

Surgical treatment in vestibular diseases

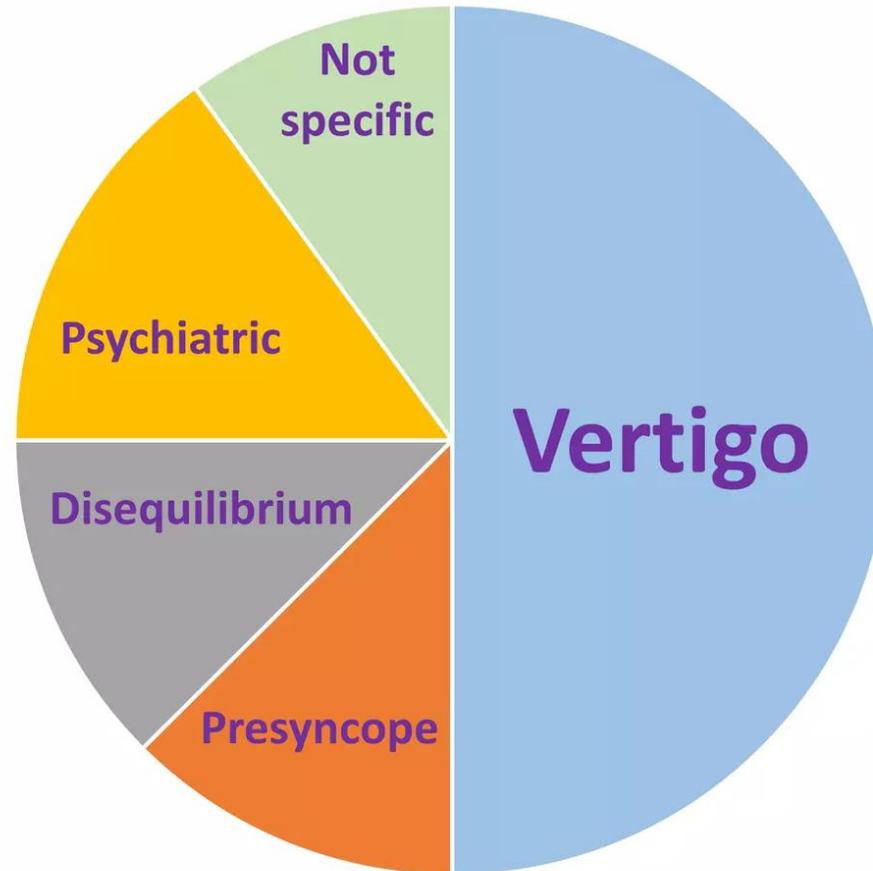
Professor Mir Mohammad Jalali

Otologist/Neurotologist

Guilan University of Medical Sciences

2024

Dizziness- Etiology

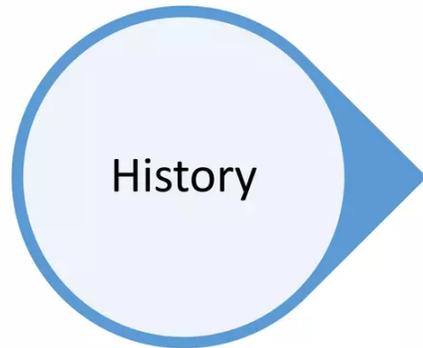


Dizziness- Etiology



The accurate diagnosis of the underlying etiology is the crucial step in the management of vertigo.

Diagnostic approach



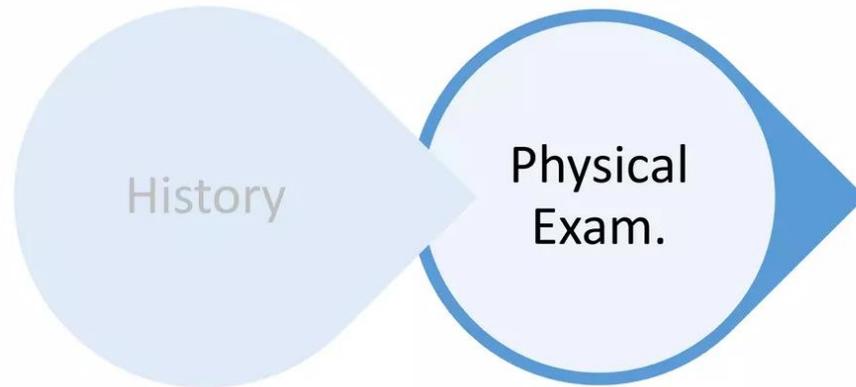
- True *or* pseudo-vertigo
- One attack *or* more
- Episodic *or* continuous
- Duration of each episode
- Chronology of symptoms
- How does start at first time
(*training, trauma*)



LISTEN

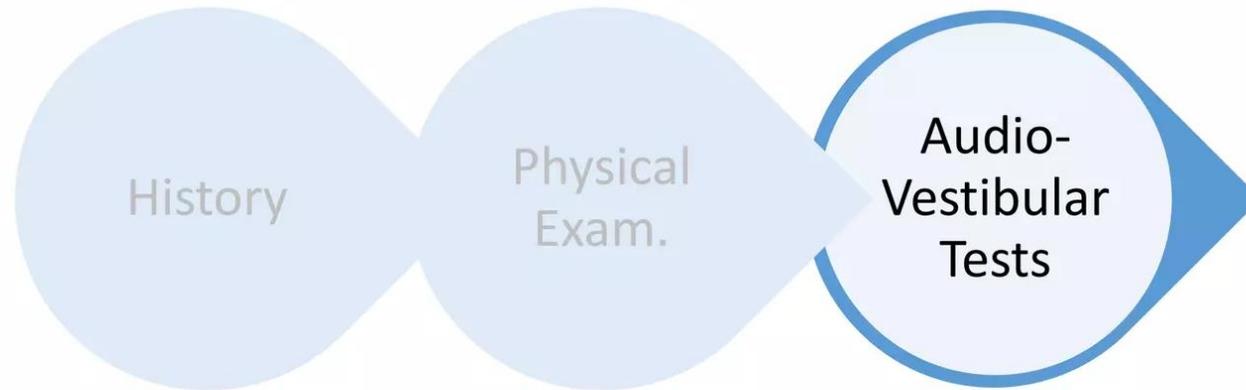
- Associated symptoms (*oto, neuro, ocular*)
- Associated histories
(*medico-surgical, family, drug, psychologic*)
- Effect of {
 - lifestyle
 - environment
 - head movement
 - ear pressure changes

Diagnostic approach



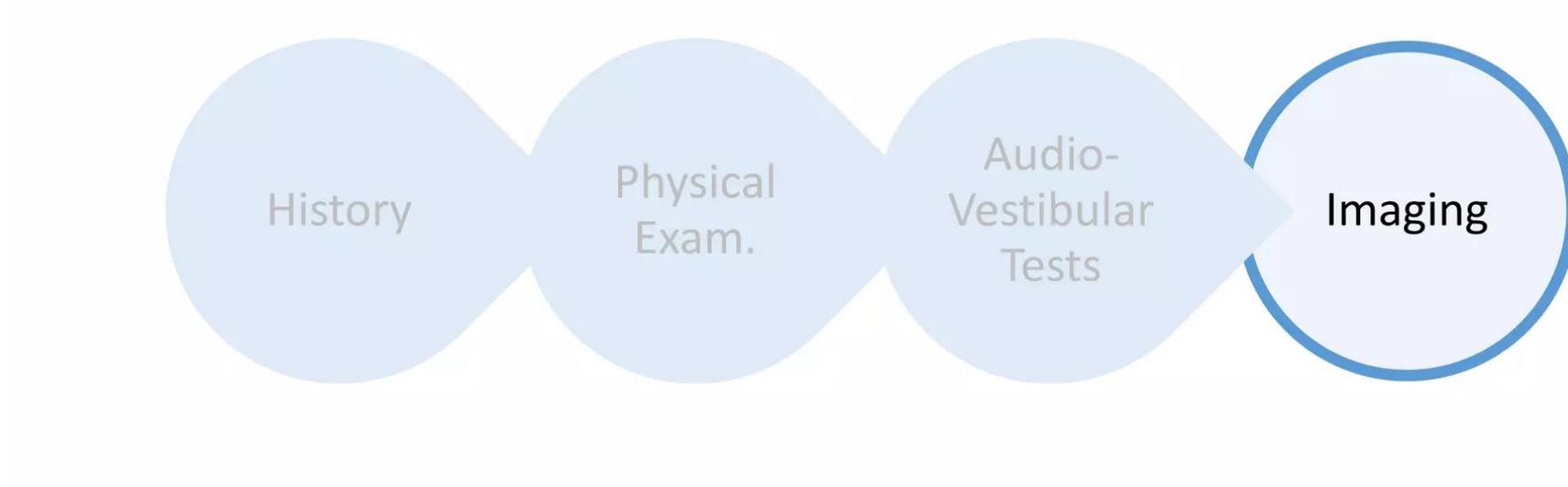
- Ear Exam (inspection)
- Eye Exam (position & Nystagmus)
- Neurologic Exam (**R/O ataxia**)
- Sound *or* Pressure (**3rd window**)
- Vibration (**SSCD, MD, VS**)
- Hyperventilation (**phobia, central**)
demyelination: MS, VS, Vascular
- Positional testing (**Hallpike , roll test**)
- H I T test (**canal dysfunction**)
- Head shaking test

Diagnostic approach



- VNG (*saccade, pursuit, nystagmus*)
- Evoked evaluation
 - Caloric Test (*lower freq.*)
 - Head Shaking (*1-2 Hz*)
 - V-HIT (*3-5 Hz*)
- PTA-SRT-WRS, AR
- ECoG
- VEMP (cervical, ocular)
- Rotatory chair test
- Posturography (C D P)

Diagnostic approach



➤ CT :

- Otic capsule involvement
- SSCD Sx. / any other 3rd window
- Large vestibular aqueduct Sx.

➤ MR :

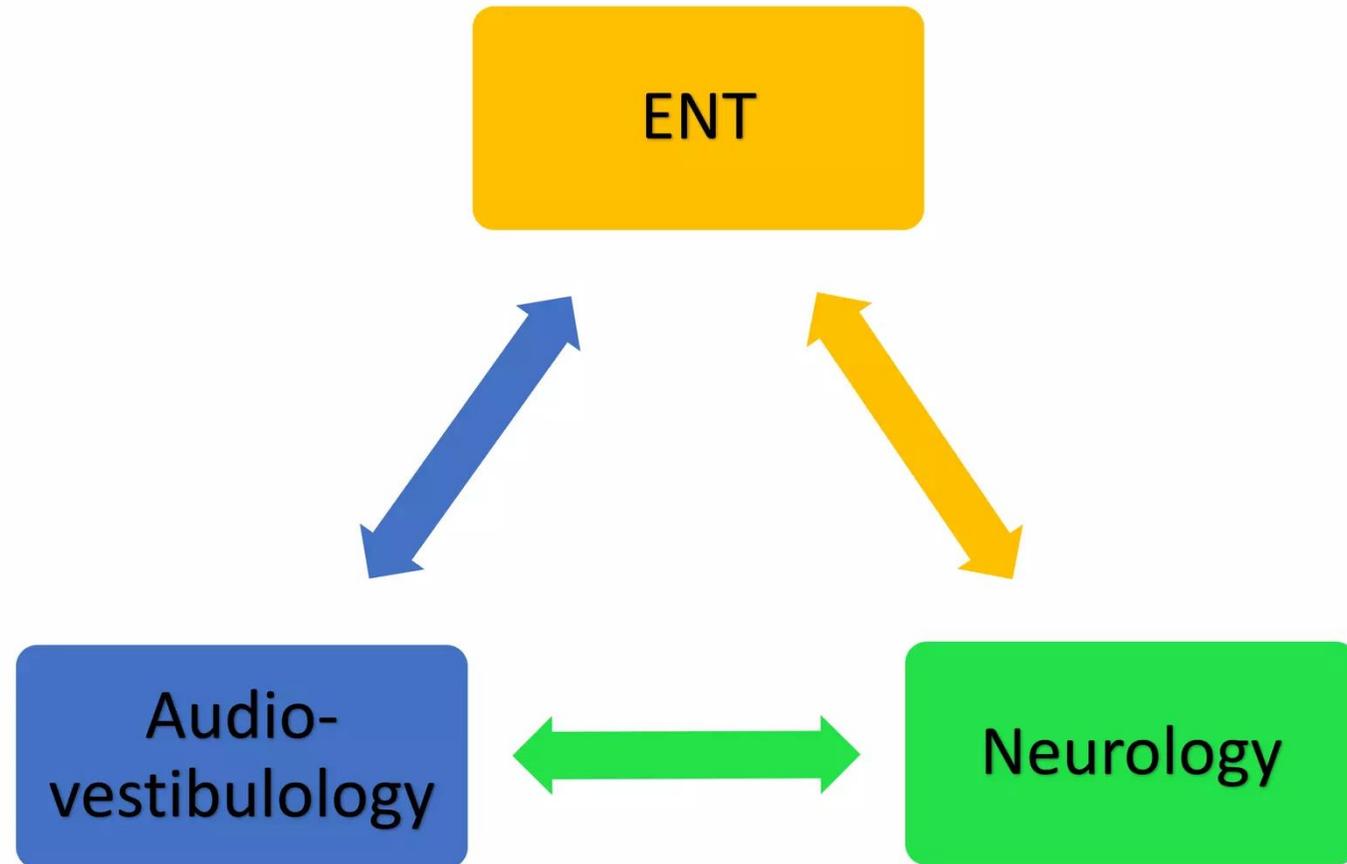
- Meniere's Disease
- CP Angle lesions
- Other central disorders

Patients with vertigo have some degree of pseudo-vertigo

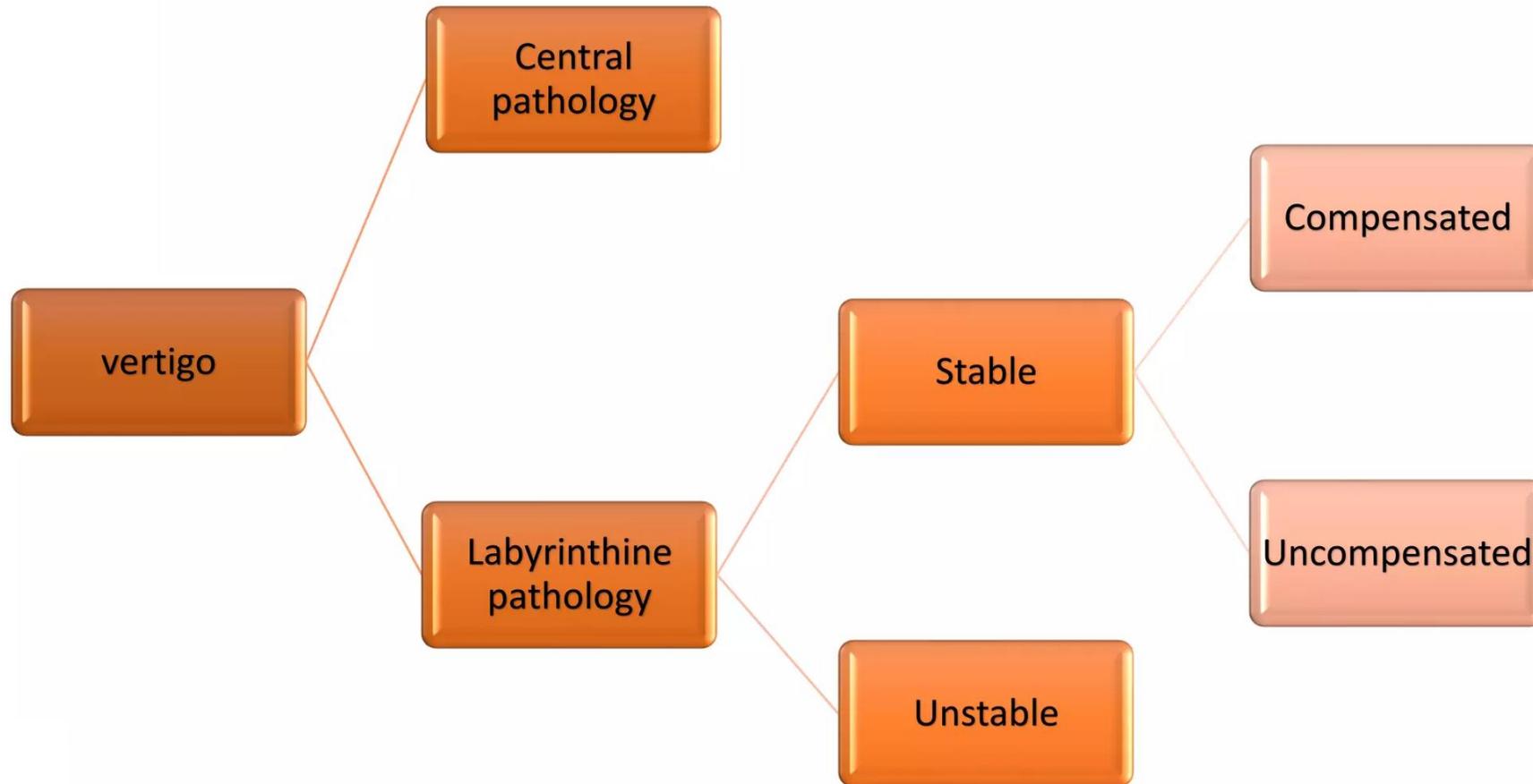
Concurrent disorders may present at the same time

The etiology of vertigo might change over time

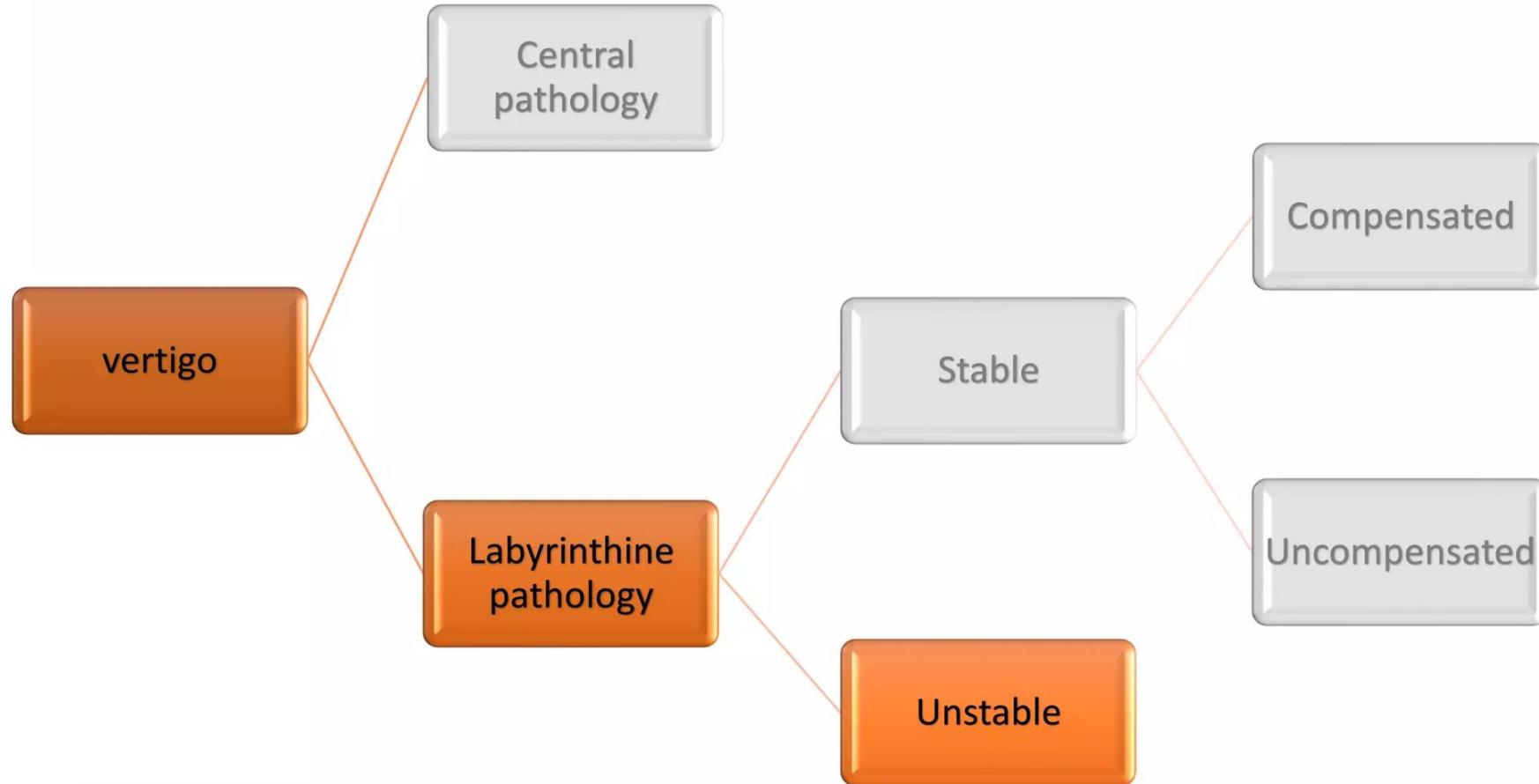
Teamwork planning



Decision making



Decision making



Surgical philosophy

In unstable or rapidly progressive lesion

→ central compensation is **not** possible

So, the goal is stabilizing the ear

(by medical or surgical management)

- Correcting the defect

or

- Ablating the function

Localizing the lesion

- An asymmetric hearing loss (**the best indicator**)
- Reproducible unilateral reduction in **caloric**
- Less reliable lateralizing features:
 - *Tinnitus*
 - *Aural fullness*
 - *Direction of nystagmus*
- Audiovestibular results

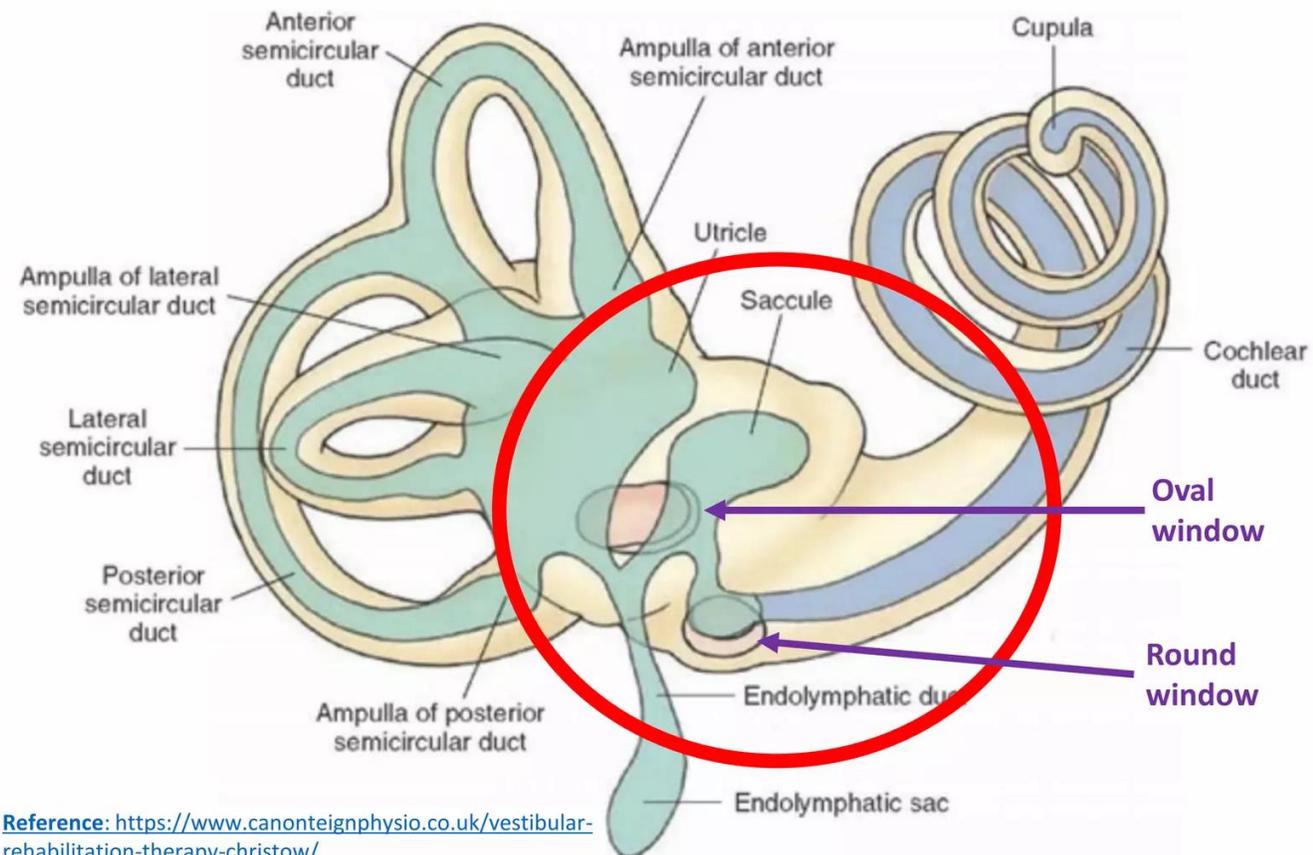
Tests should always be interpreted in the light of the entire clinical presentation

(sometimes, the worse ear is not the source ear)

Surgical preparations

- **Surgery is always elective**
- **MRI in all patients are mandatory**
- **Residual hearing is always important**
(completely patient-based)
- **Start from less invasive to more aggressive**
(Transtympanic injections have priority)

Surgical anatomy



Reference: <https://www.canonteignphysio.co.uk/vestibular-rehabilitation-therapy-christow/>

Common disorders

BPPV

Meniere's
Disease

Vestibular
Migraine

SSCD Sx.

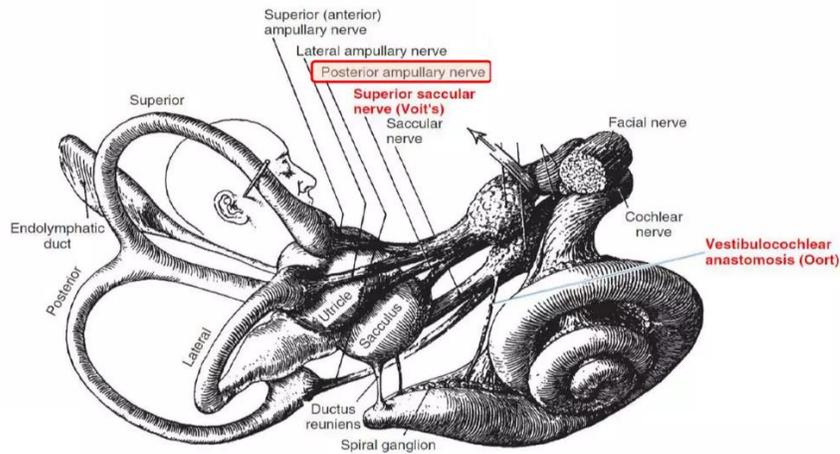
Peri-
lymphatic
Fistula

Vestibular
Neuritis

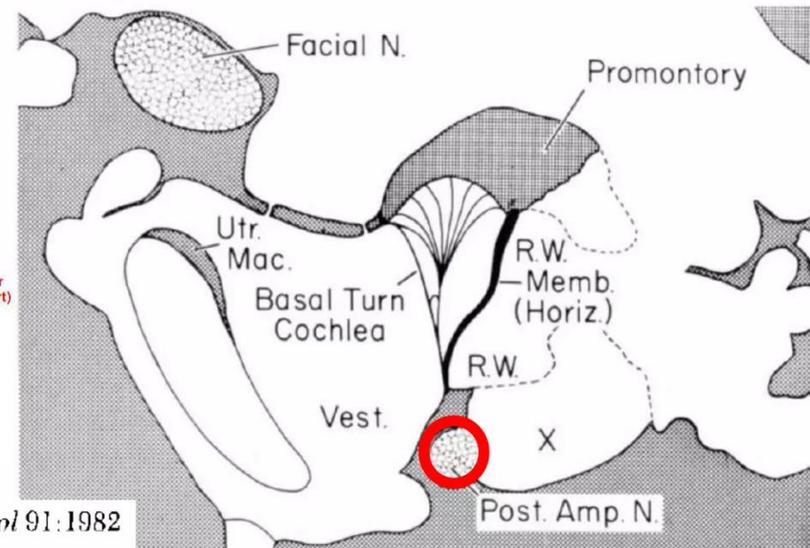
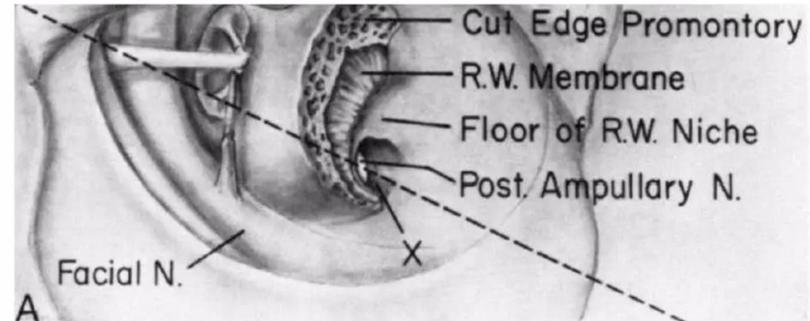
Interventions

BPPV

- Singular Neurectomy



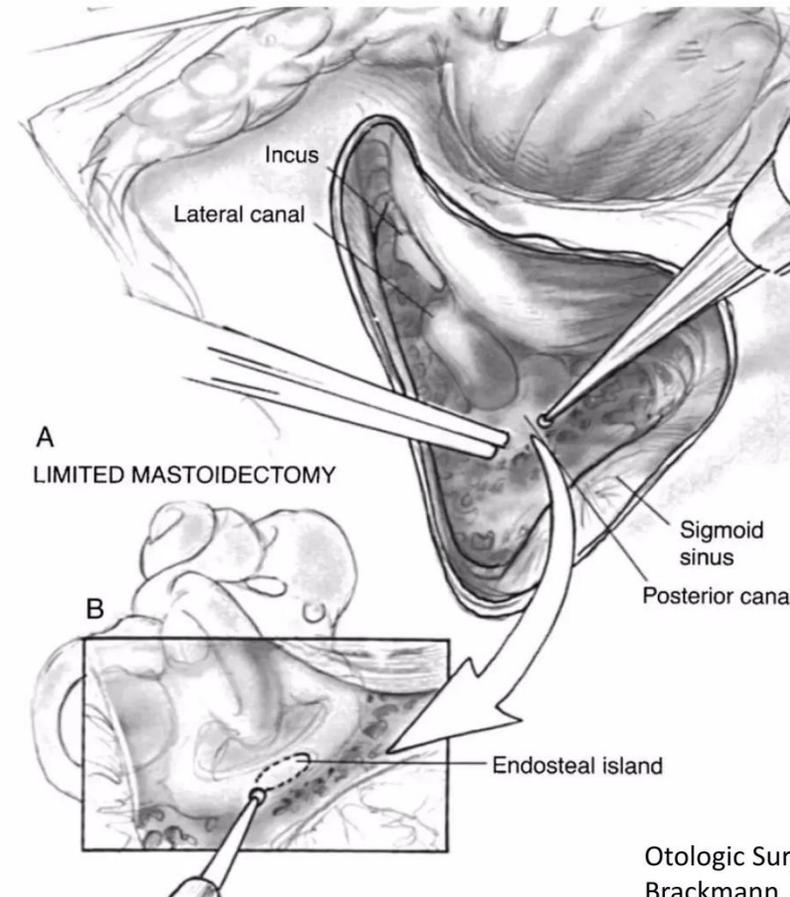
Ann Otol Rhinol Laryngol 91:1982



Interventions

BPPV

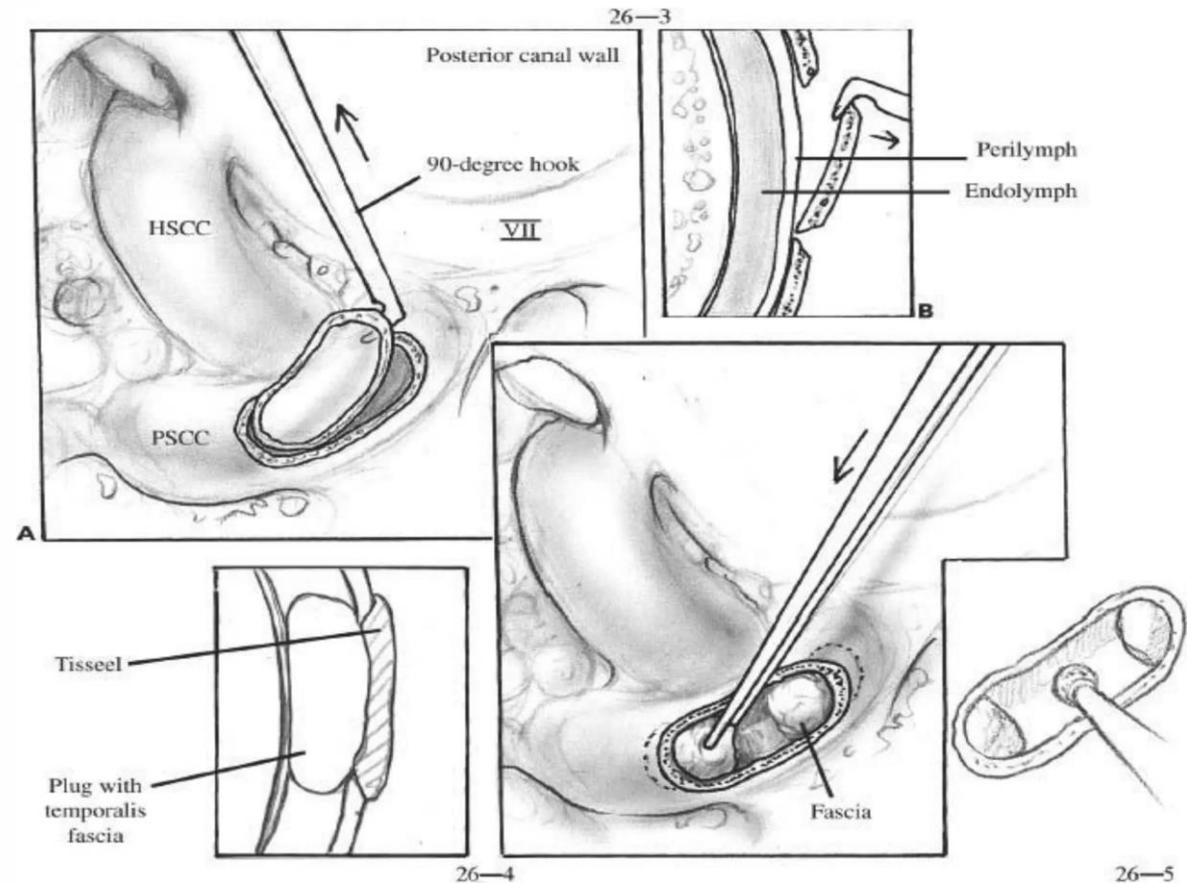
- Singular Neurectomy
- **Canal Occlusion**



Interventions

BPPV

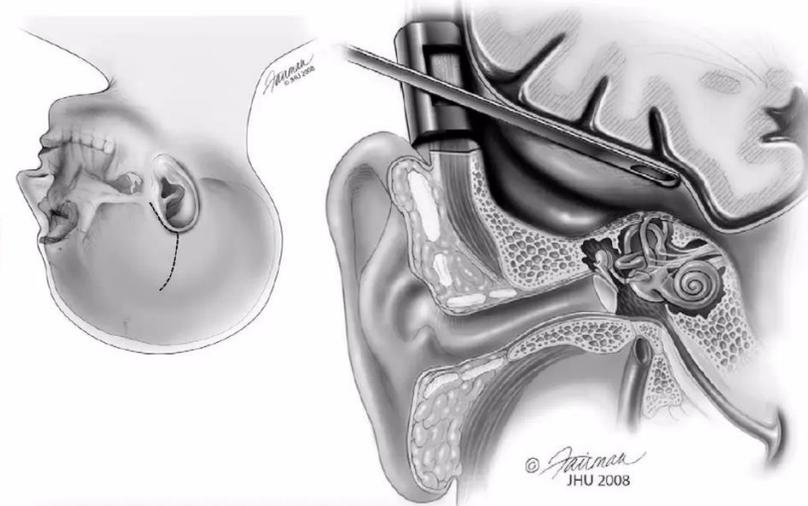
- Singular Neurectomy
- Canal Occlusion



Interventions

SSCCD Sx

- Canal Occlusion (not repair)
 - Middle fossa approach
 - Transmastoid approach



Otologic Surgery,
Brackmann, 2016

Interventions

Perilymphatic Fistula

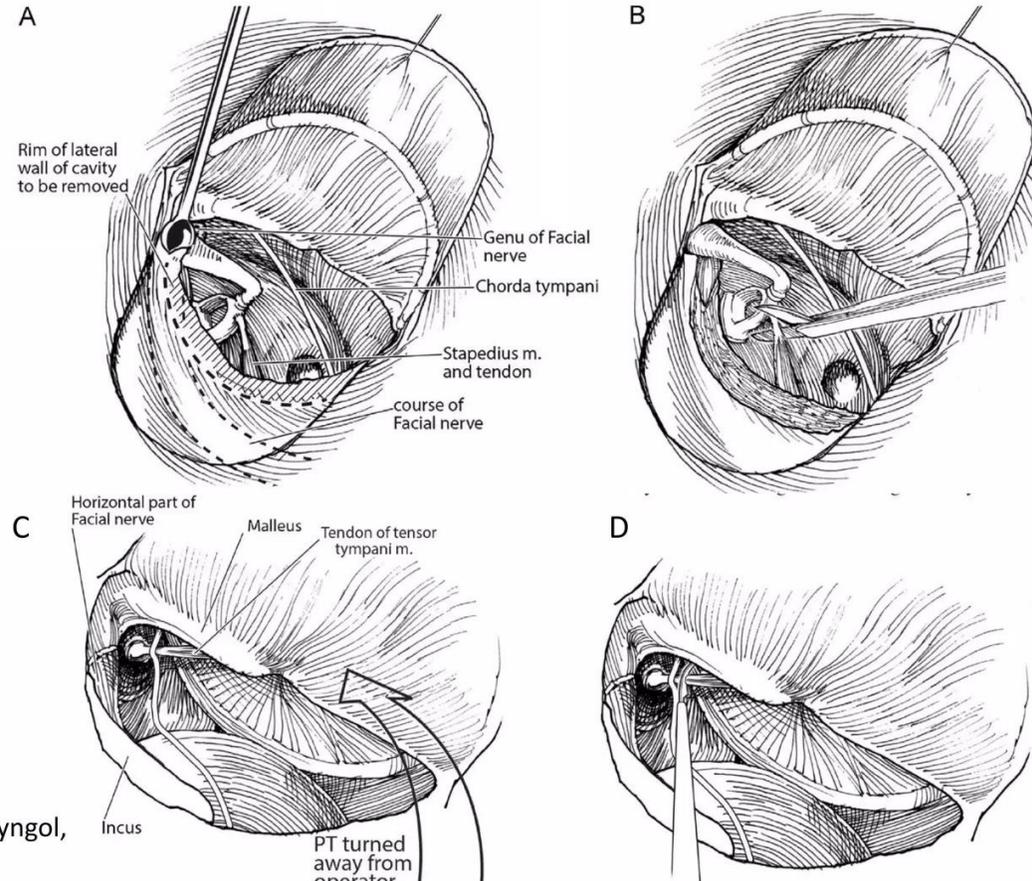
- **Closure of the fistula**
 - **Oval window**
 - In iatrogenic footplate manipulations
 - In idiopathic etiologies (anterior to OW)
 - **Round window**
 - In Hyrtl's fissure (inferior to RW)
 - In idiopathic etiologies (RW occlusion)



Interventions

Meniere's Disease

- **Tenotomy**
(tensor tympani and stapedius)



Oper Tech Otolaryngol,
2016, 27:240

Interventions

Meniere's
Disease

A. Hearing preservation + Balance preservation

Sacculotomy by puncture of footplate

Cochlear duct piercing via round window

Endolymphatic sac decompression / shunting

Interventions

Meniere's
Disease

B. Hearing preservation + Balance ablation

Chemical labyrinthectomy

Vestibular neurectomy

Vestibular end organ destruction by USG / cryoprobe

Interventions

Meniere's
Disease

C. Hearing ablation + Balance ablation

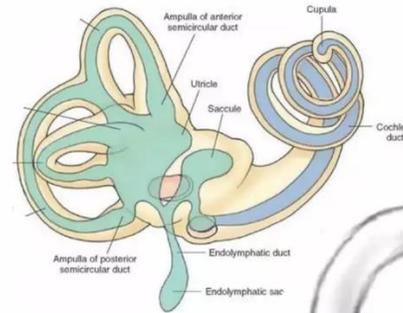
Section of 8th nerve

Total labyrinthectomy

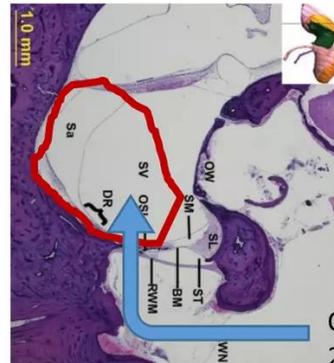
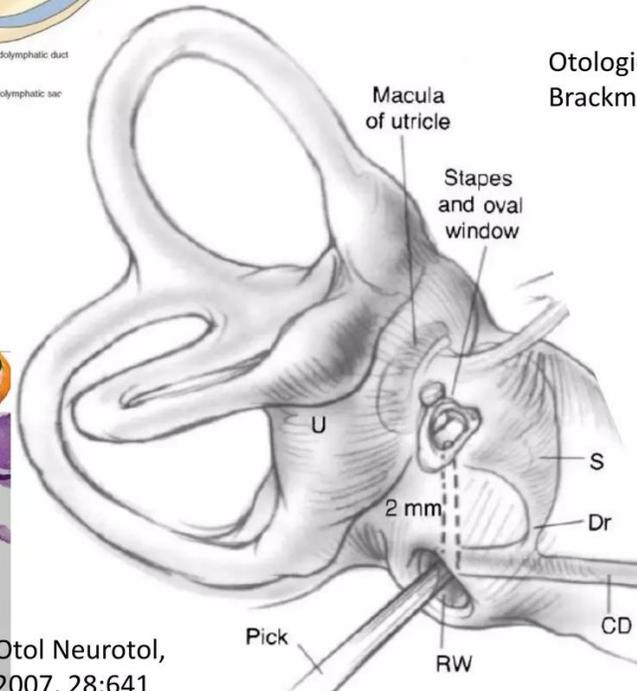
Interventions

Meniere's Disease

- Tenotomy
- Cochleosacculotomy



Otologic Surgery,
Brackmann, 2016

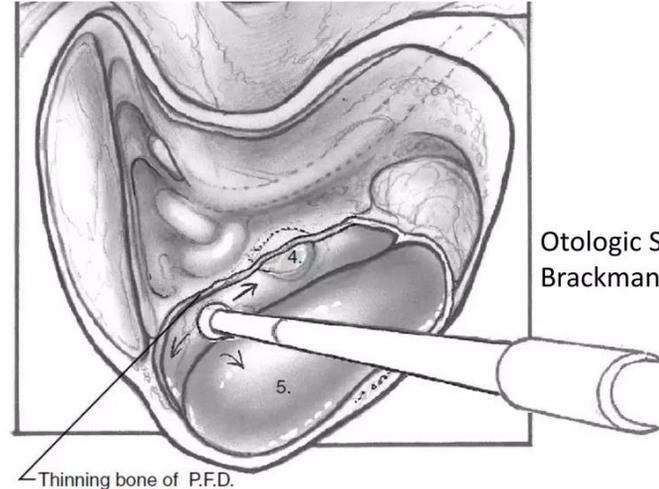


Otol Neurotol,
2007. 28:641

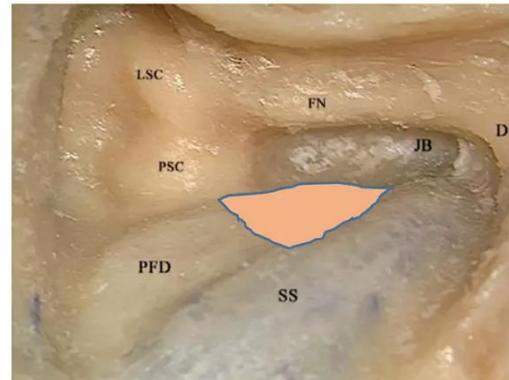
Interventions

Meniere's Disease

- Tenotomy
- Cochleosacculotomy
- **Endolymphatic Sac Surgery**



Otologic Surgery,
Brackmann, 2016

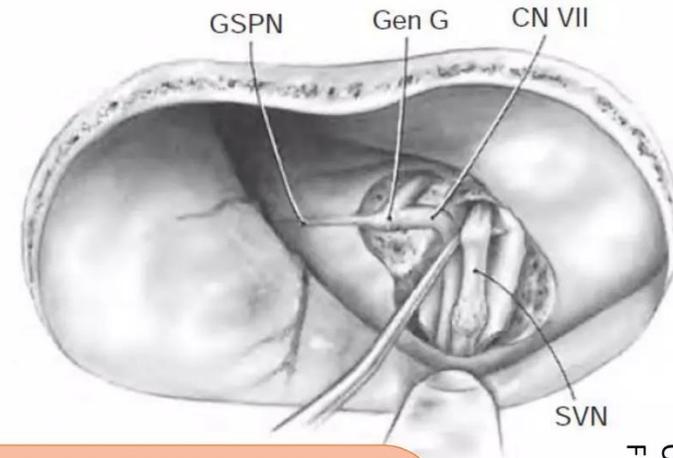


Temporal Bone,
Sanna, 2006

Interventions

Meniere's Disease

- Tenotomy
- Cochleosacculotomy
- Endolymphatic Sac Surgery
- **Vestibular Neurectomy**
(Only Hearing Preservation)



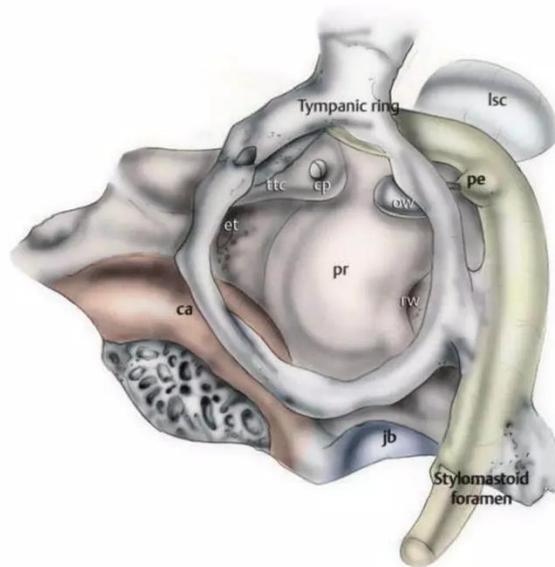
- Middle fossa
- Retrolabyrinthine
- Retrosigmoid
- Infralabyrinthine

Cummings Otolaryngology,
Flint et al, 2021

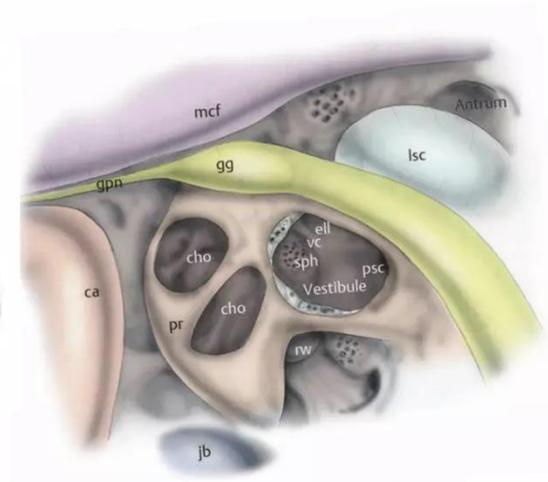
Interventions

Ablative Surgery

- **Labyrinthectomy**
 - Transcanal
 - Transmastoid (**GOLD Standard**)
 - Facial nerve
 - Irrigation
 - Drill direction
 - Neuroepithelium



IAC



Endoscopic Ear Surgery,
Marchioni and Presutti, 2014

Interventions

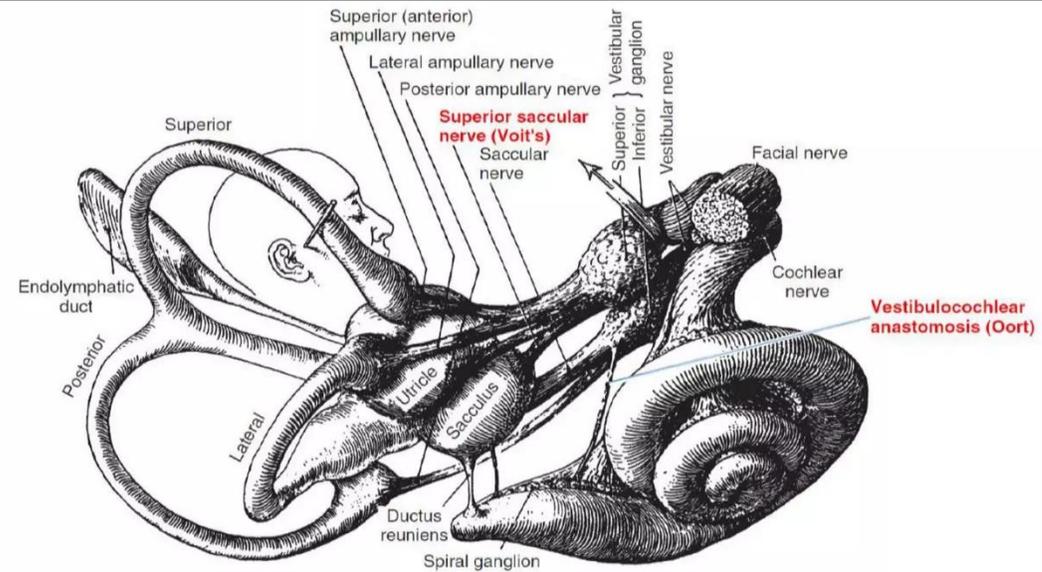
Ablative Surgery

- Labyrinthectomy

- **Vestibular Neurectomy** (added to labyrinthectomy)

Intradural dissection

- Translabyrinthine (cutting the vestibular nerve)
- Transcochlear (cutting the cochleovestibular nerve)

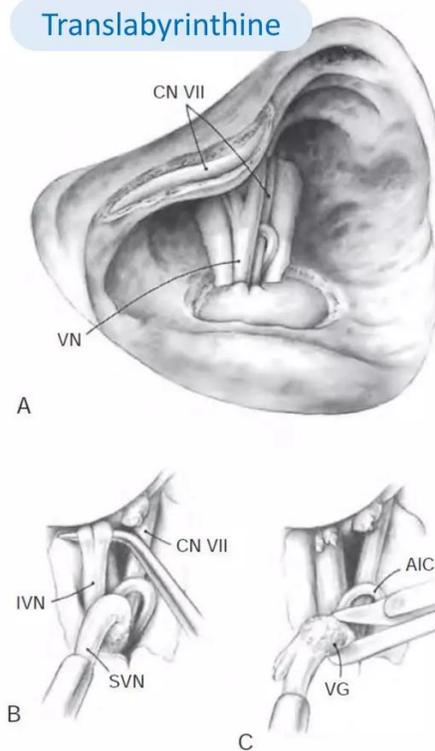
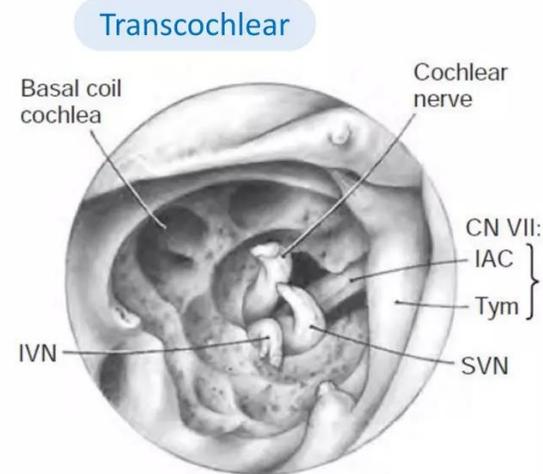


Endoscopic Ear Surgery,
Marchioni and Presutti, 2014

Interventions

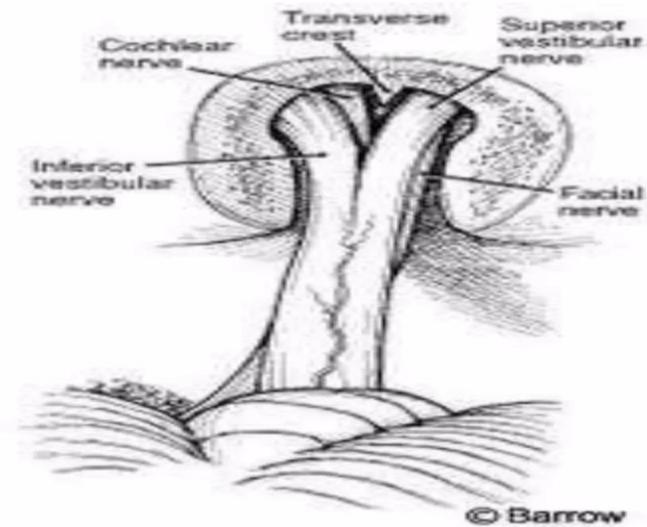
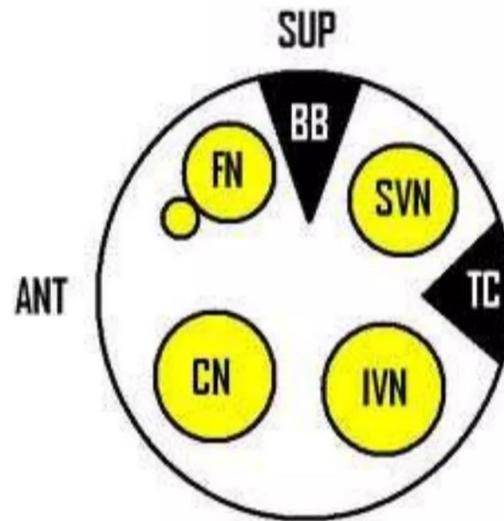
Ablative Surgery

- Labyrinthectomy
- **Vestibular Neurectomy** (added to labyrinthectomy)
 - Translabyrinthine (cutting the vestibular nerve)
 - Transcochlear (cutting the cochleovestibular nerve)



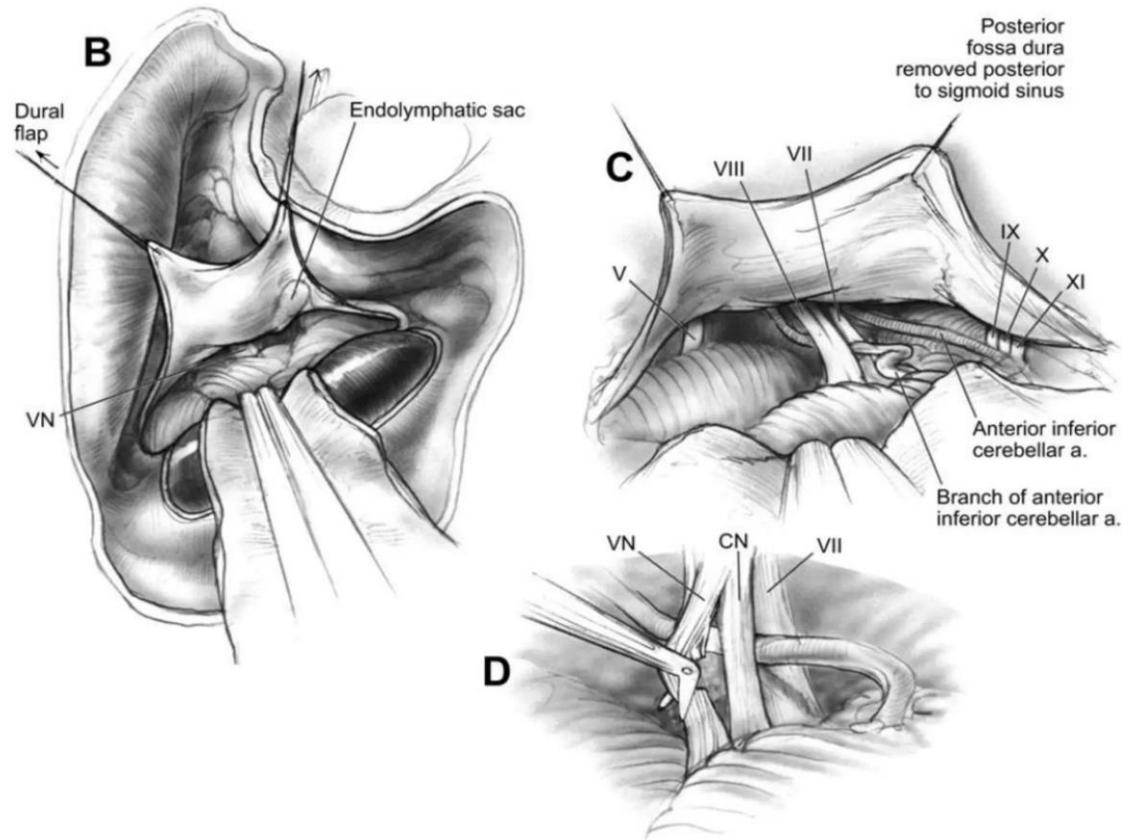
Interventions

Ablative
Surgery



Interventions

Ablative Surgery

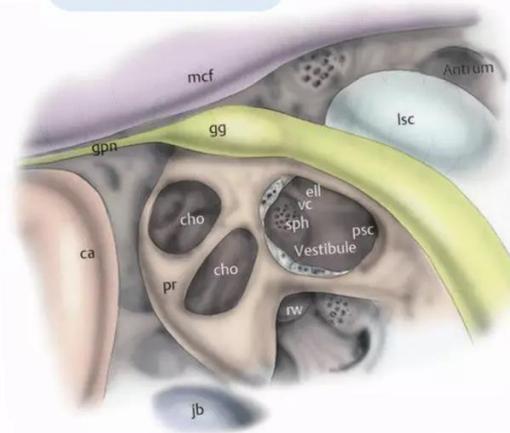


Interventions

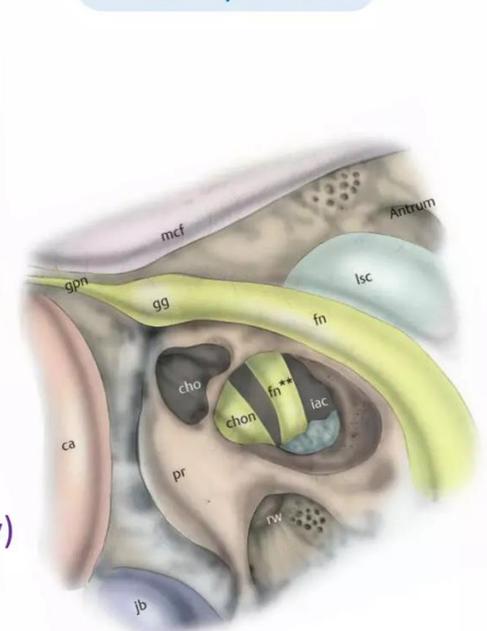
Ablative Surgery

- Labyrinthectomy
- **Vestibular Neurectomy** (added to labyrinthectomy)
 - Translabyrinthine (cutting the vestibular nerve)
 - Transcochlear (cutting the cochleovestibular nerve)

Transcochlear



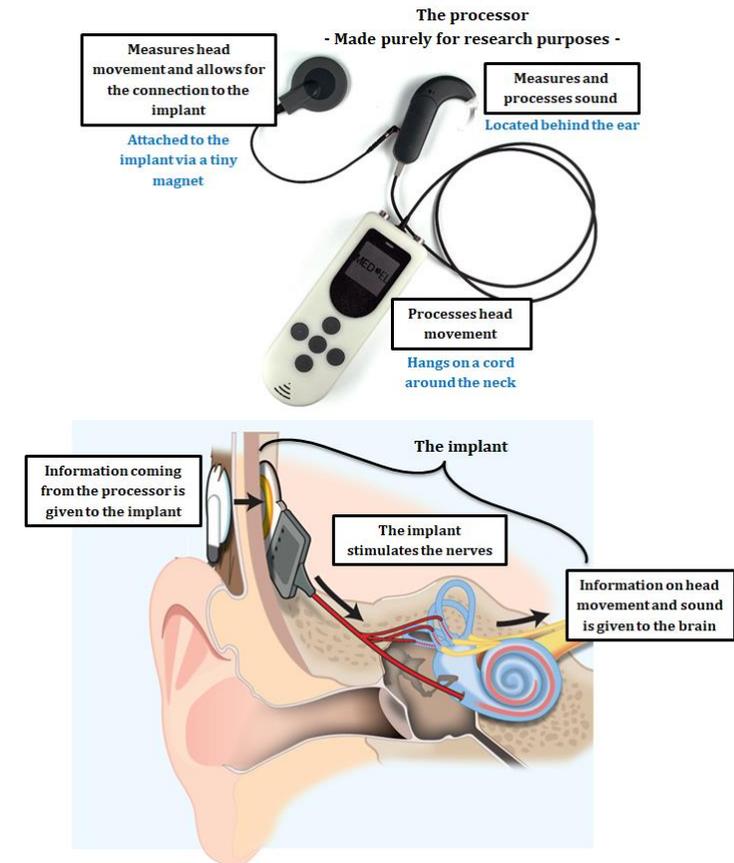
Translabyrinthine



Endoscopic Ear Surgery,
Marchioni and Presutti, 2014

Vestibular implantation

- Gong and Merfeld: The first in restoring lost vestibular function using a vestibular implant in Guinea in 2000
- Maastricht- Geneva group: The first implantation in human in 2007



Vestibular implantation

- Suitable implantation site
- Extra-labyrinthine
- a transmeatal approach to the lateral and superior ampullary nerves

