurrences of acuta inflamm. of tympanic cavity
- Eustachian tube dysfunction
- Chronic inflammation of upper airway
- Injuries



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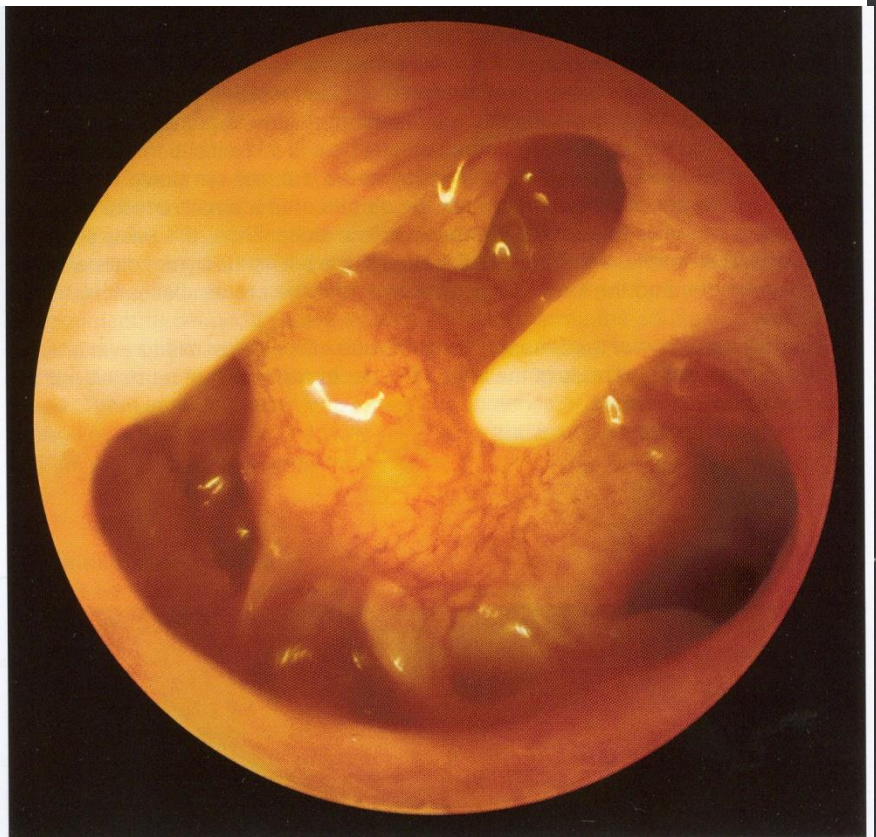
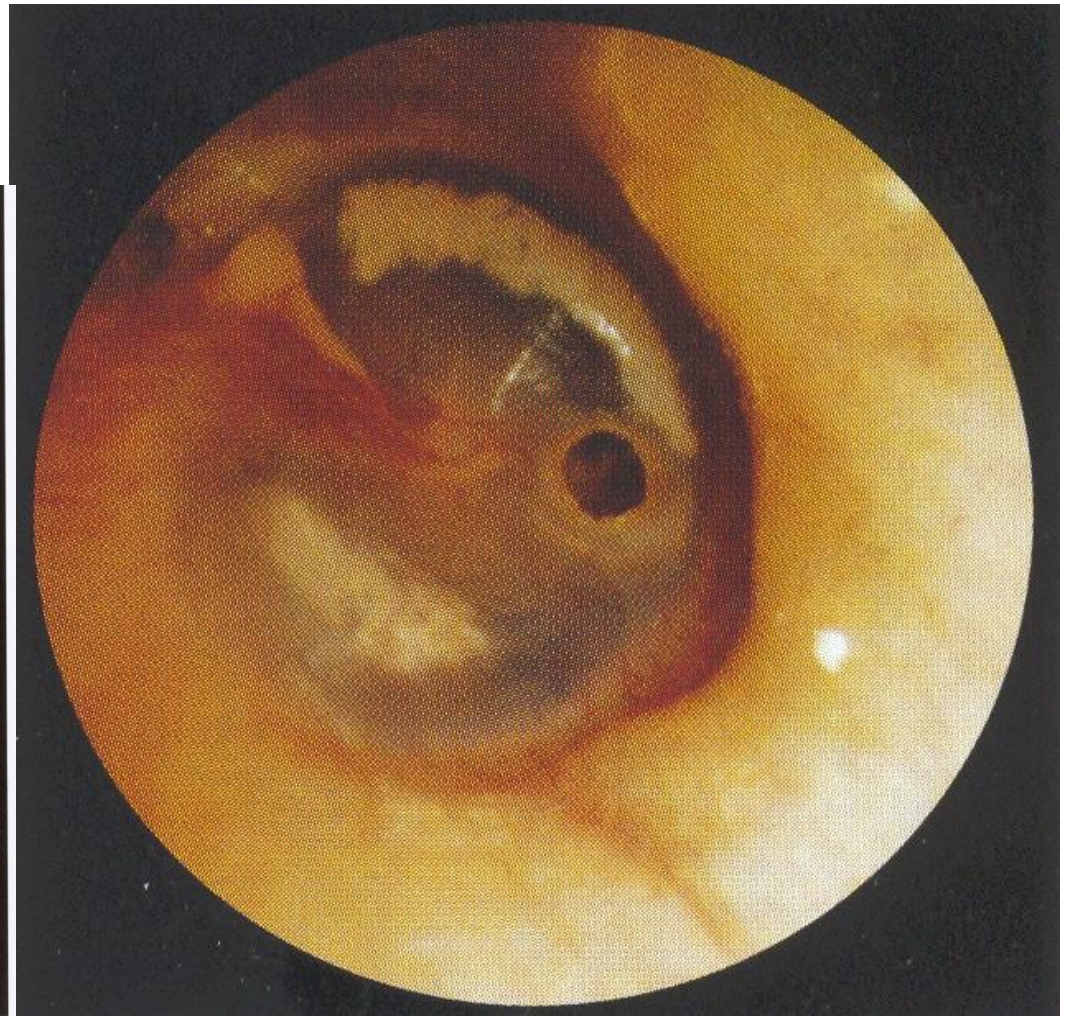
Central perforation





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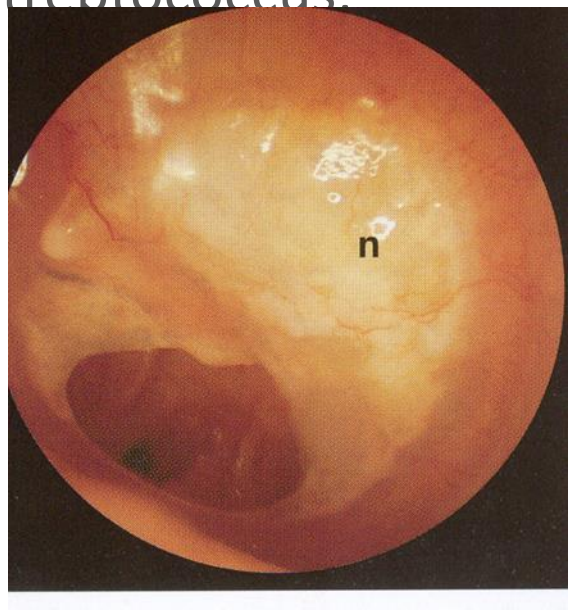
Otitis media chronica suppurativa mesotympanalis

Depend of phase of inflammation. In remission – only hearing disorder. In exacerbation – symptoms as in acute inflammation:

- Conductive hearing loss,
- Ear drum perforation, in pars tensa, ear discharge – purulent, without smell,
- Without temperatures and pain.
- Microbiology – usually mixed microbes – Escherichia, Klebsiella, Streptococcus. Pseudomonads and mycosis.

Otoscopy:

pars tensa - central perforation, changed middle ear epithelium, polyps, granulations.



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Otitis media chronica suppurativa mesotympanalis

Treatment

- Treatment of upper airway inflammation, improvement of nasal patency tube function.
- Local antibiotics , combination with s corticosteroids
- Polyps and granulations removed surgically , ev. in 3-6 months myringoplasty, ev. Reconstruction of ossicle chain.

Prognosis

Favorite

Complications rare

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Otitis media chronica epitympanalis

- Localization in epitympanal cavity;
- Frequently connected with cholesteatoma and osteo destruction
- Possible destruction of ossicular chain, bone of middle ear cavity,

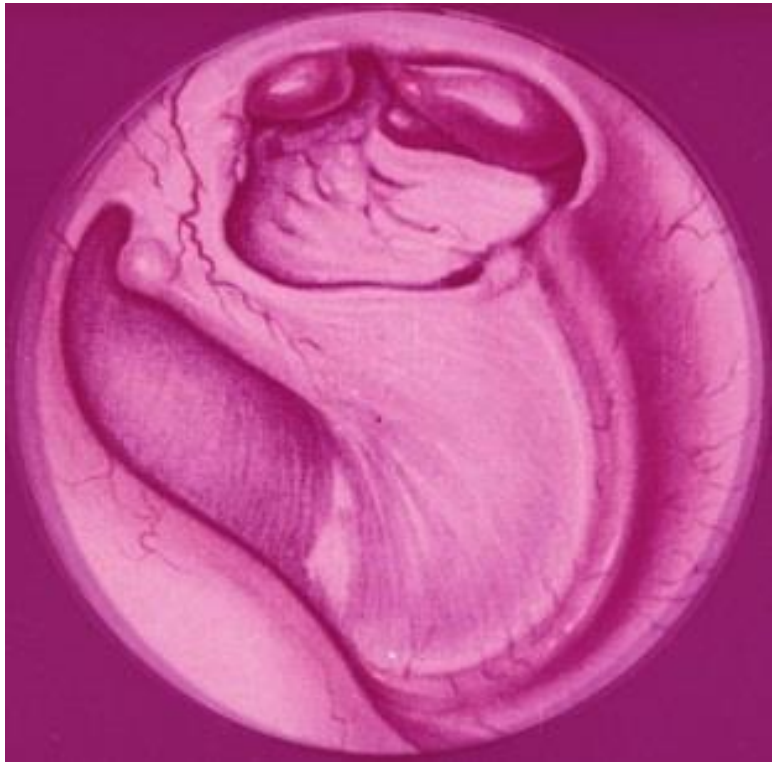
Theory of genesis

1. Tube Dysfunction – pocket in Schrapnell membrane – perforation – cholesteatoma
2. Direct growth of epithelium through defect of ear drum into middle ear
3. Embryogenetic theory – congenital cholesteatoma

Symptoms: smelly discharge, hearing disorder, occasionally ear pain, ev. paresis n.VII

Otoscopy – perforation in pars flaccida

Therapy – surgery with removal of cholesteatoma



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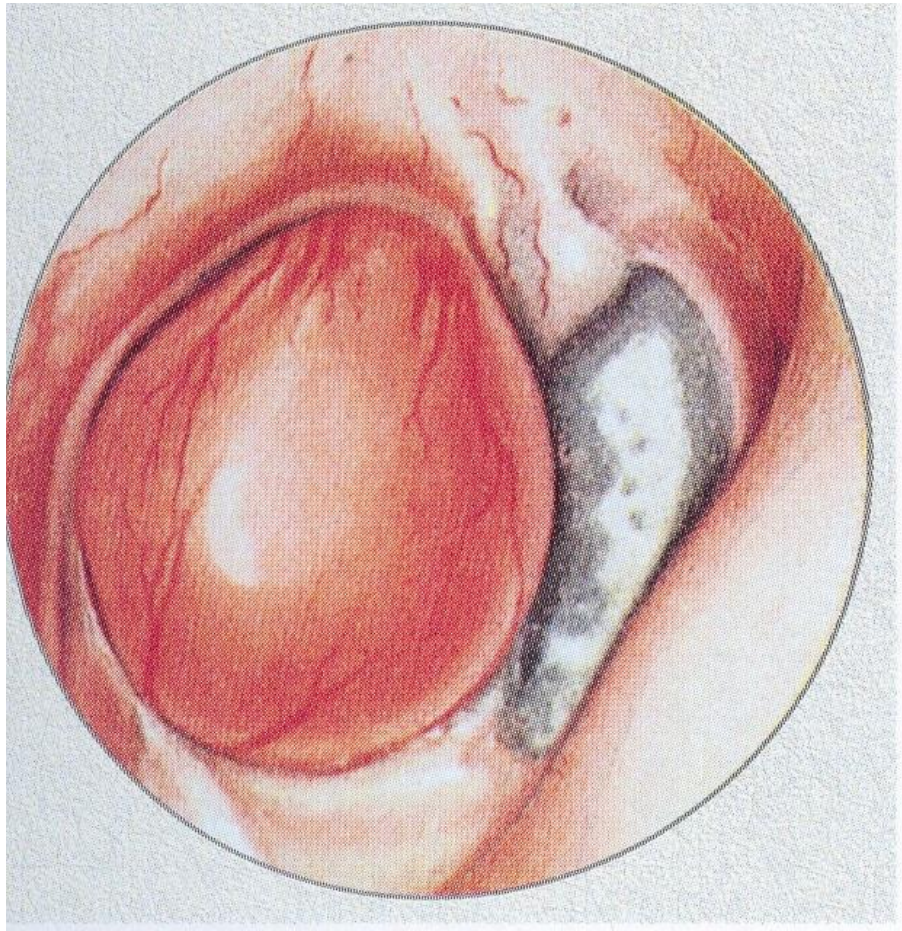
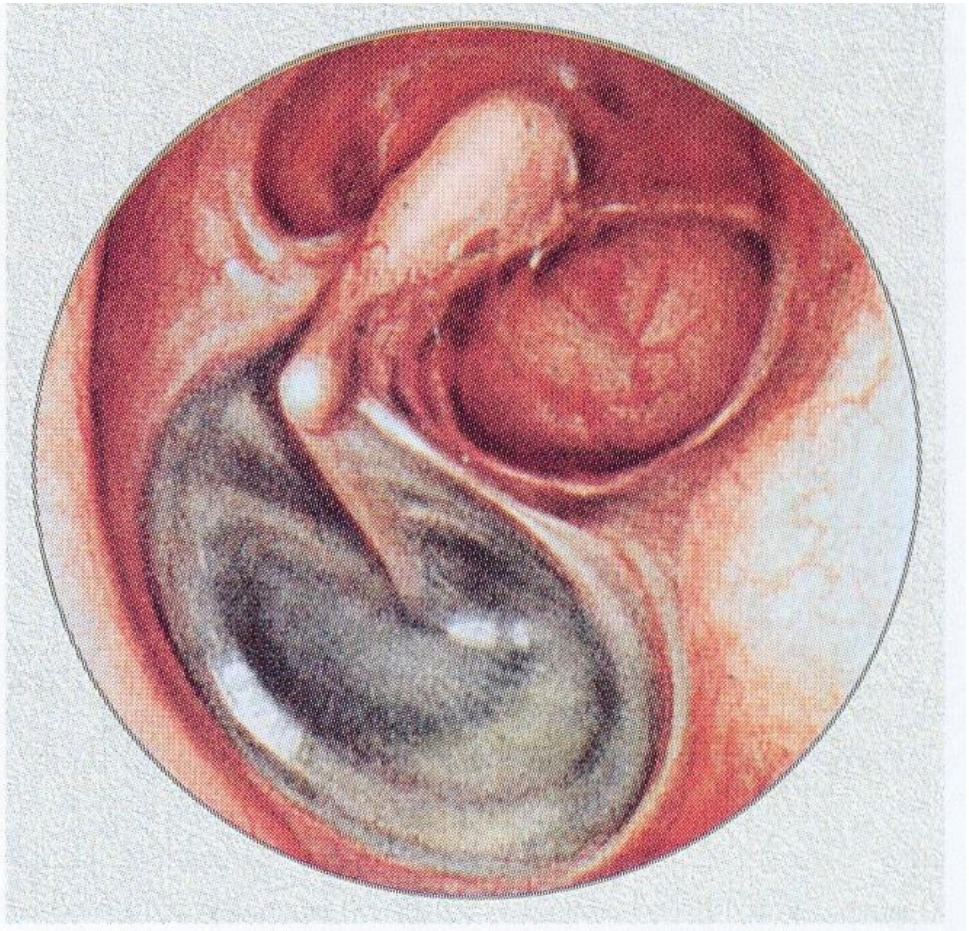
Polyp in otitis med. chronica, Defect of epitympanl space after removal of cholesteatoma





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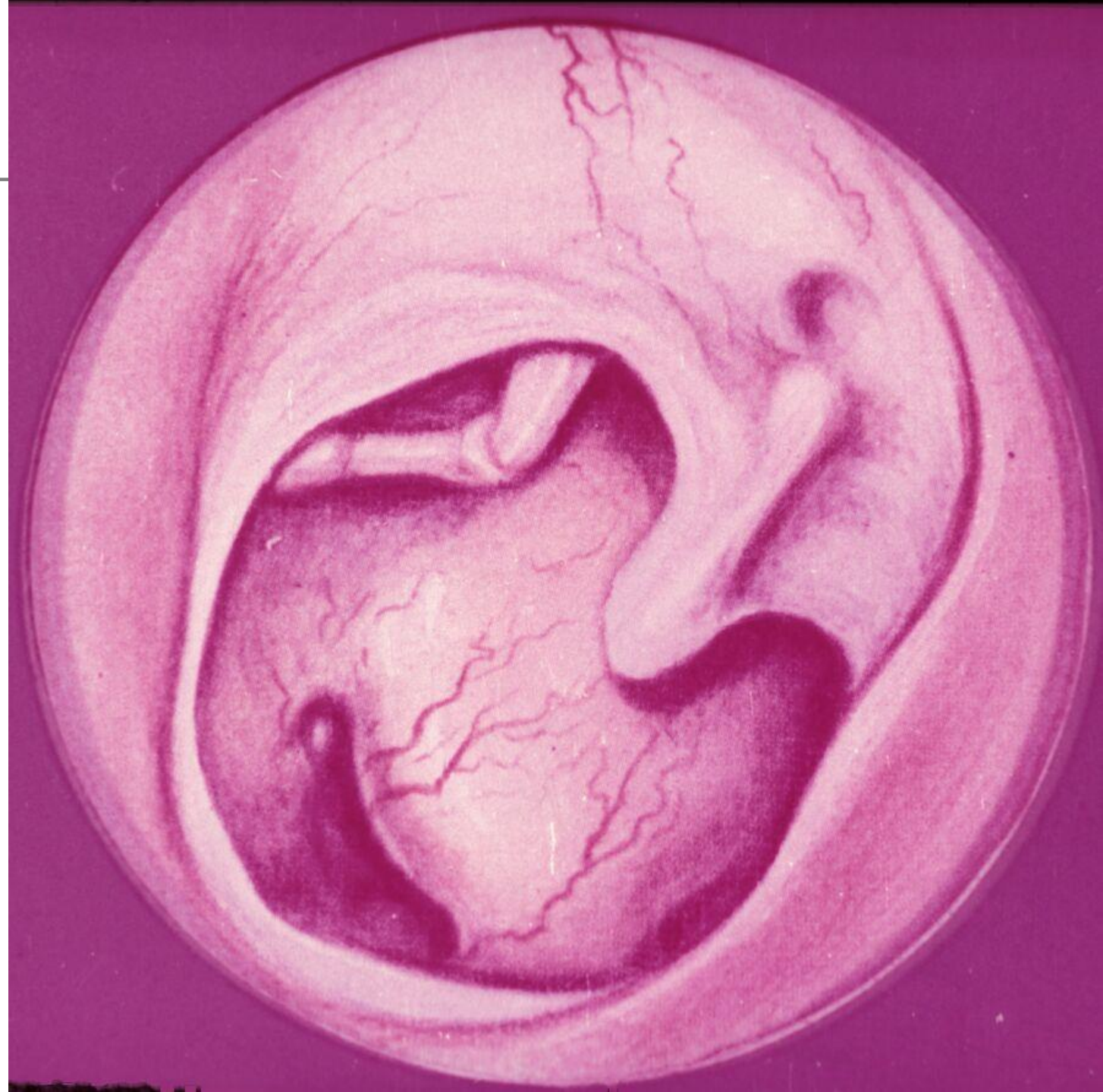
Subtotal (but central) perforation of ear drum



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Complications of middle ear inflammation

In antibiotic era rare

- **Otologic** – mastoiditis, petrositis, paresis n. VII, labyrinthitis
- **Intracranial** – abscessus epiduralis, subduralis, meningitis, brain and cerebellar abscess; trombophlebitis sinus sigmoideus, sepsis

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Mastoiditis

Inflammation of processus mastoideus temporal bone.

Osseal septums are melted, destructed (radiologic diagnosis).

- Usually complication of middle ear cavity inflammation.
- Rarely hematologic spread or injury

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Mastoiditis - forms

- **acute** (in 2–4 weeks after mediootitis, 50 % of all mastoiditis);
- **subacute**
- **latents**

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Mastoiditis - symptoms

- **Acute mastoiditis**: fever, palpating pain, retroauricular infiltration, apostasis auriculae or antalgic head position, purulent discharge from ear chanal , worsening of hypacusis, tinnitus, worsening of general condition
  - Bezold- s abscess
  - Mouret abscess
  - Trombophlebitis sinus sigmoideus
  - Intracranial spread
- **Subacute and latent mastoiditis** (mild symptoms): some pain – feeling of pressure, hypacusis

Bezolds absces in child

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Mastoiditis

Diagnosis:

- History of disease
- Otoscopy – posterior wall drop, signs of inflam. Middle ear
- Audiometry – decrease of both bone and air conduction
- **CT – destruction of septums, cavity**
- Increase of inflam. markers

Possible complications:

- Thrombophlebitis sinus sigmoideus
- Intracranial complications (epidural, subdural abscess, meningitis, cerebral, cerebellar abscess)

Treatment:

- Broad spectrum antibiotics
- Mastoidectomy

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Sanation and reconstruction surgery in chronic inflammation and its consequences

- **Sanation surgery** – aim – remove infection focus in temporal bone, potential risk of life threatening intracranial complications
- **Reconstructive surgery** – aim – reconstruction of hearing function

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Surgery for otitis media – Sanation surgery

Approach

- Schwartze - via planum mastoideum into antrum
- Stake - via atticus into antrum
- Zaufal – via posterior wall into aditus ad antrum and from this antreriorly and posteriorly

Sanation surgery

- atticotomy
- meatoantrotomy
- atticoantrotomy
- tympanomastoidectomy

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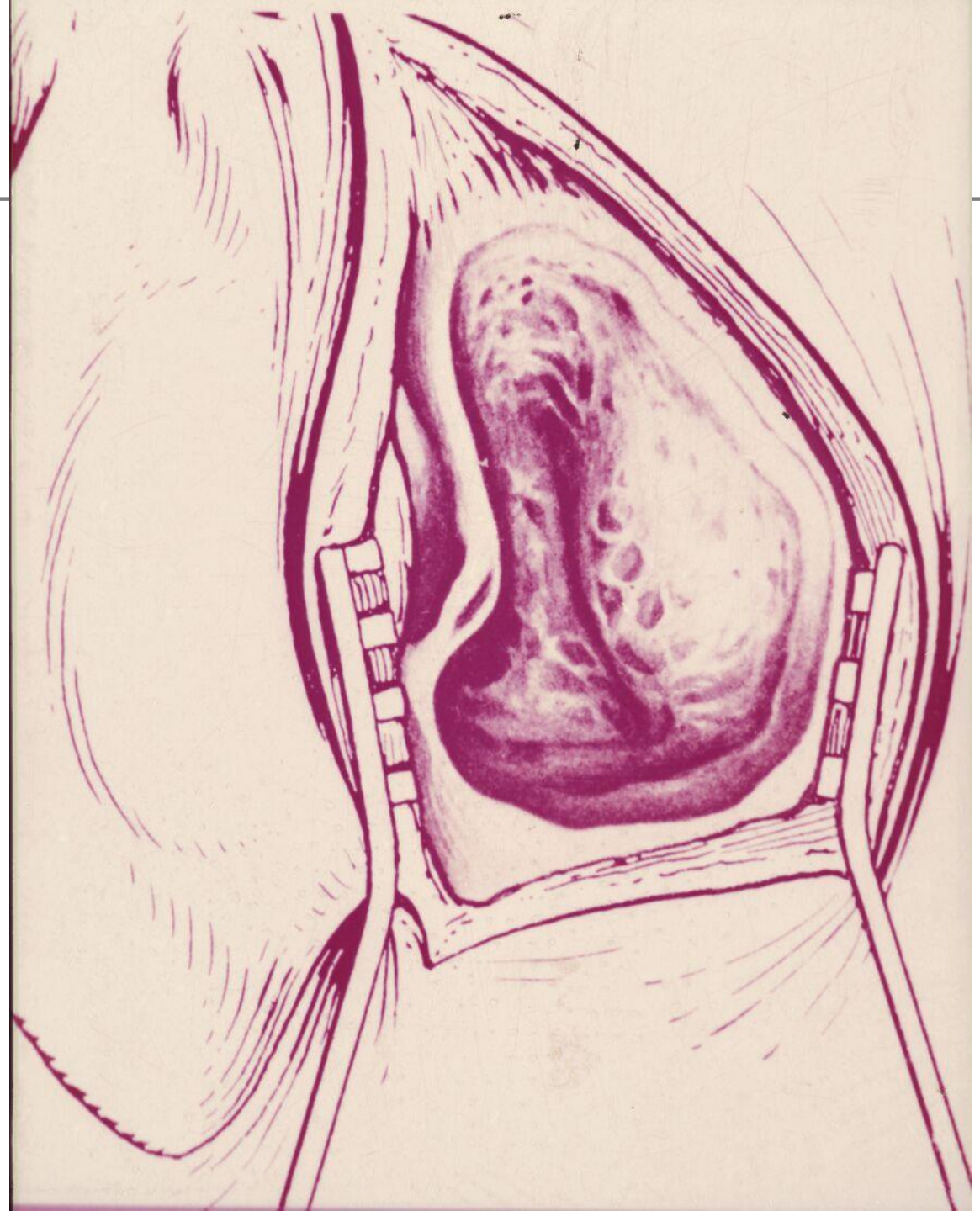
Status post mastoid-ectomiam



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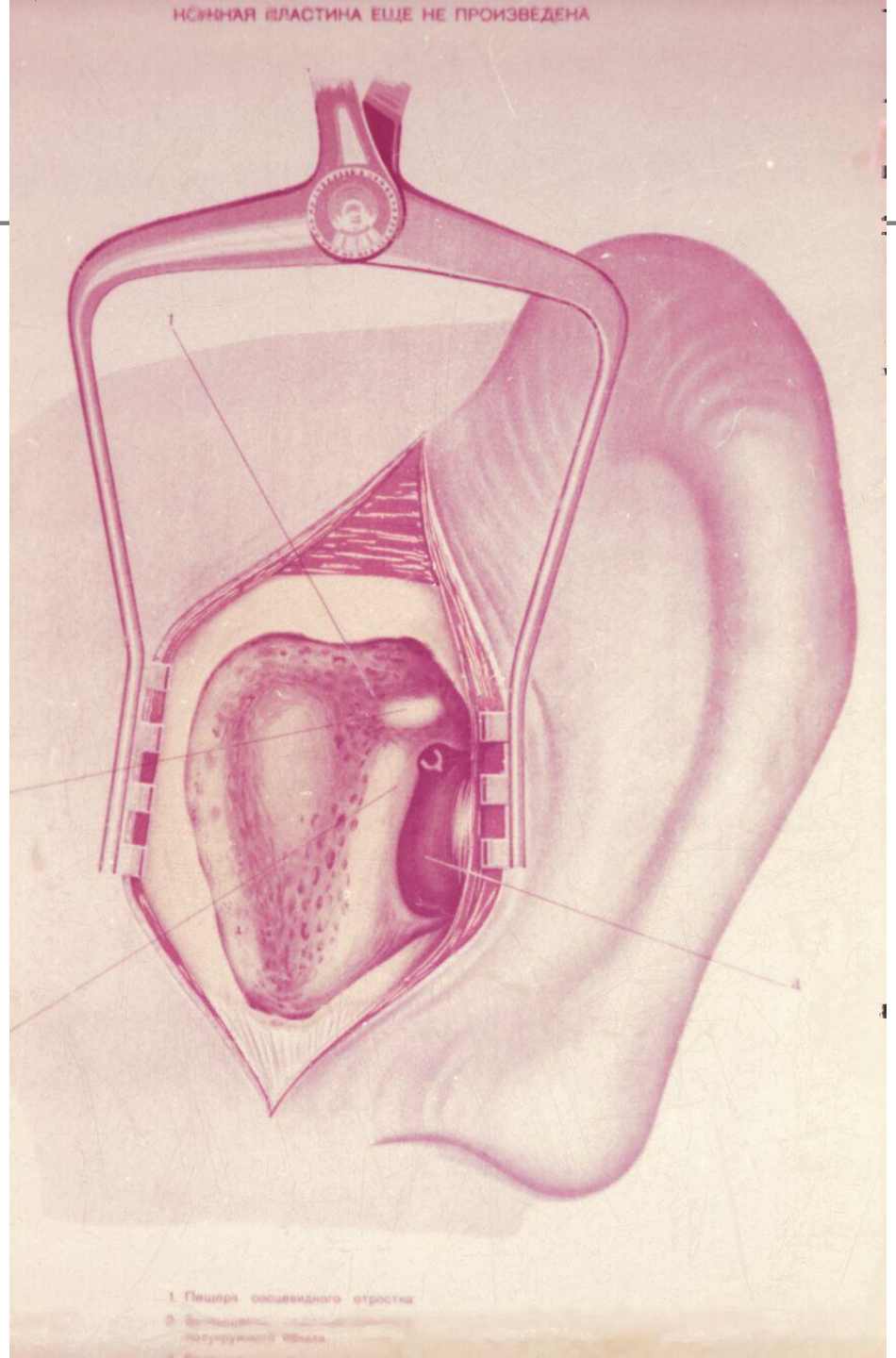
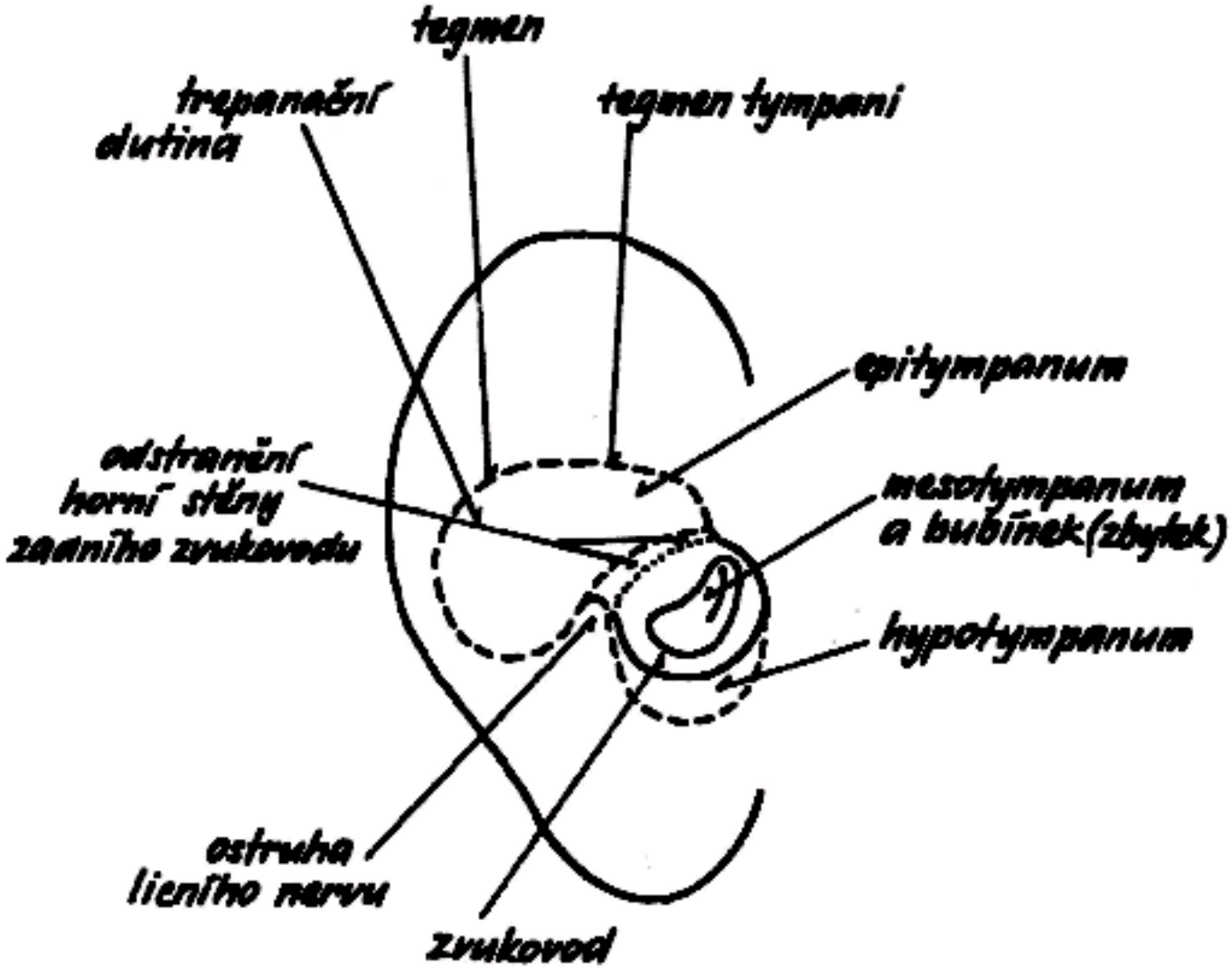
Status post atticoantro-tomiam (radical- conservative surgery)





Relation between external meatus and trepanation cavity

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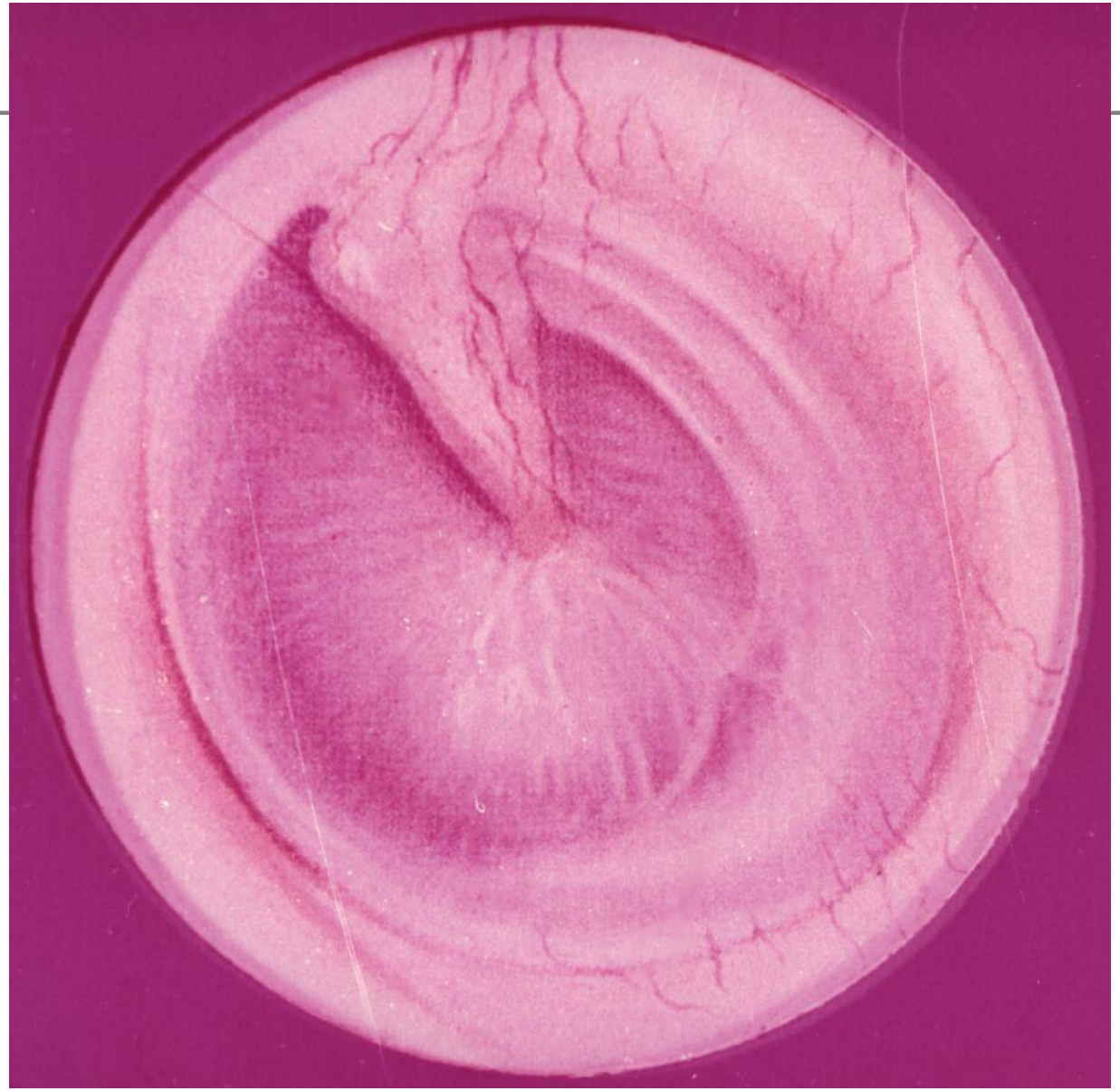
Scared thickened ear drum after otitis



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Ear drum with atrophic scar and calcification after otitis

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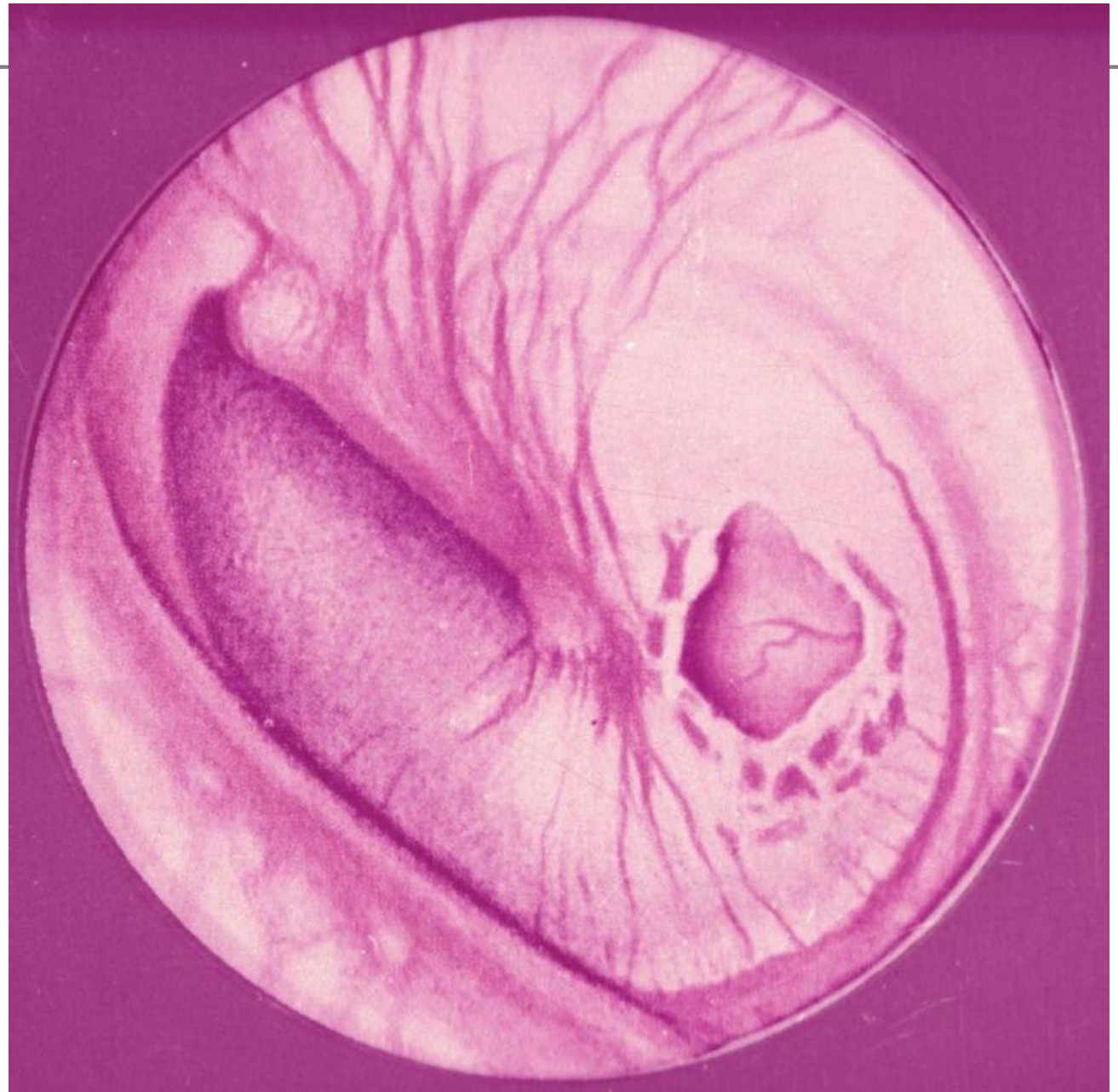
Injury perforation



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Surgery treatment - reconstructive surgery

Tympanoplasty

Myringoplasty

Ossiculoplasty

Division according to Wulstein

I. Myringoplasty

II. Columelisation of incus

III. Columelisation (stapes)

IV. Ekranisation (shade of round window)

V. Fenestration of labyrinth

The main aim

reconstruction of hearing function

Indication

- Sufficient function of inner ear
- Infection controlled
- Good function of Eustachian tube
- Mucos membrane inside tympanic cavity – at least alongside opening of Eustachian tube

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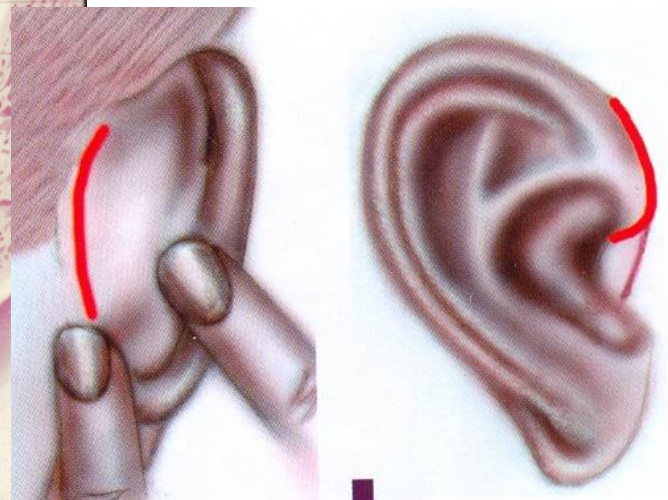
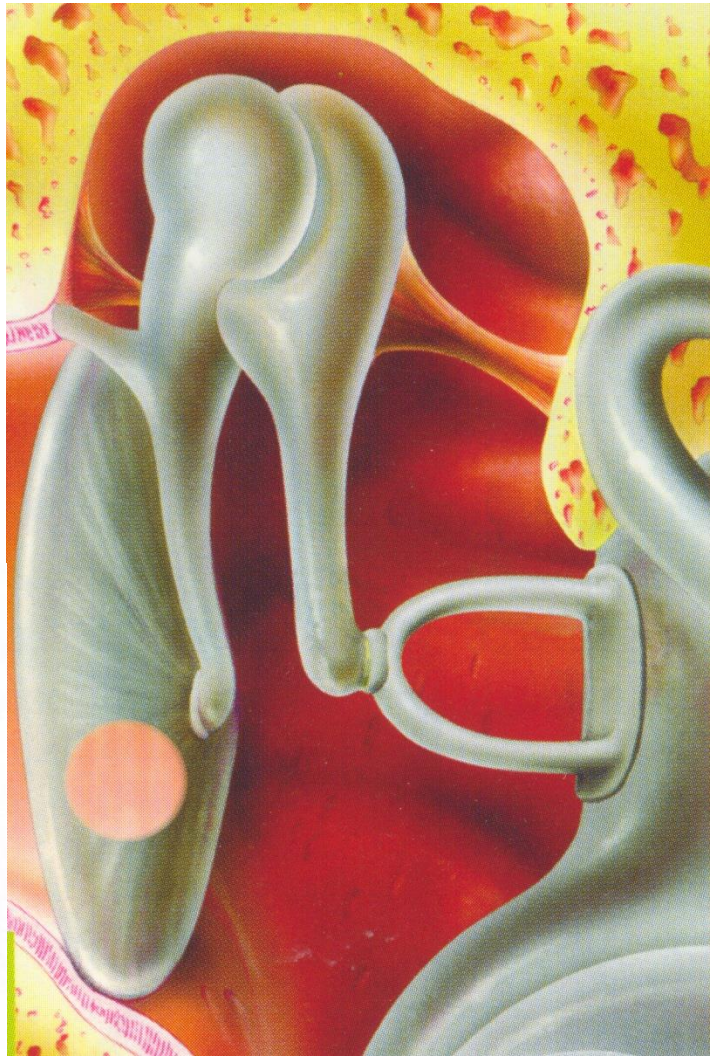
Tympanoplasty - type I. Myringoplasty





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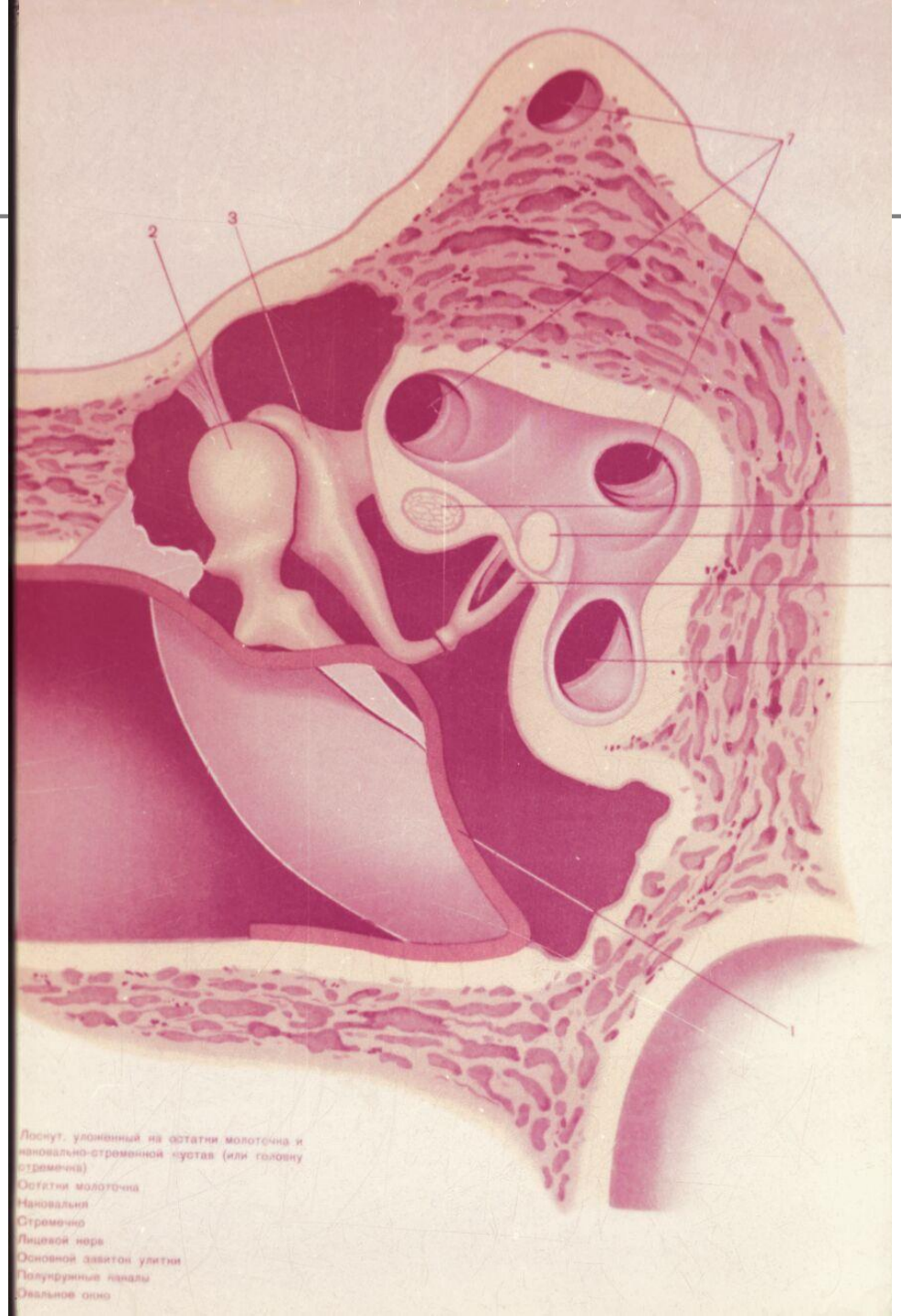
Tympanoplasty II.

Columalisation of incus



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Tympanoplasty type III.a (ossiculoplasty)

damaged incus and maleus, stapes intact, sound conducted by prosthesis PORP, underlayed by cartilage

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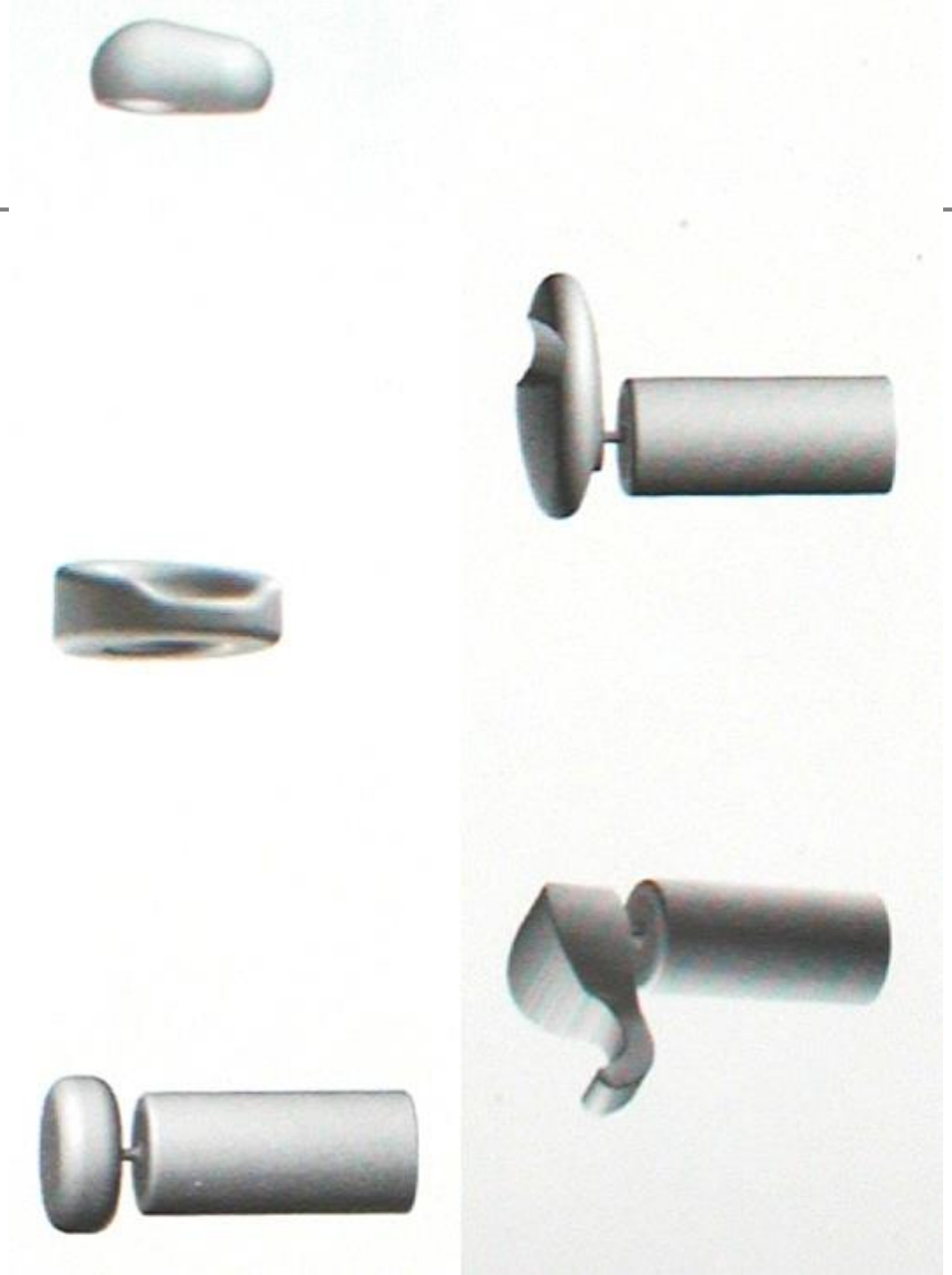
PORP
partial
ossicular
replacement
prosthesis



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PORP

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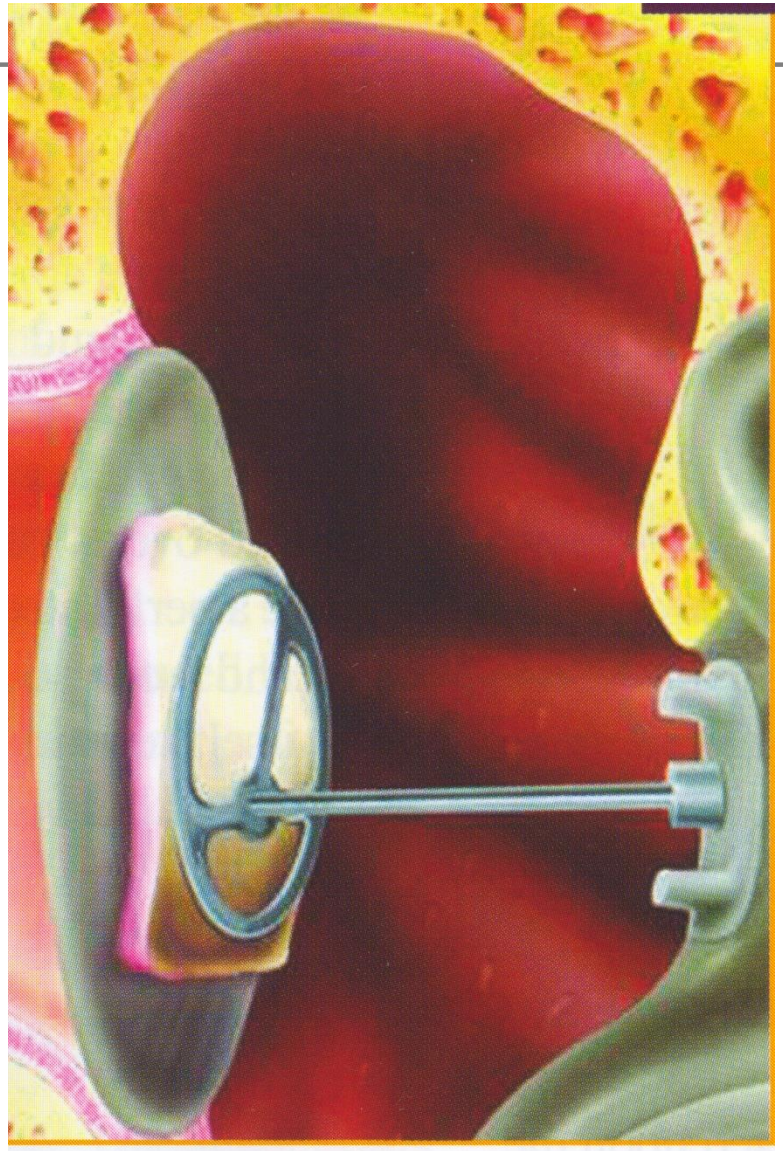
Tympanoplasty type III.b (ossiculoplasty)

damaged incus and maleus,
stapes without suprastructures,
sound conducted by prosthesis TORP, underlayed by cartilage.
Connection directly between basis stapedis and ear drum.



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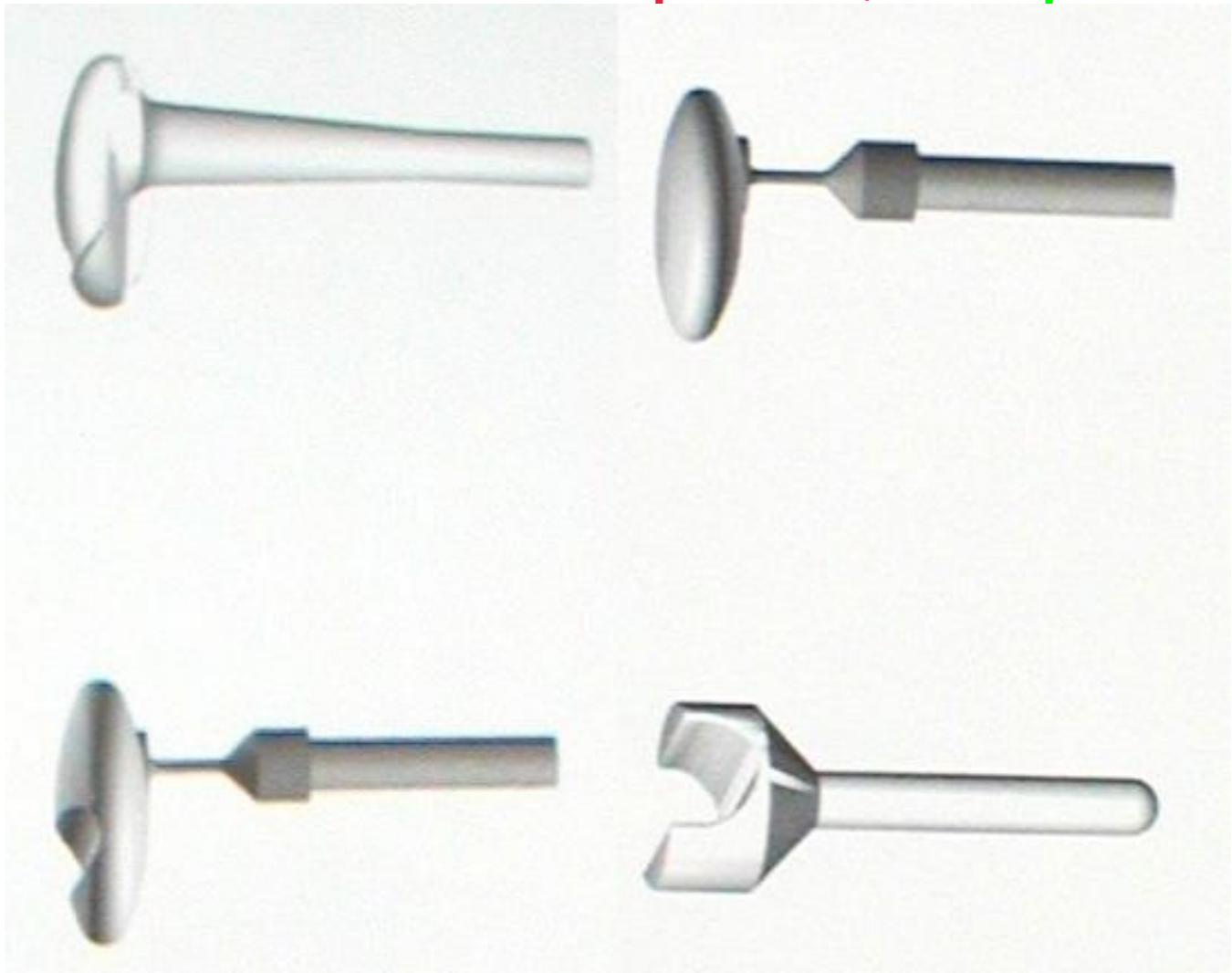
TORP

Total ossicular replacement prosthesis



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Tympanoplasty type III.c

Columelisation

damaged incus, maleus, stapes intact, connected directly to ear drum - myringostapedopexis

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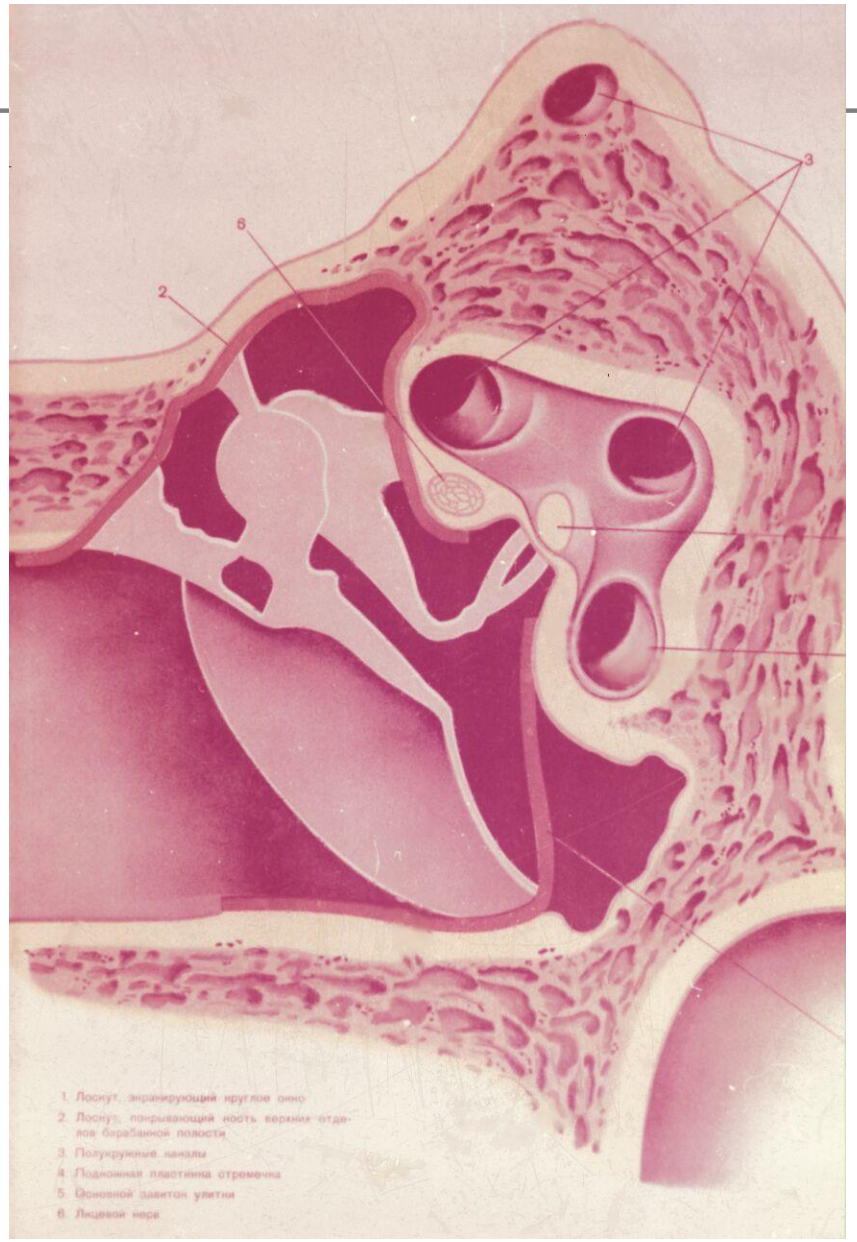
Tympanoplasty

typ IV.

Ecranisation

(round window shielded)



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Tympanoplasty type V.

Fenestration

(new window created into labyrinth)

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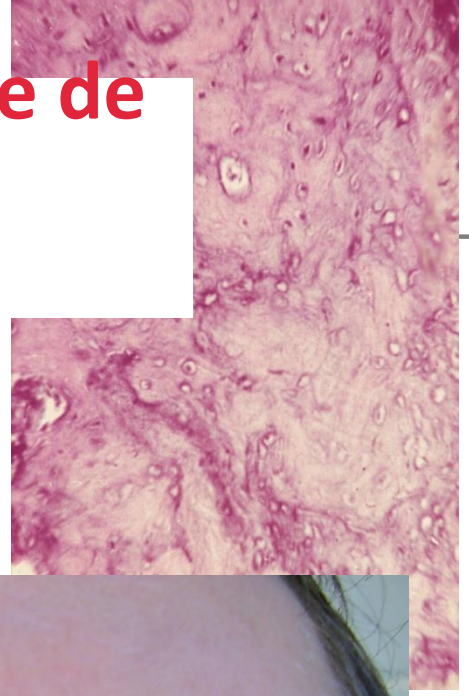
Syndrome Van den Hoeve de Klein

osteogenesis imperfecta
fixatio stapedis on both sides
blue sclera („the white of the eye“)



Otosclerosis vs. tympanosclerosis

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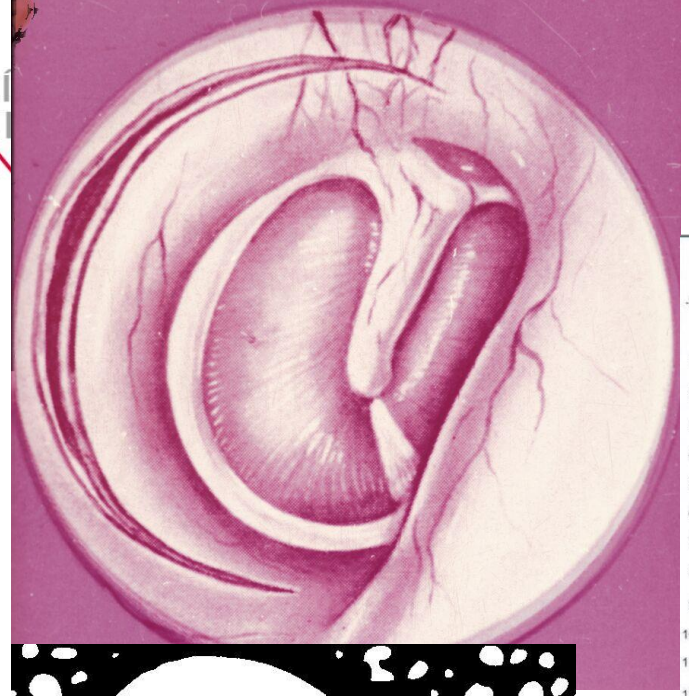
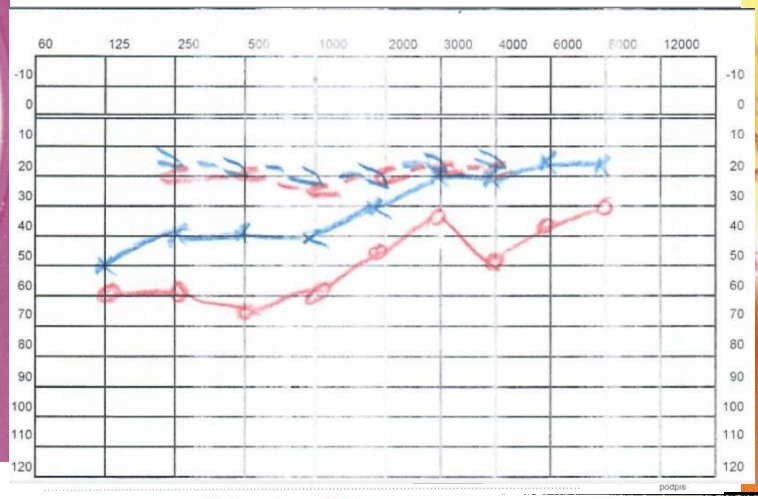
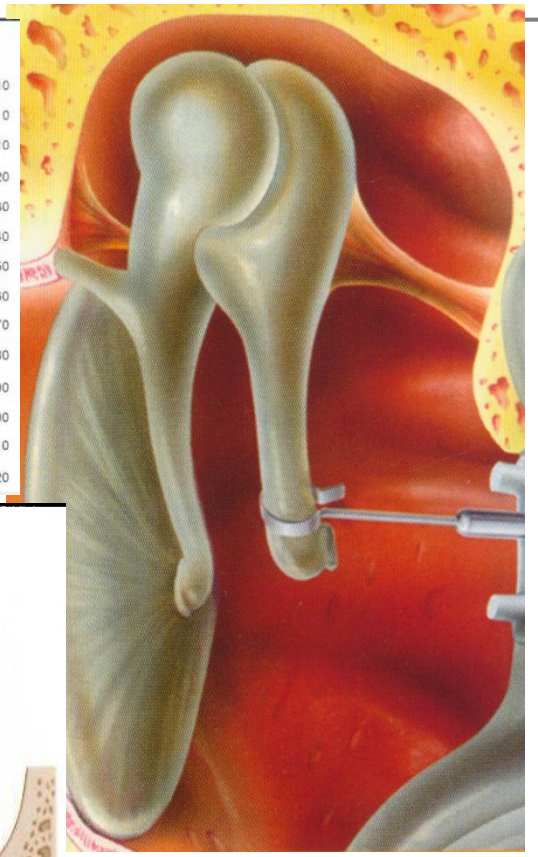
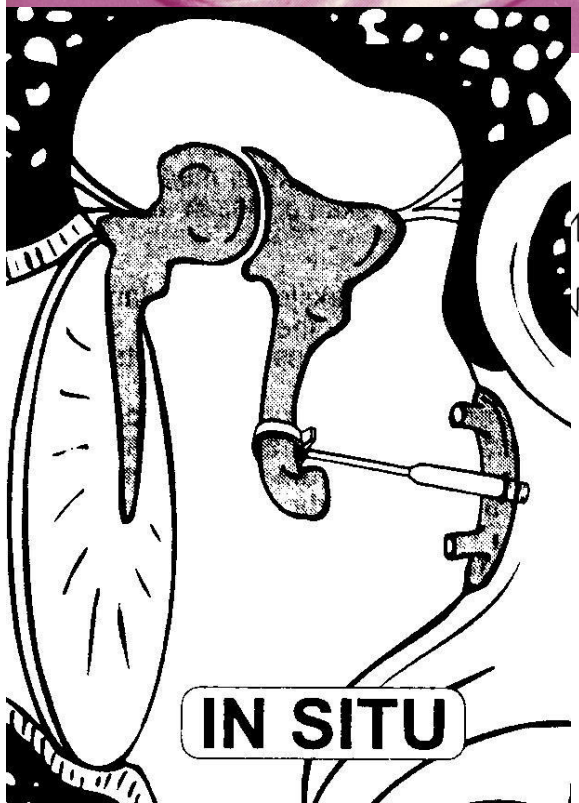
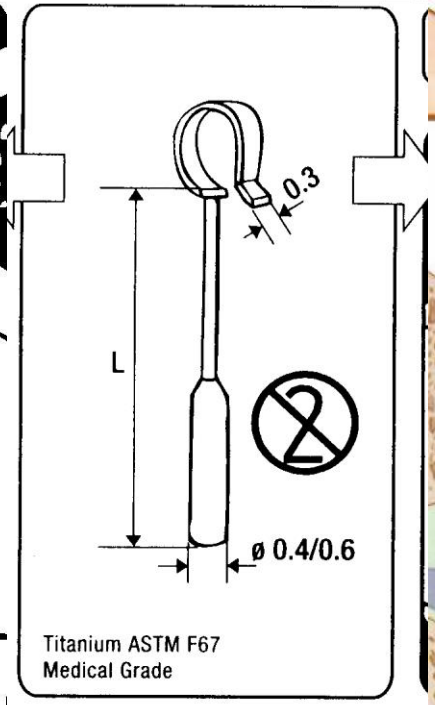
Stapedotomy

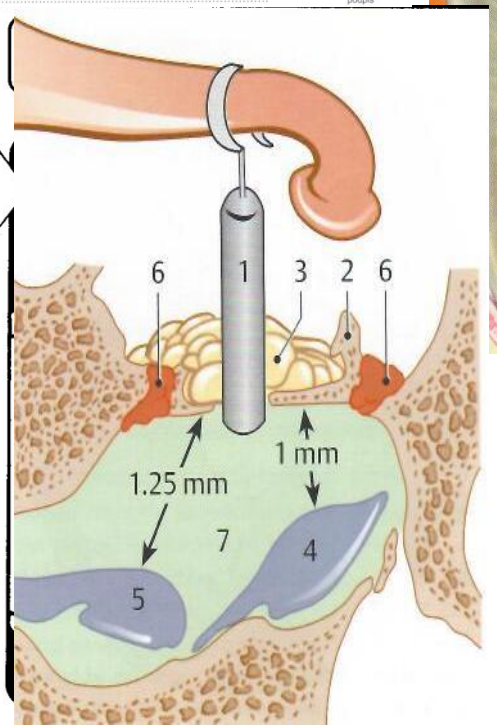




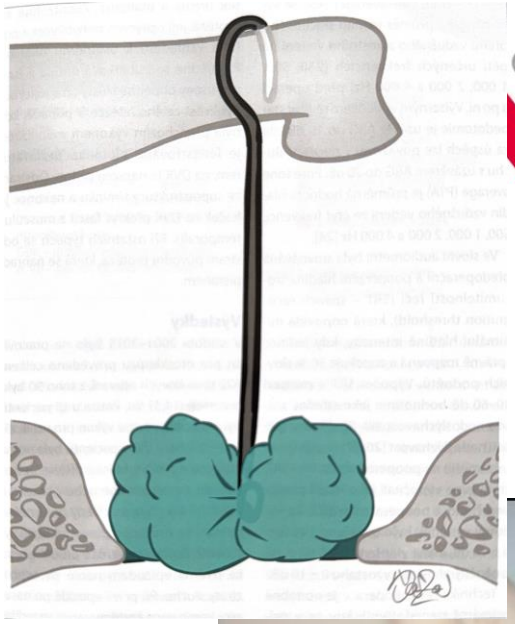




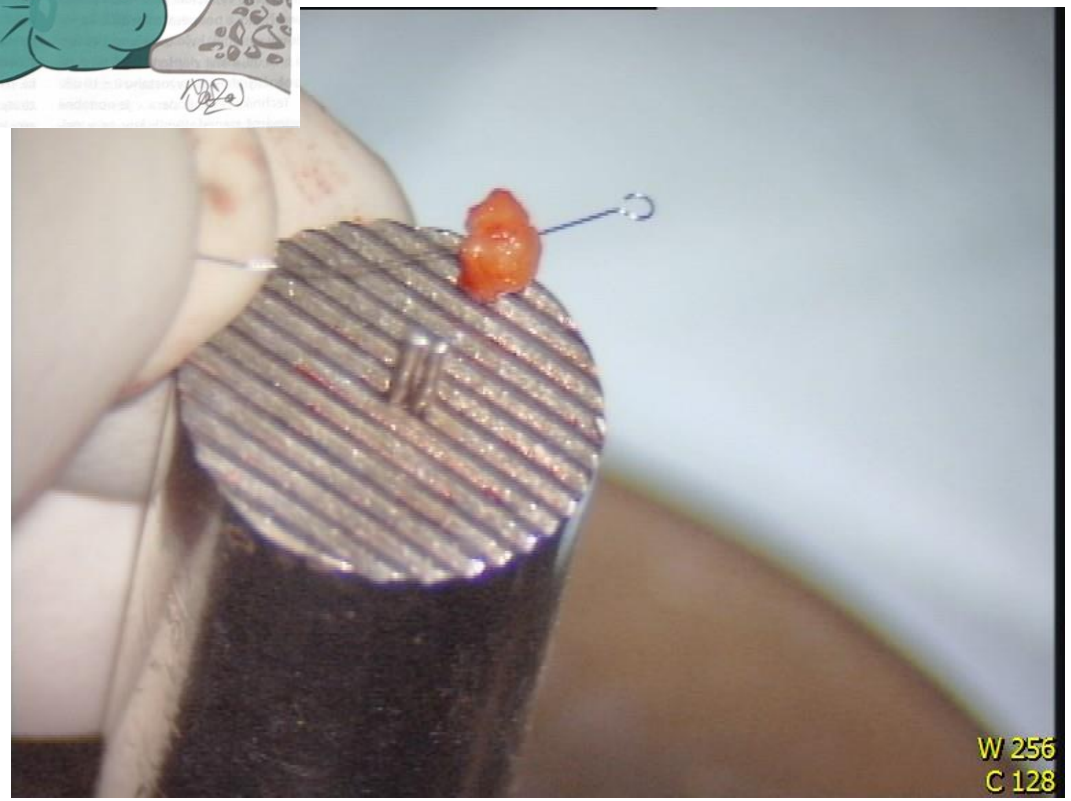


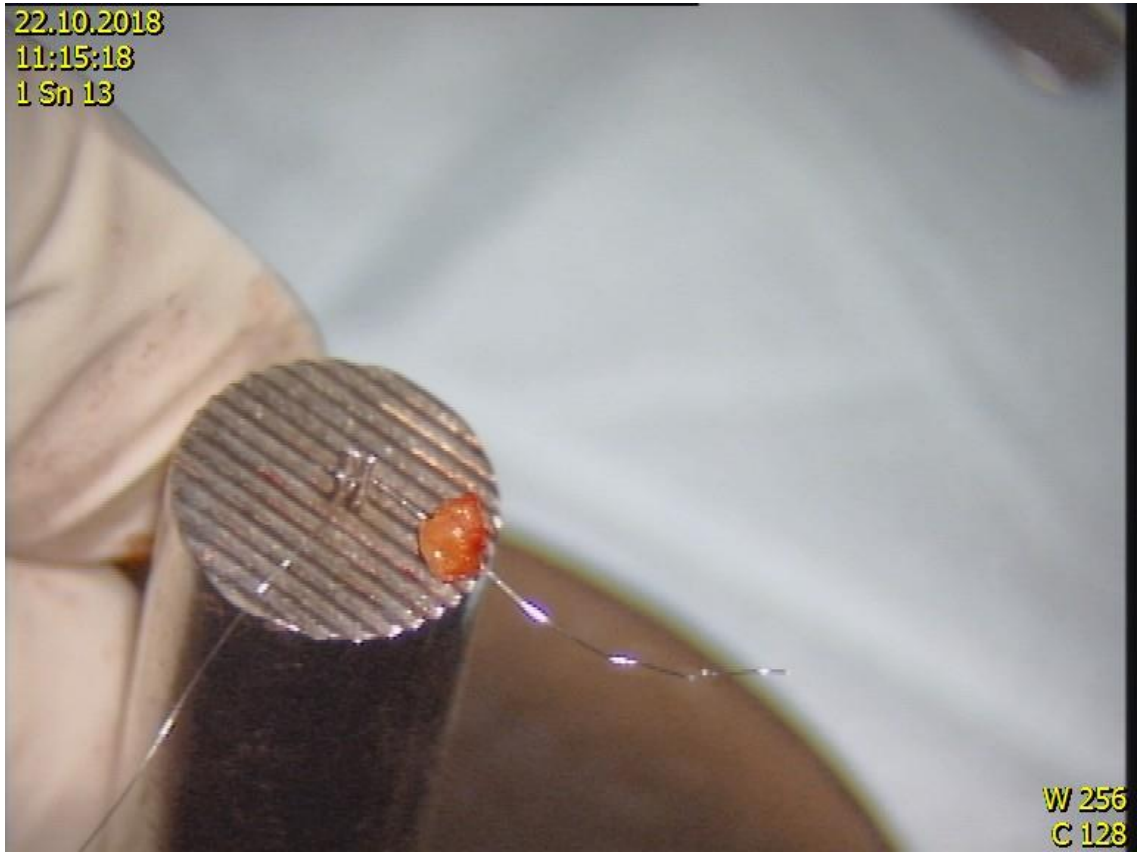


„Schuknecht´s prostesis“ (tantal wire and fat),



History – Schuknecht HF, Oleksiuk S, 1960





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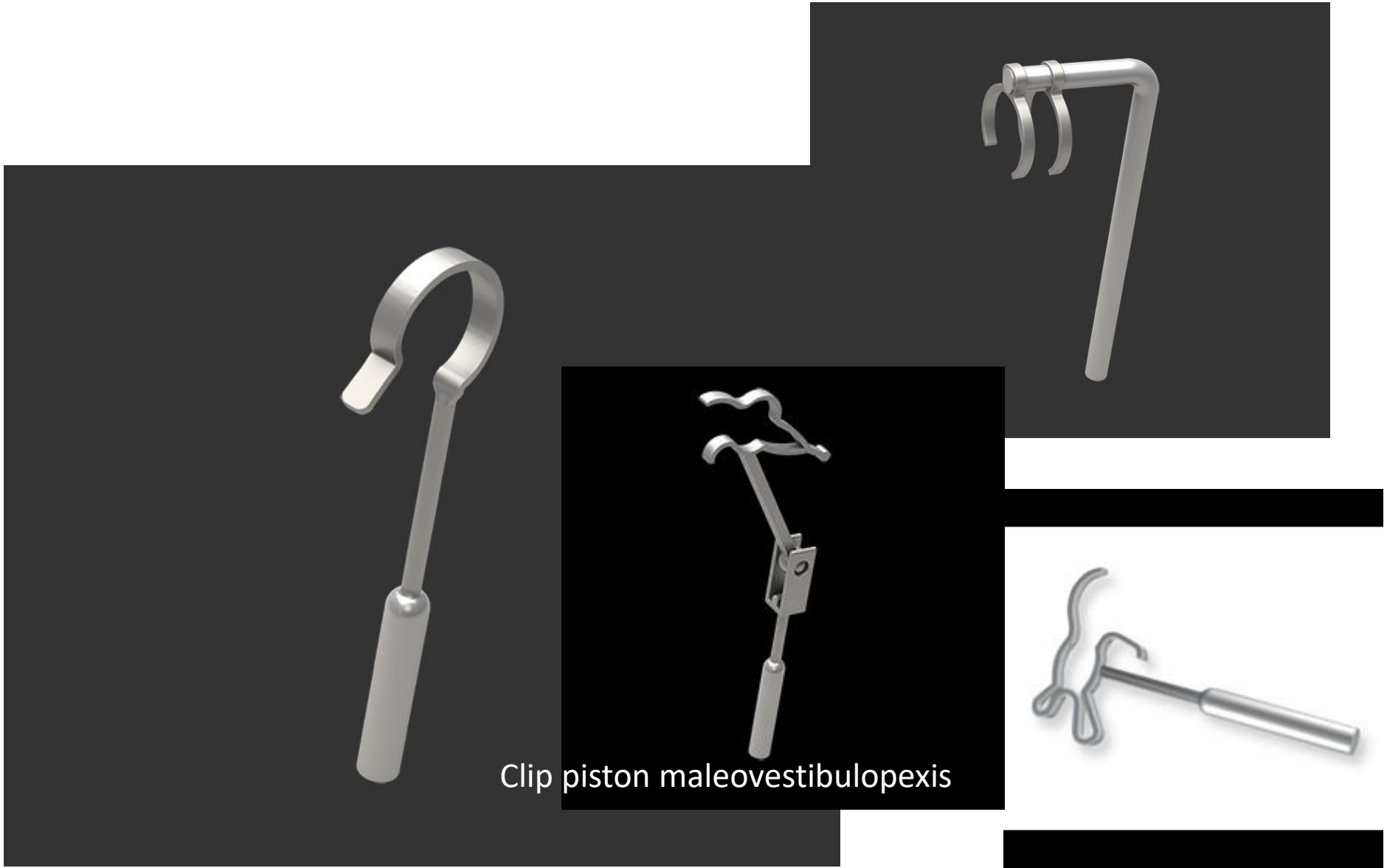
K-PISTON STAPES PROSTHESIS



Clip piston maleovestibulopexis

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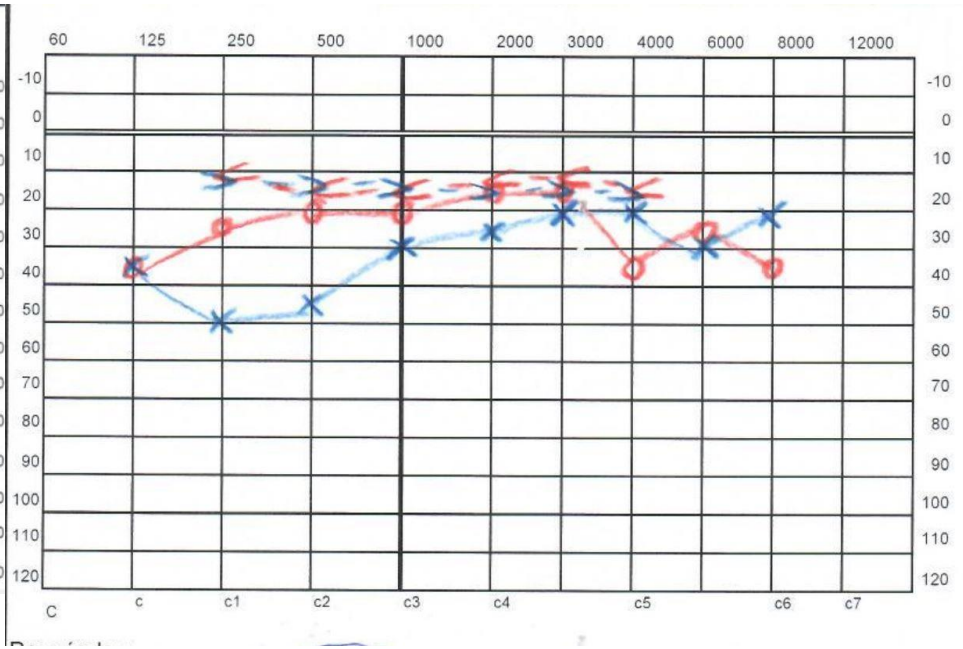
Stapedotomia

Hypacusis cond. l. utr.

St.p. stapedotomiam l.dx.



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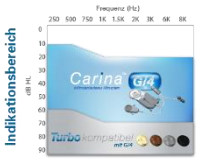
Possibility for improvement of hearing by surgery and prosthetics

Improvement of hearing

- Middle ear surgery
- Middle ear implant
- External bone hearing aid
- System for direct bone conduction
- Hearing aid for air conduction

- BAHA
- Sound-bridge
- **BONEBRIDGE**



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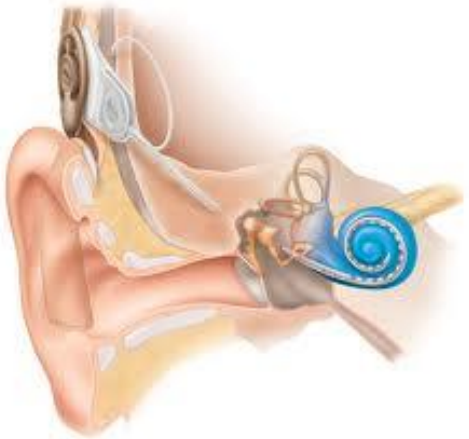
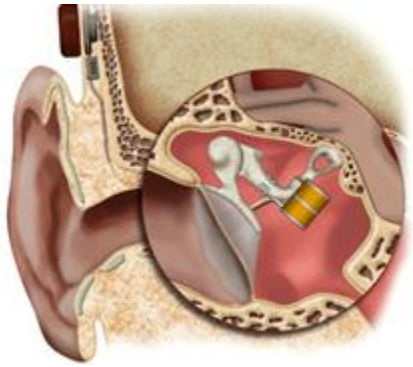
Implantable hearing aids

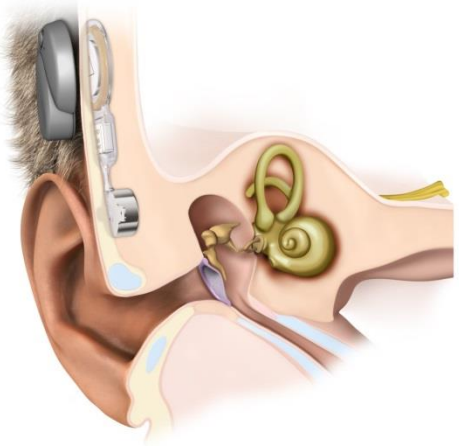
Cochlear implants



Middle ear implants (MEI)



Bone conduction implants



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BONEBRIDGE

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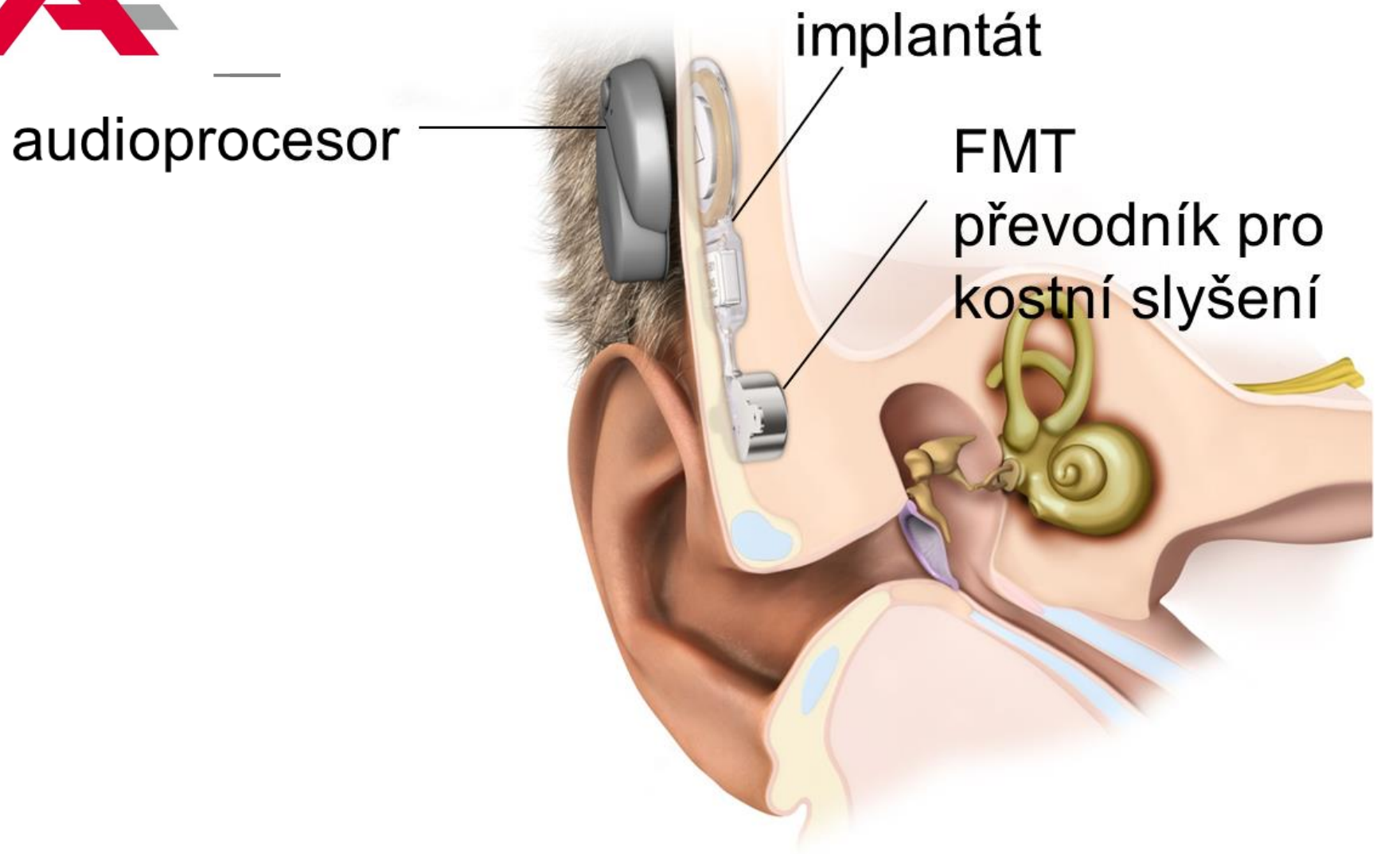

BC-FMT = Bone Conduction Floating Mass Transducer

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First implantation of BONEBRIDGE in Czech rep.

- Patient with Treacher-Collins syndrome and atresia meatus acust. ext.
- Normal bone conduction, full „cochlear reserve“ bothsided
- Surgery: ENT Clinic St.Ann Faculty hospital 29.8.2014

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Preparation

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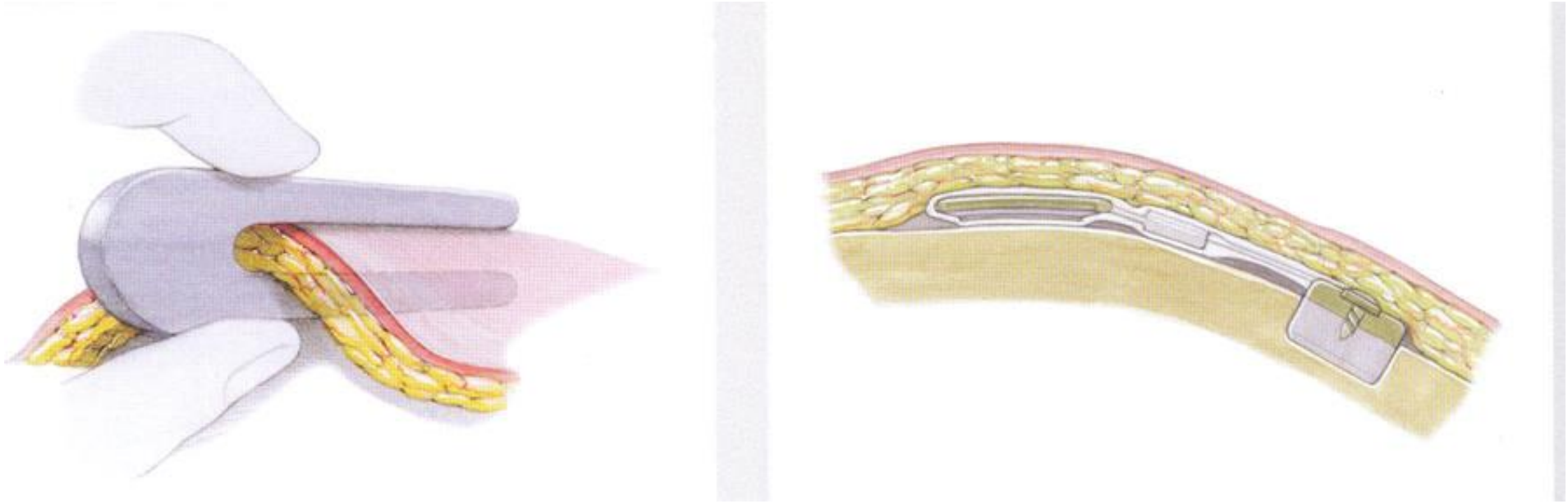
Incision

Estimation of cutaneous flap thickness (until 7 mm)



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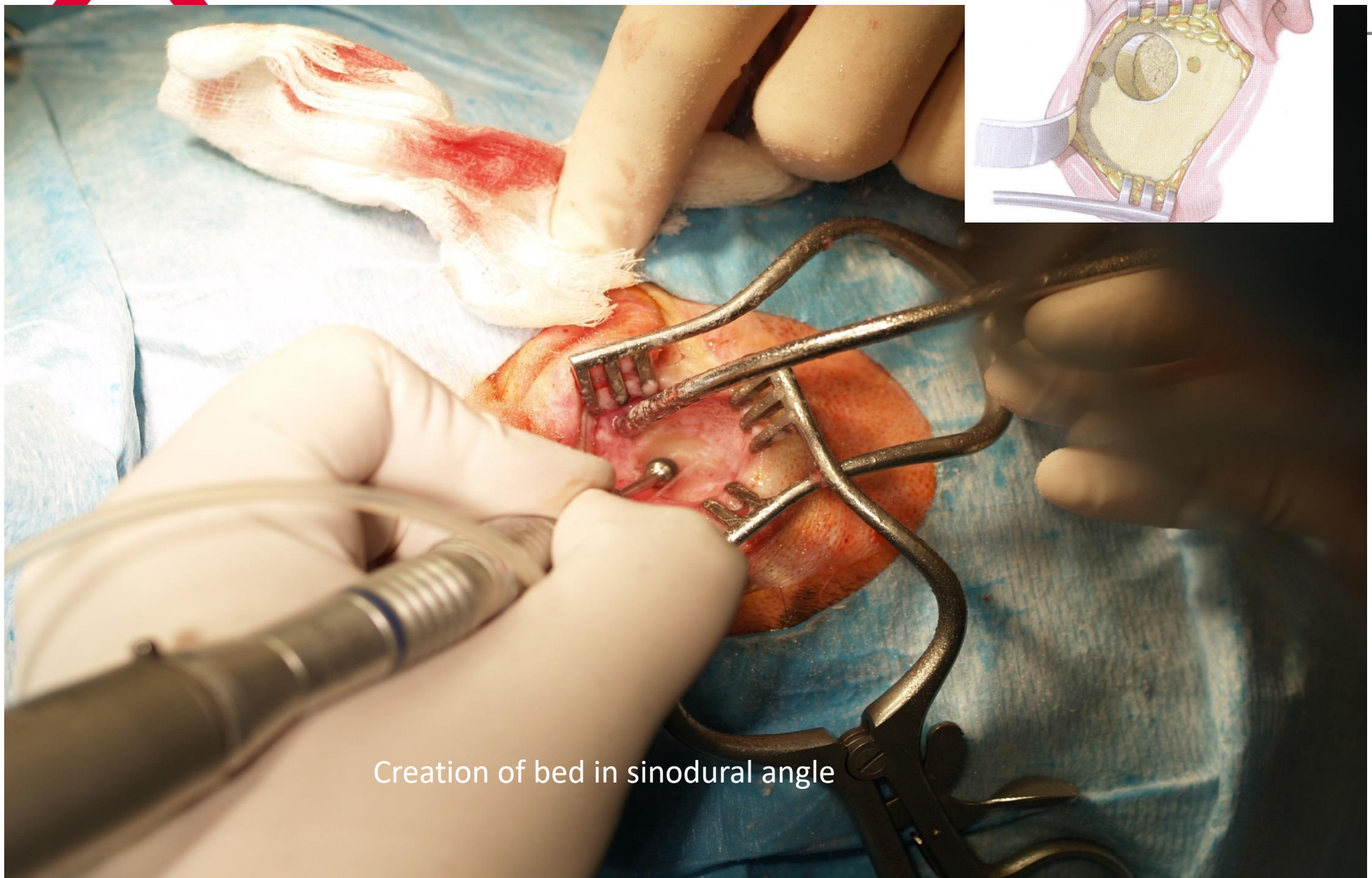

Creation of bed in sinodural angle

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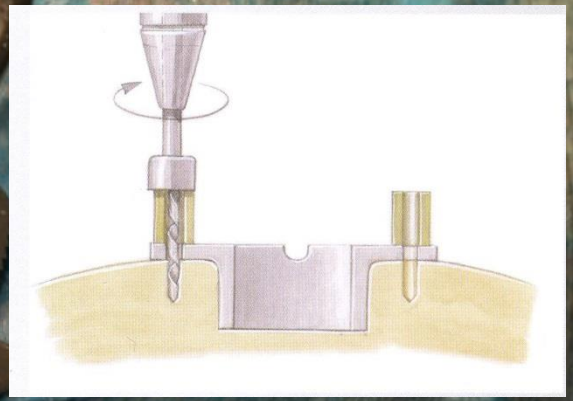
Gauge for FMT (T-sizer)



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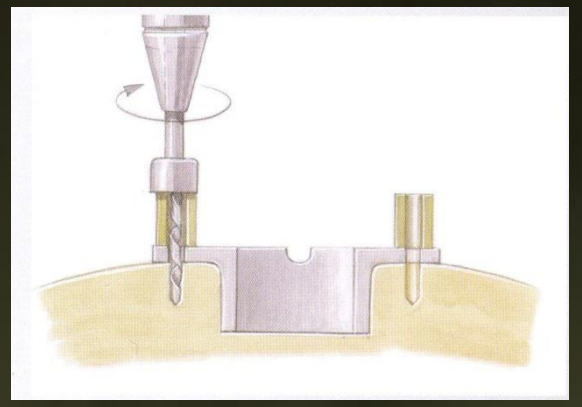
Fixation of FMT



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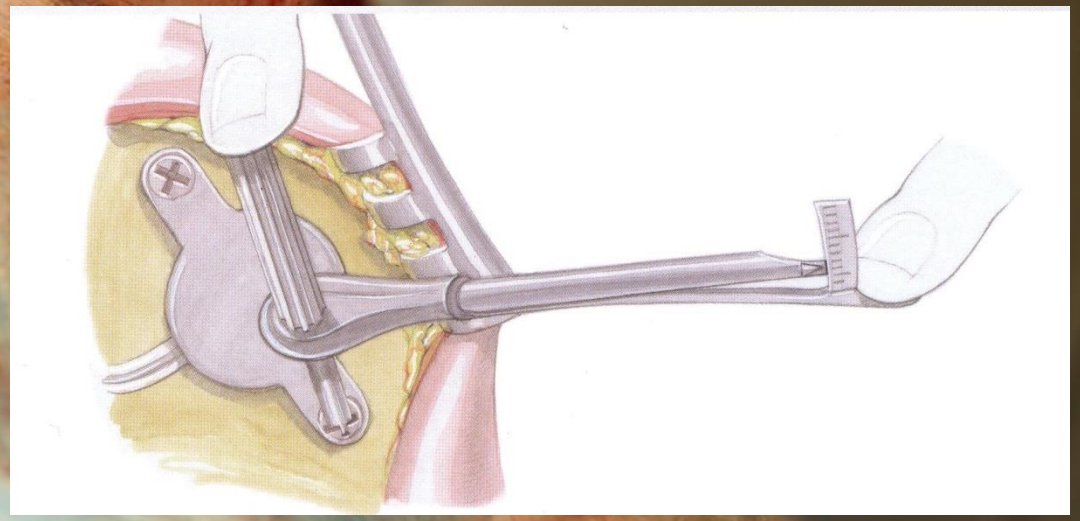
Fixation of FMT



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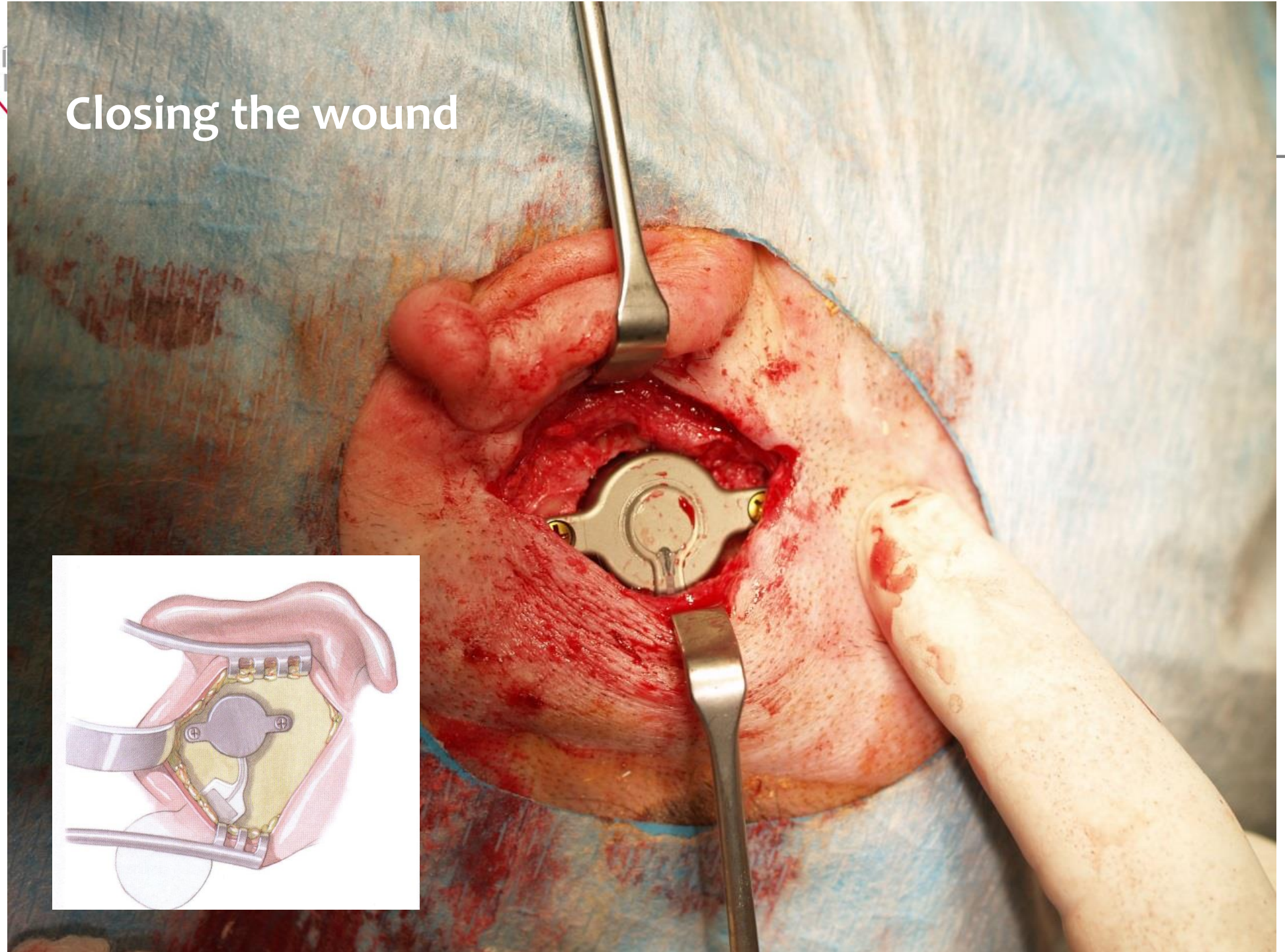
Closing the wound



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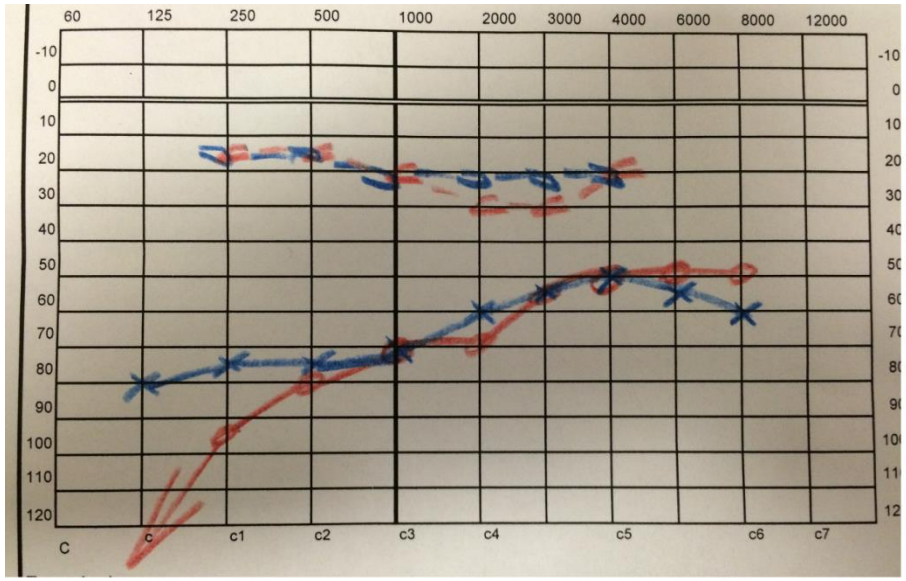
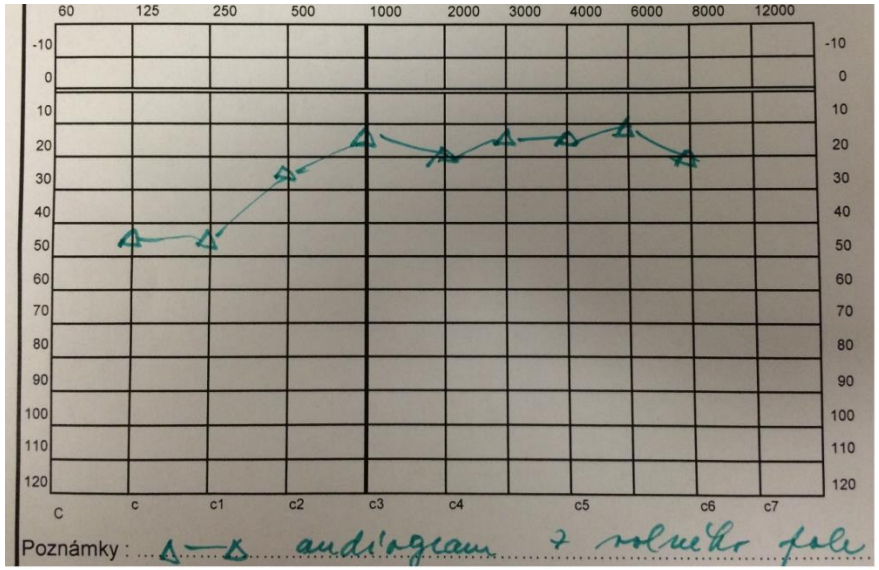
Hearing function before and after surgery





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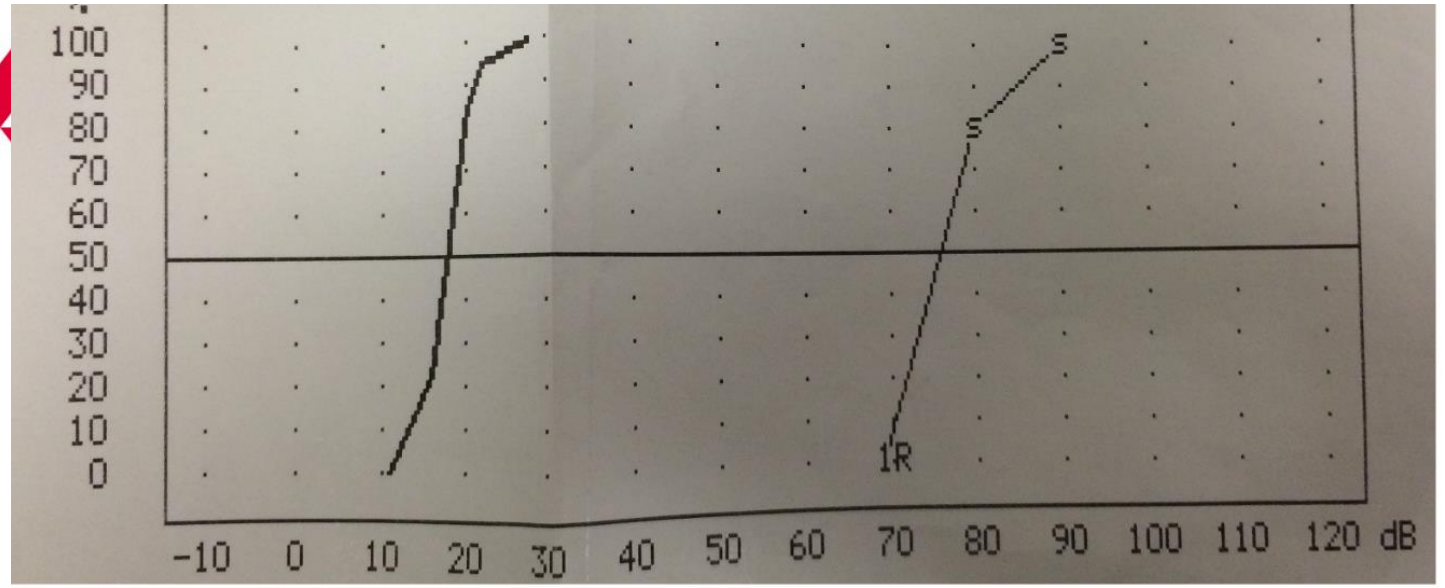

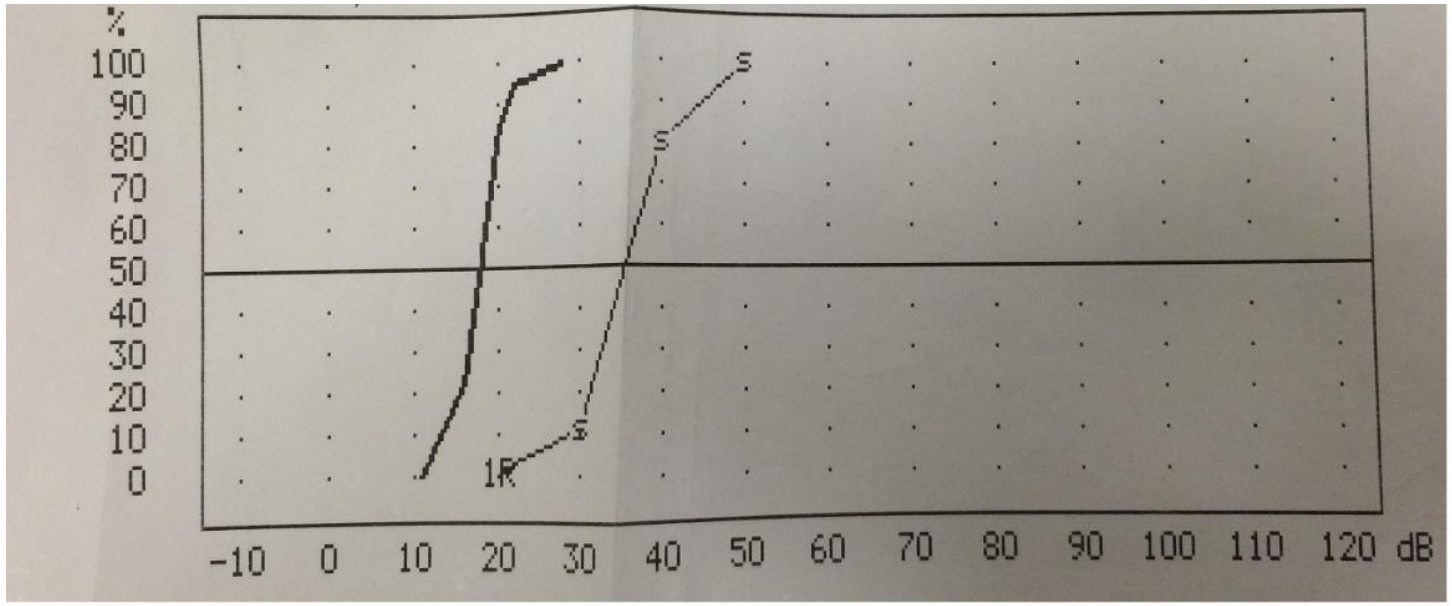

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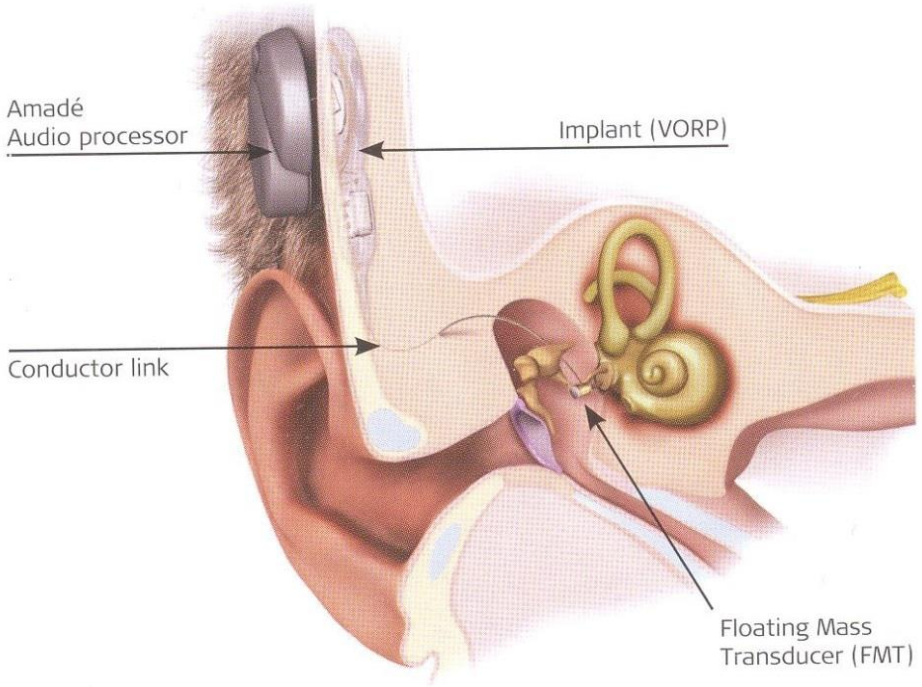
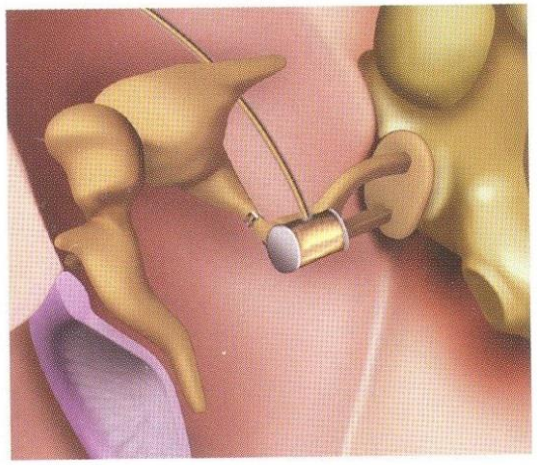
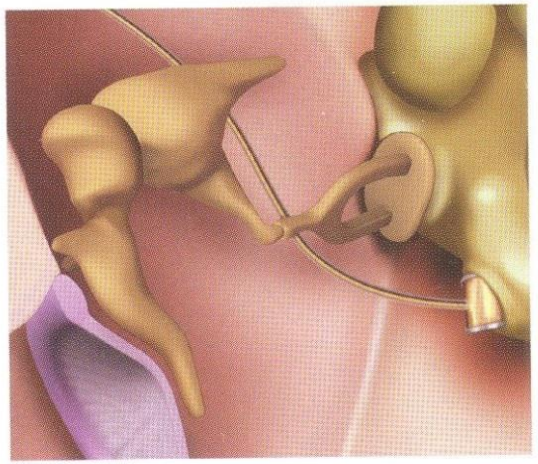
Vibroplasty - sound bridge





Incus Vibroplasty
used to treat
sensorineural hearing loss



Round Window Vibroplasty
used to treat conductive
and mixed hearing loss

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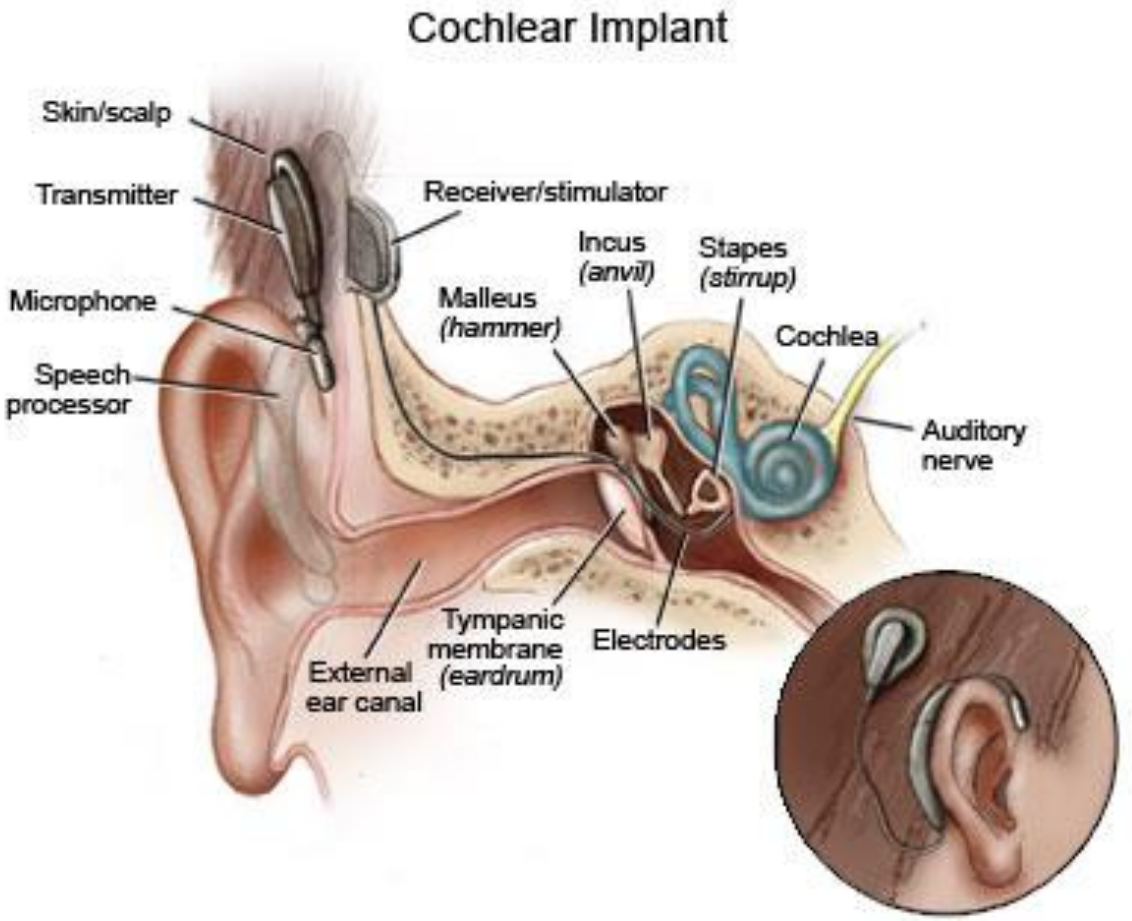
A cochlear implant system

two main components.
The externally worn **audio processor** detects sounds and sends them to the **internal implant**, which is placed just under the skin behind the ear.
The sound is encoded in processor, electric signal is sent into internal implant and through flexible electrode, which is introduced into the cochlea stimulates directly neurons of auditory nerve.
Electric signals are led into the brain, where they are
interpreted as sound.



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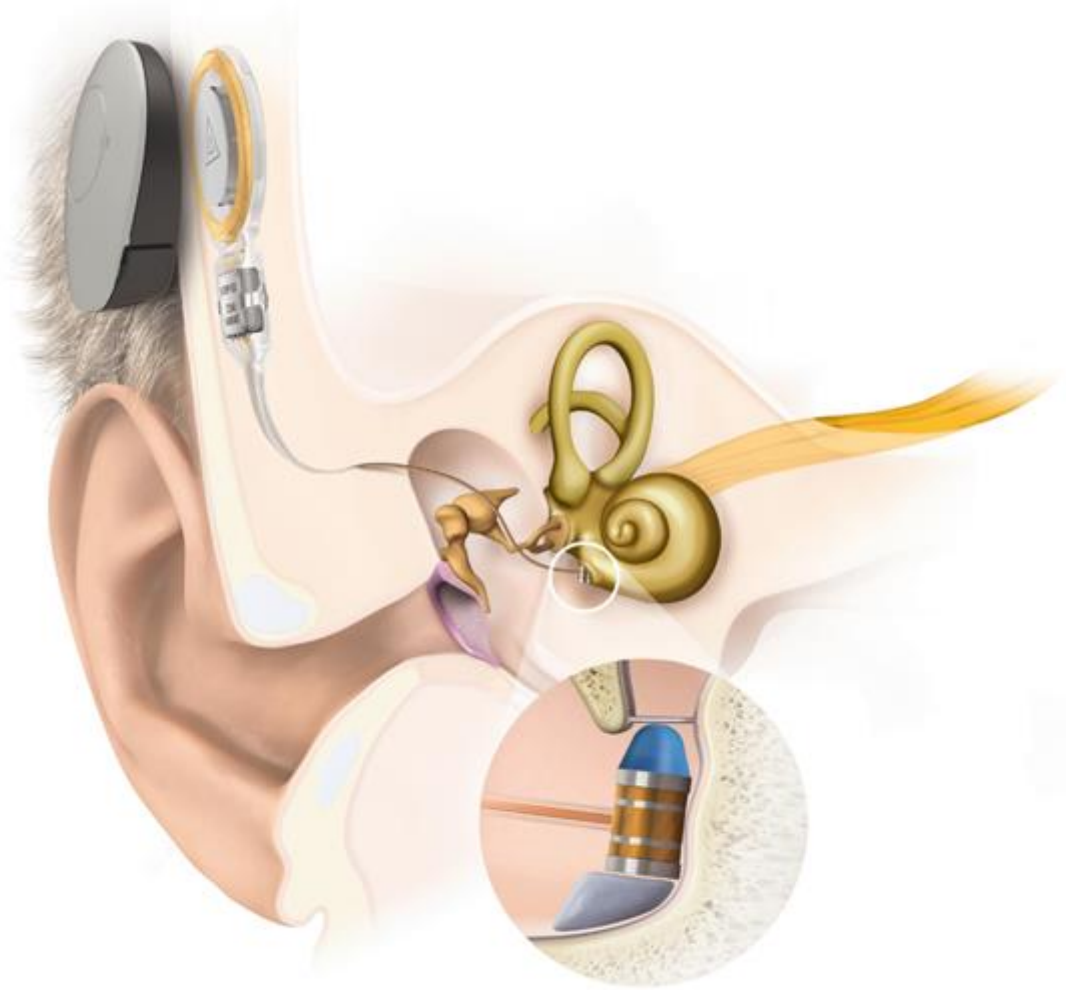
Vibrant soundbridge – active middle ear implant hearing system. Vibroplasty

The externally worn **audio processor receive and** detects sounds and convert them into electrical signals, which are sent to the **internal implant.**
Electrical signals are led into FMT, which change it into mechanical vibration and directly stimulate ossicles or round window niche or different vibratory structures.



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Labyrinthine Concussion (Commotio labyrinthi)

damage to the inner ear due to head trauma with no well-defined injury or skull fracture, resulting in sensorineural hearing loss with or without vestibular symptoms

acceleration-deceleration movement of the membranous labyrinth against the bony labyrinth, or the compression and vibration forces generated by a blunt force trauma. It is suggested that these actions result in “hemorrhaging sites and microcirculation disturbances in the cochlea, destroying the sensory epithelium due to rupture of vessels in the membranous labyrinth