

# Surgical treatment in vestibular diseases

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2024

# Dizziness- Etiology

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# Dizziness- Etiology

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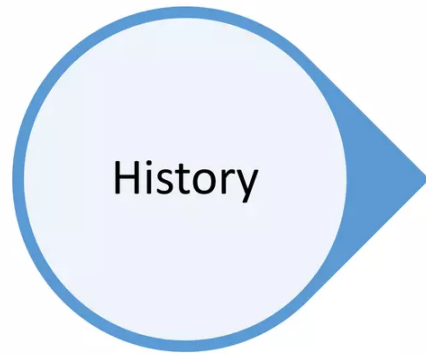


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The accurate diagnosis of the underlying etiology is the crucial step in the management of vertigo.

# Diagnostic approach

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- 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)*

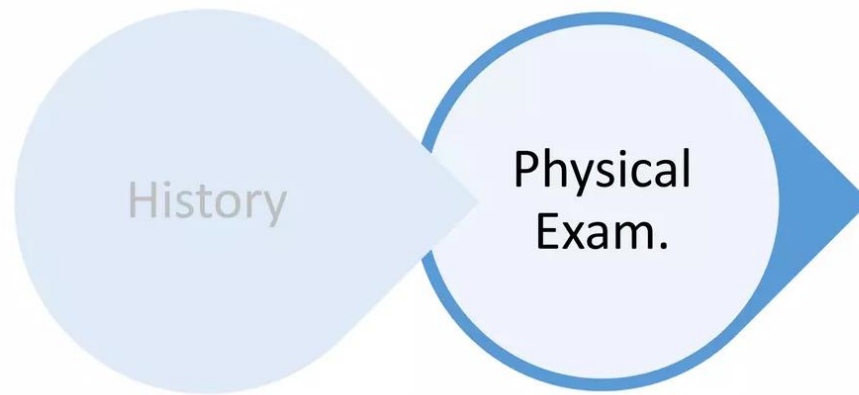


LISTEN

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

# Diagnostic approach

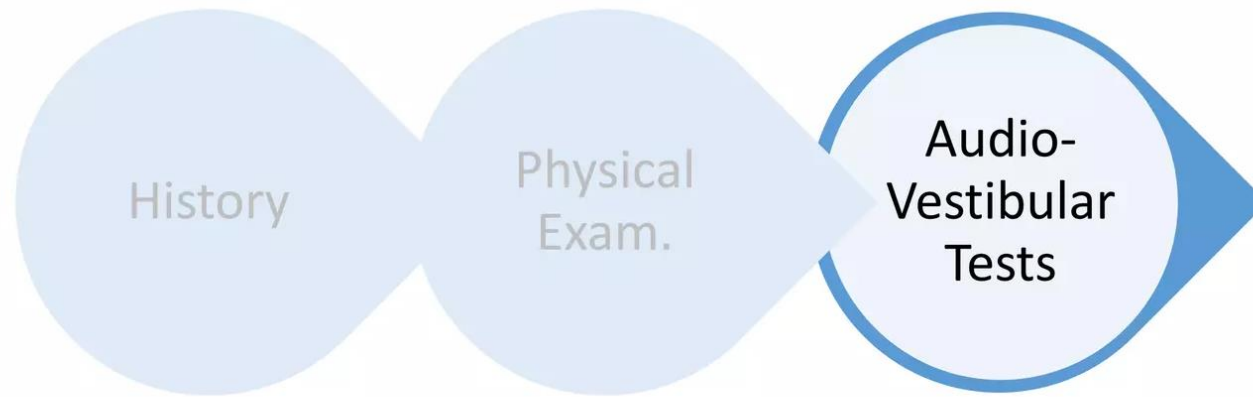
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- Ear Exam (inspection)
- Eye Exam (position & Nystagmus)
- Neurologic Exam (**R/O ataxia**)
- Sound *or* Pressure (**3rd window**)
- Vibration (**SSCD, MD, VS**)
- Hyperventilation (**phobia, central**)  
**demyelination: MS, VS, Vascular**
- Positional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

# Diagnostic approach

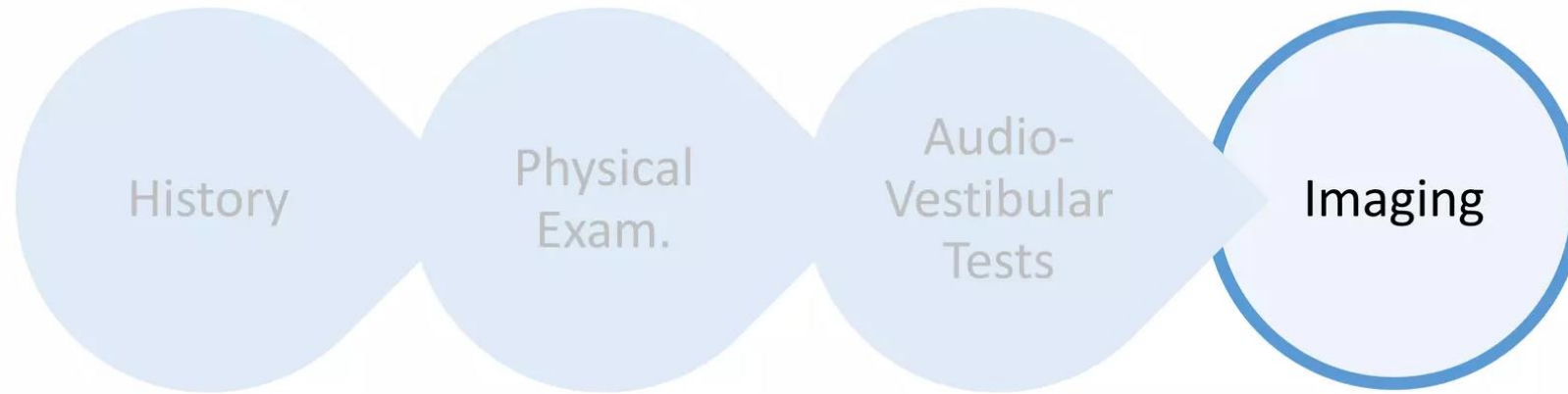
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- VNG (*saccade , pursuit , nystagmus*)
- Evoked evaluation
  - Caloric Test ( *lower freq.* )
  - Head Shaking ( *1-2 Hz* )
  - V-HIT ( *3-5 Hz* )
- PTA-SRT-WRS, AR
- ECoG
- VEMP (cervical, ocular)
- Rotatory chair test
- Posturography ( C D P )

# Diagnostic approach

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➤ CT :

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

➤ MR :

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



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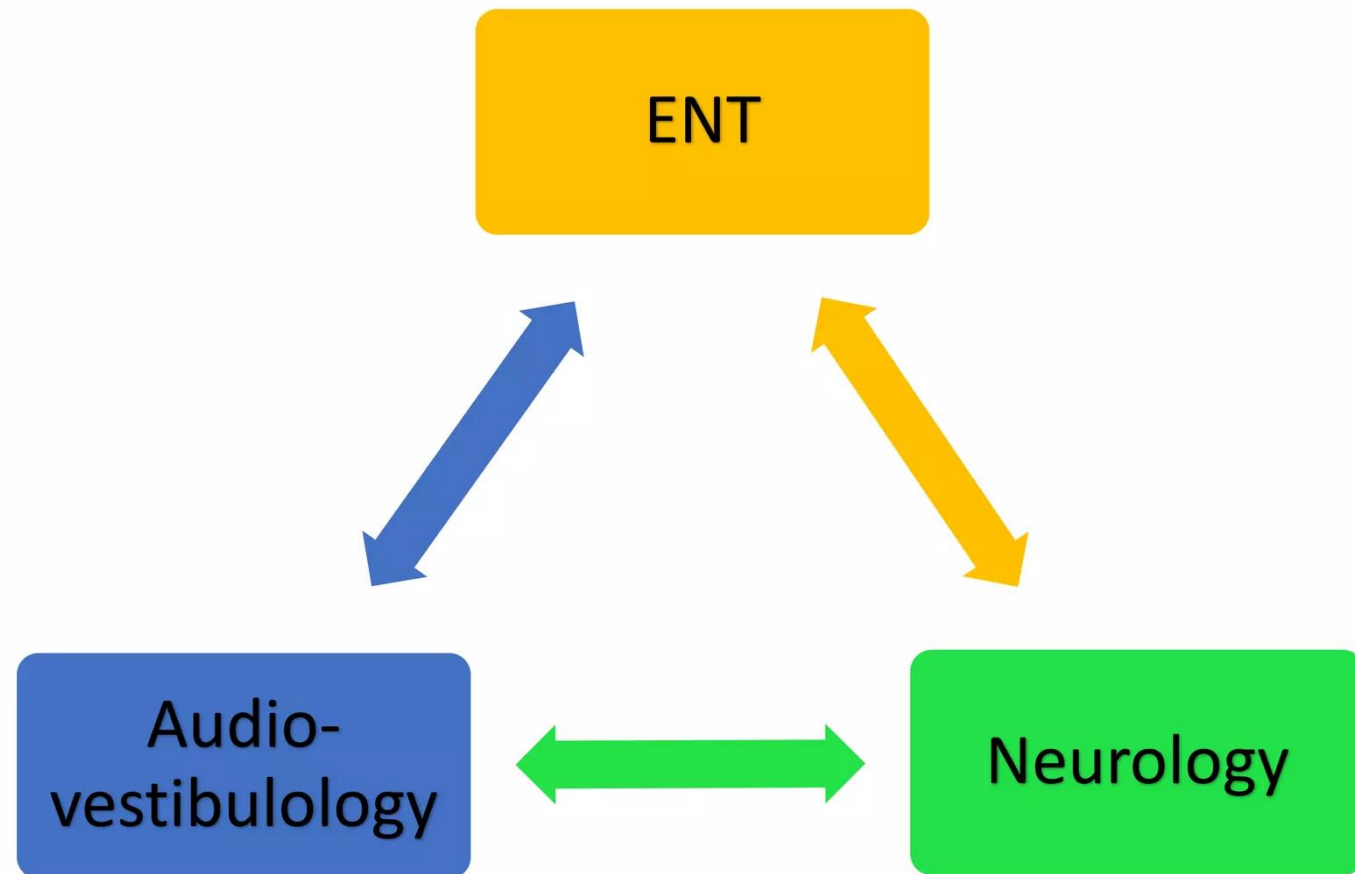
Patients with vertigo have some degree of pseudo-vertigo

Concurrent disorders may present at the same time

The etiology of vertigo might change over time

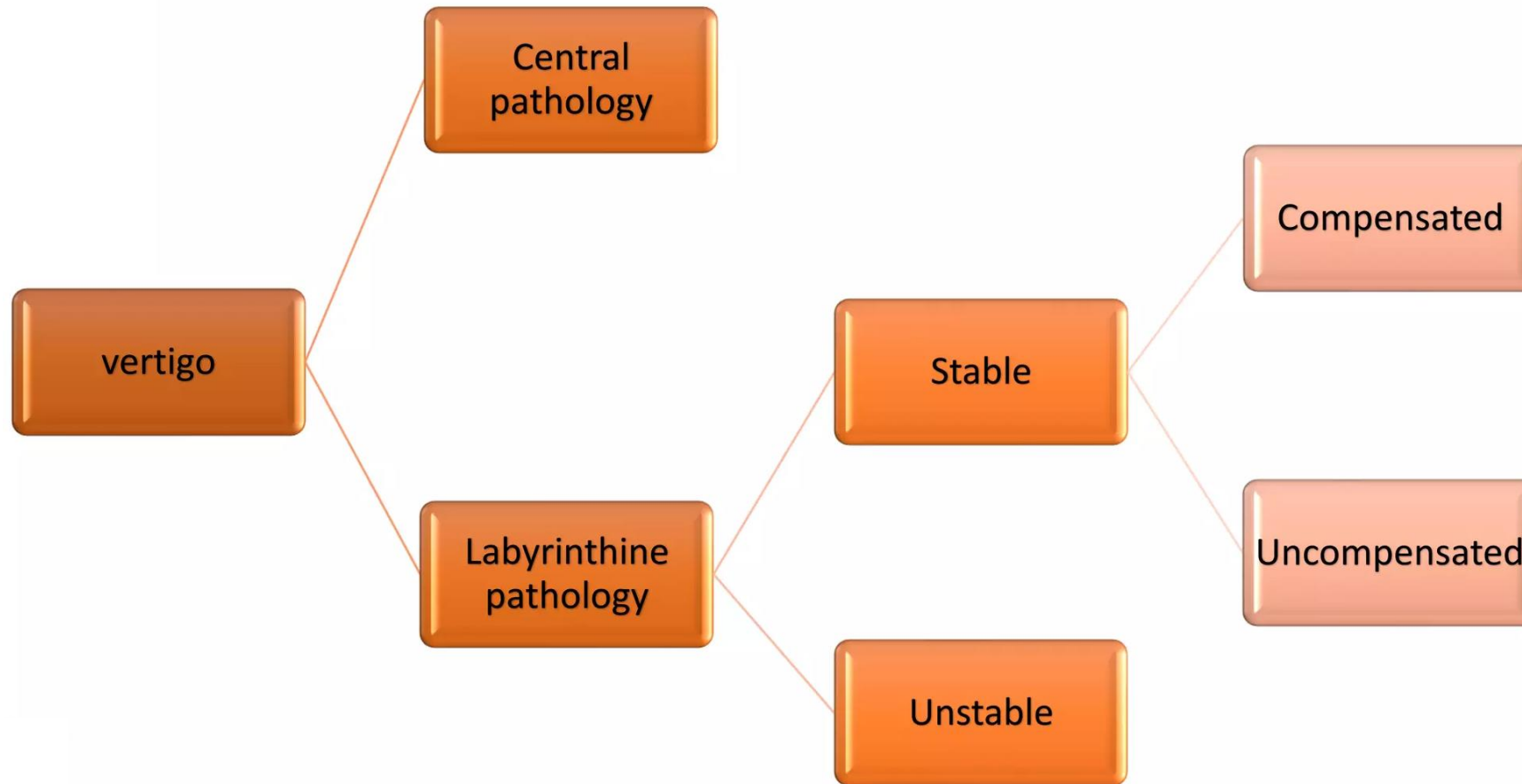
# Teamwork planning

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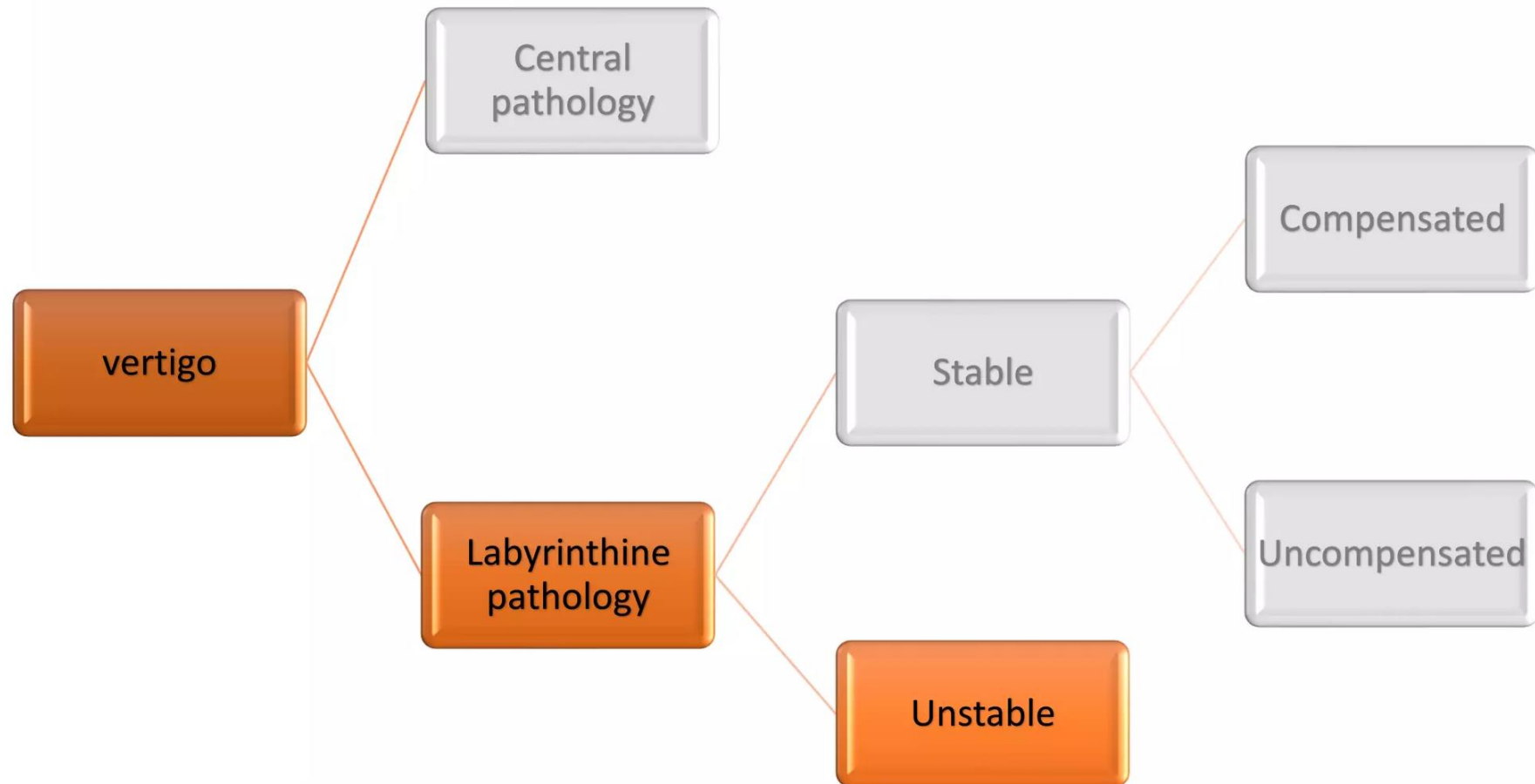
# Decision making

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# Decision making

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# Surgical philosophy

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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

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- 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)**

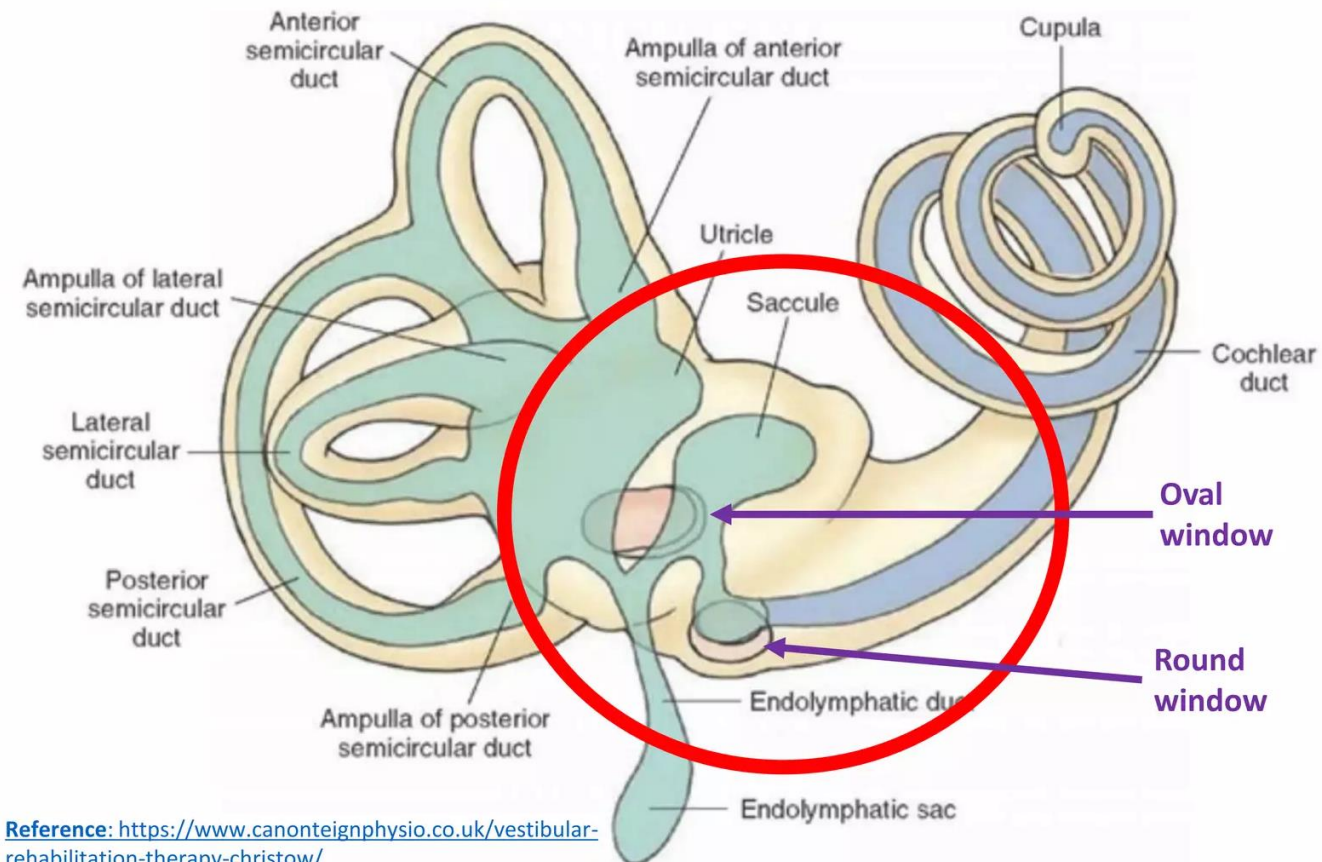
# Surgical preparations

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- **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

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



# Common disorders

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BPPV

Meniere's  
Disease

Vestibular  
Migraine

SSCD Sx.

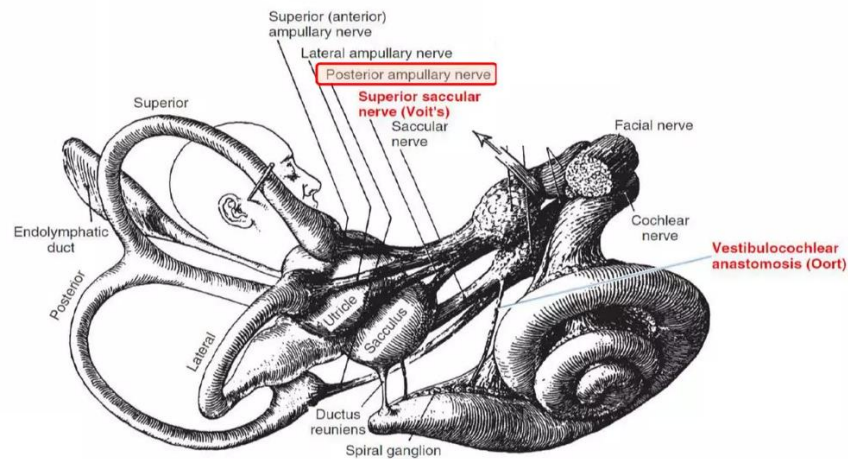
Peri-  
lymphatic  
Fistula

Vestibular  
Neuritis

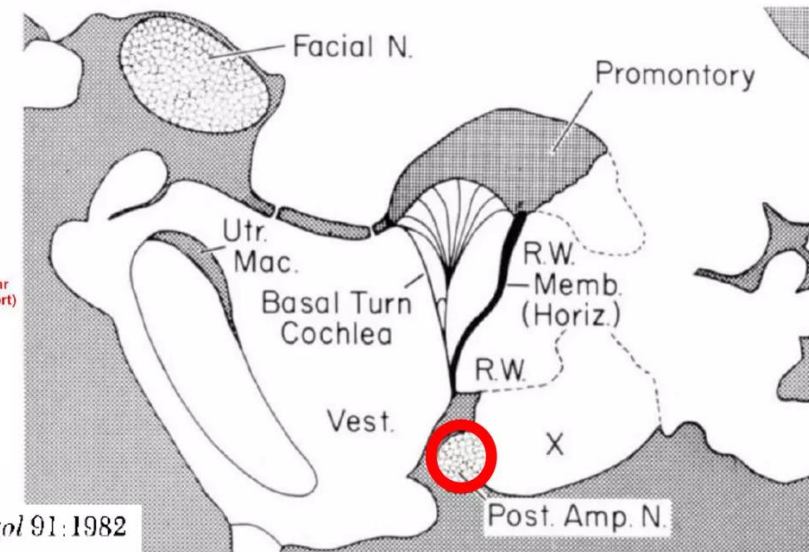
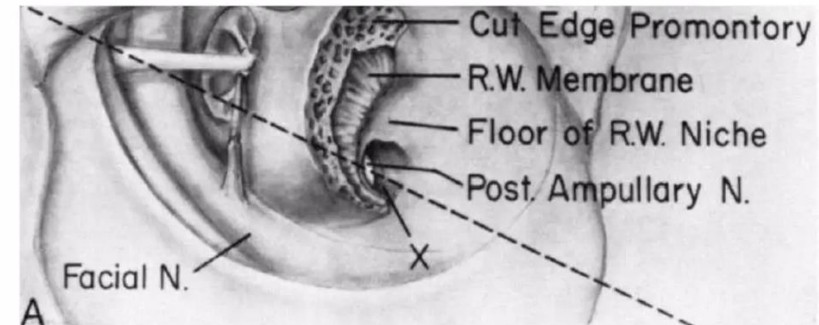
# Interventions

## BPPV

- Singular Neurectomy



*Ann Otol Rhinol Laryngol* 91:1982

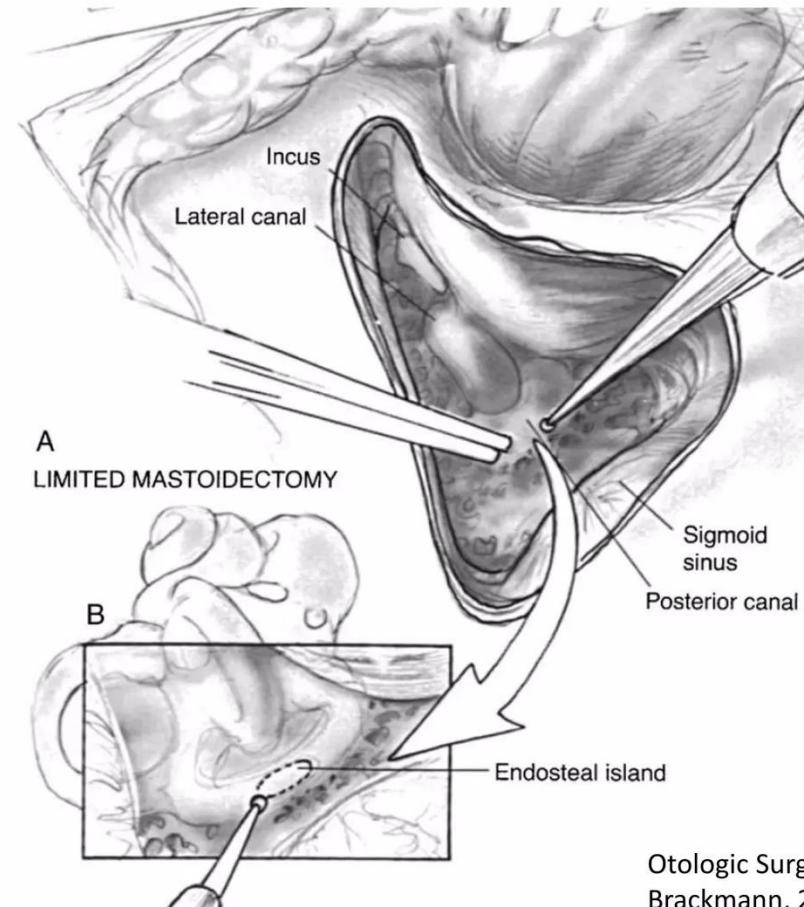


# Interventions

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## BPPV

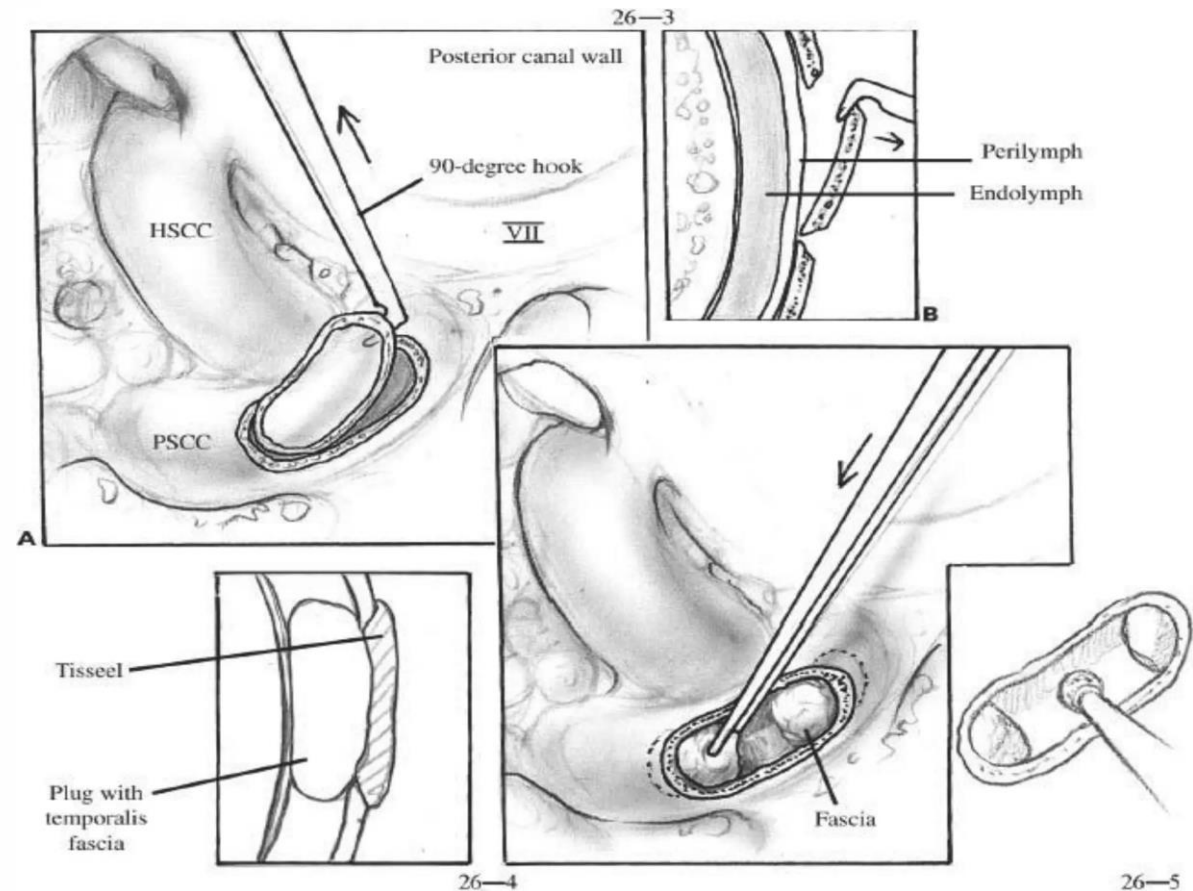
- Singular Neurectomy
- **Canal Occlusion**



# Interventions

## BPPV

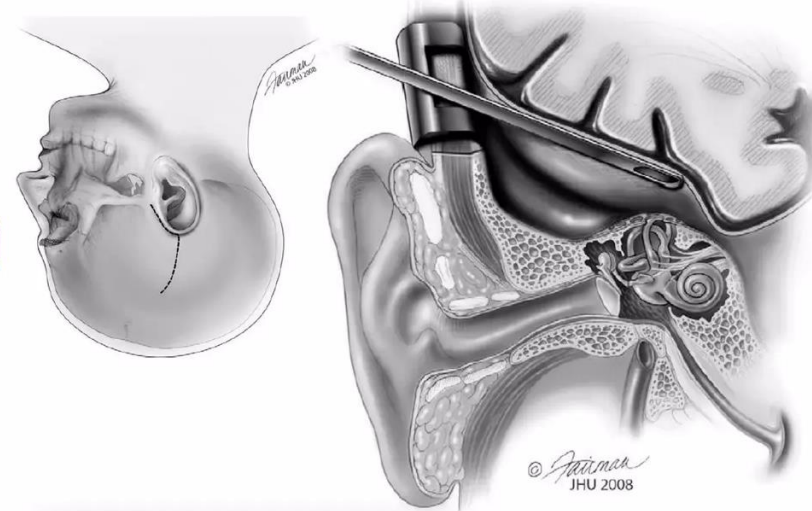
- Singular Neurectomy
- Canal Occlusion



# Interventions

SSCCD Sx

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



Otologic Surgery,  
Brackmann, 2016



# Interventions

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## Perilymphatic Fistula

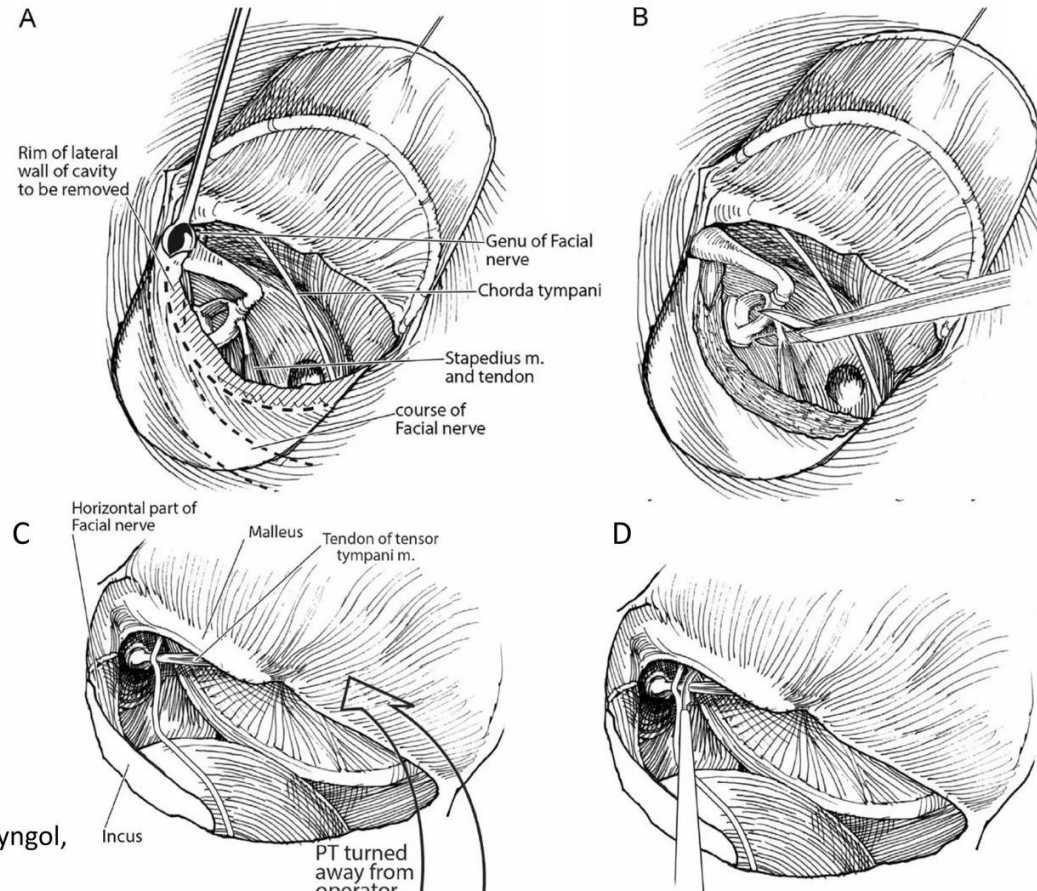
- **Closure of the fistula**
  - **Oval window**
    - In iatrogenic footplate manipulations
    - In idiopathic etiologies (anterior to OW)
  - **Round window**
    - In Hyrtl's fissure (inferior to RW)
    - In idiopathic etiologies (RW occlusion)



# Interventions

## Meniere's Disease

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



Oper Tech Otolaryngol,  
2016, 27:240

# Interventions

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Meniere's  
Disease

## A. Hearing preservation + Balance preservation

Sacculotomy by puncture of footplate


Cochlear duct piercing via round window

Endolymphatic sac decompression / shunting



# Interventions

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Meniere's  
Disease

## B. Hearing preservation + Balance ablation


Chemical labyrinthectomy

Vestibular neurectomy

Vestibular end organ destruction by USG / cryoprobe

# Interventions

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Meniere's  
Disease

C. Hearing ablation + Balance ablation

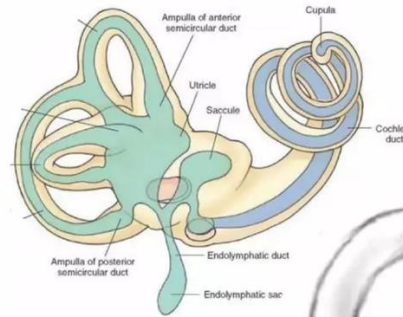
Section of 8<sup>th</sup> nerve

Total labyrinthectomy

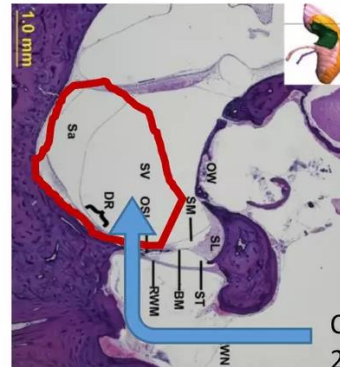
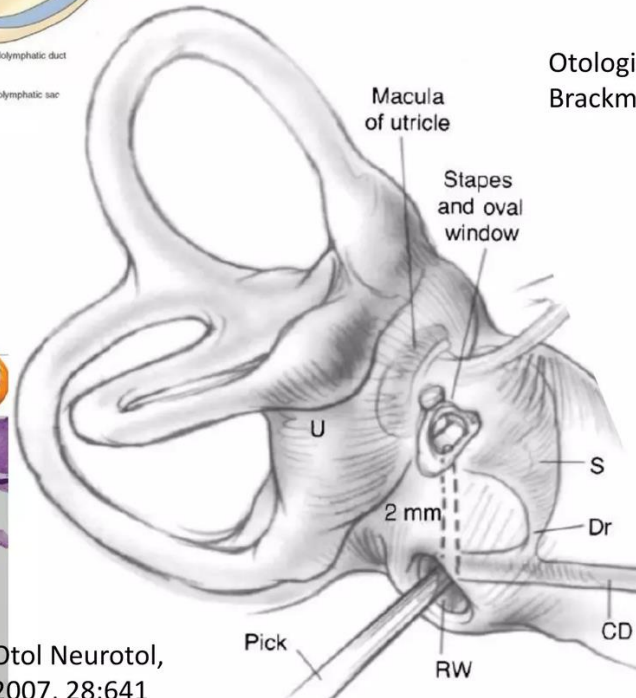
# Interventions

## Meniere's Disease

- Tenotomy
- Cochleosacculotomy



Otologic Surgery,  
Brackmann, 2016

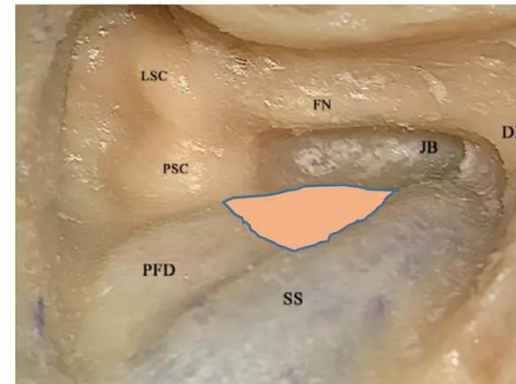
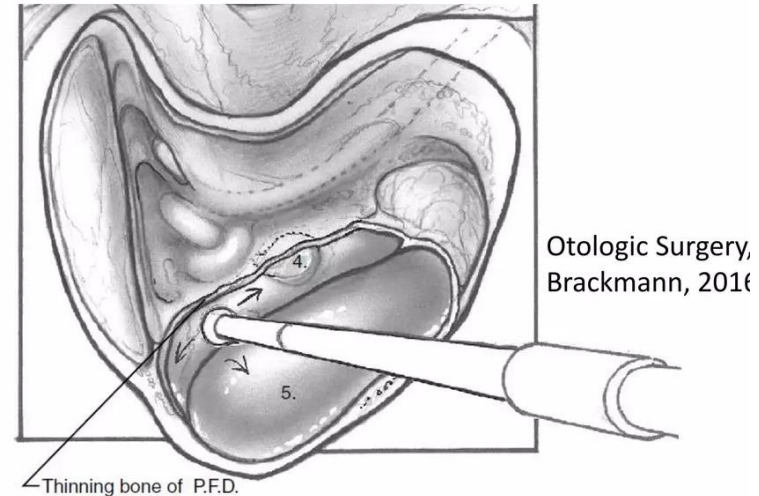


Otol Neurotol,  
2007. 28:641

# Interventions

## Meniere's Disease

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

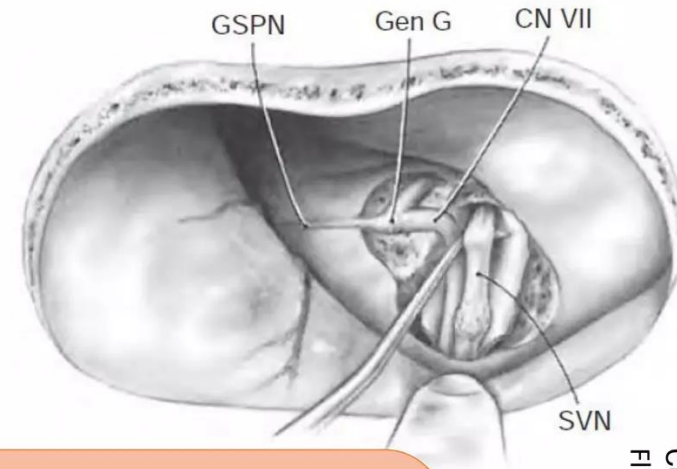


# Interventions

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## Meniere's Disease

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



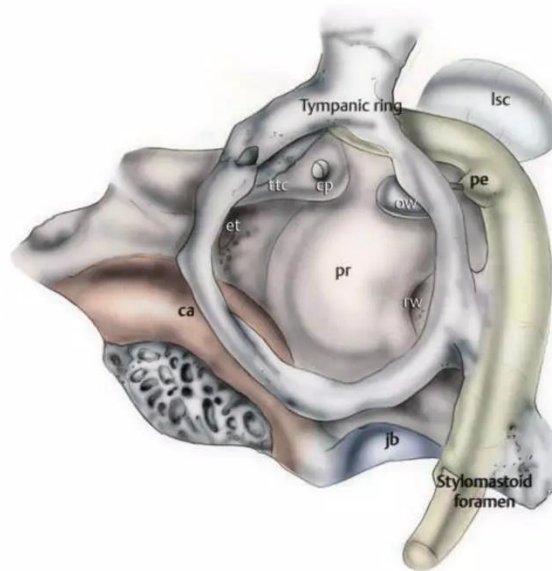
- Middle fossa
- Retrolabyrinthine
- Retrosigmoid
- Infralabyrinthine

Cummings Otolaryngology,  
Flint et al, 2021

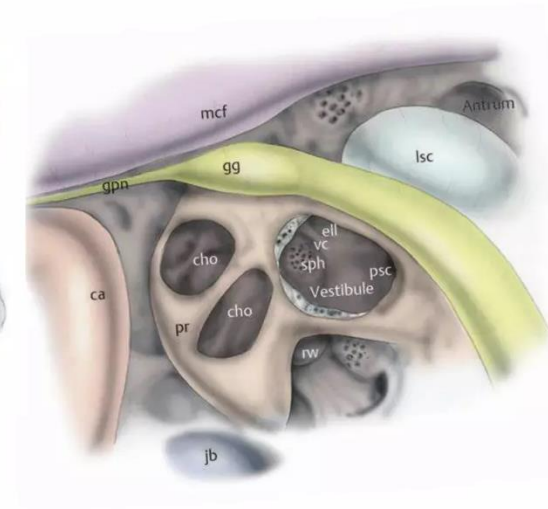
# Interventions

## Ablative Surgery

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



IAC



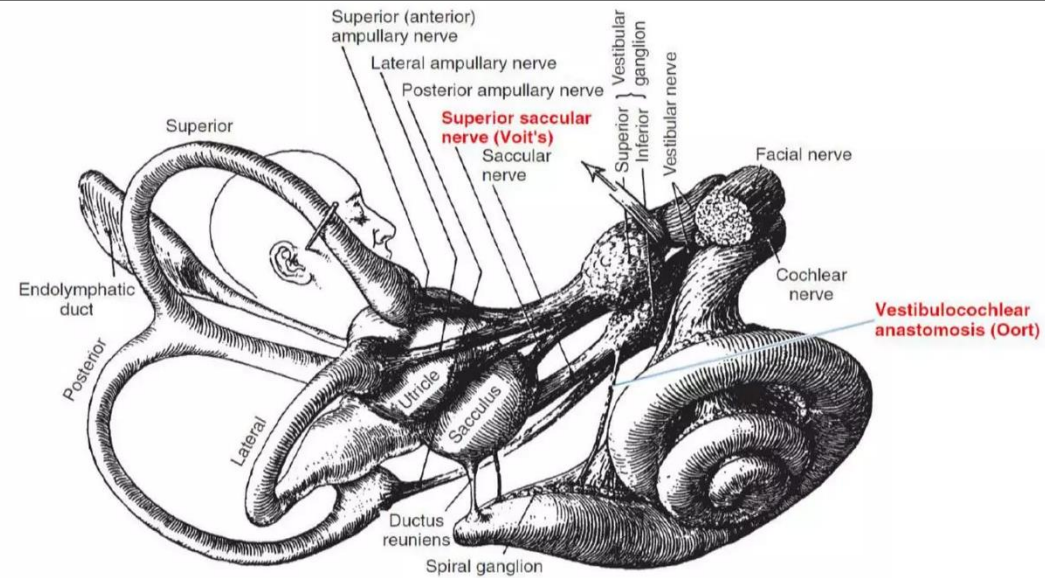
Endoscopic Ear Surgery,  
Marchioni and Presutti, 2014



# Interventions

## Ablative Surgery

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

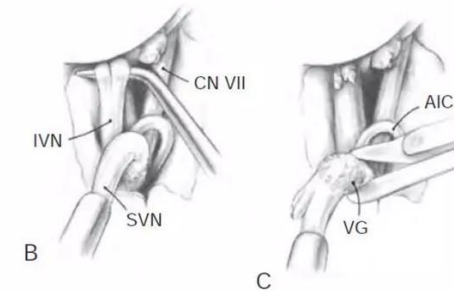
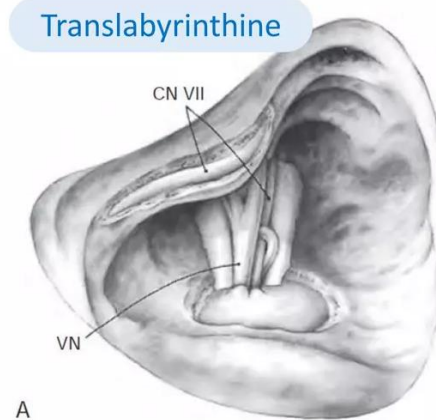
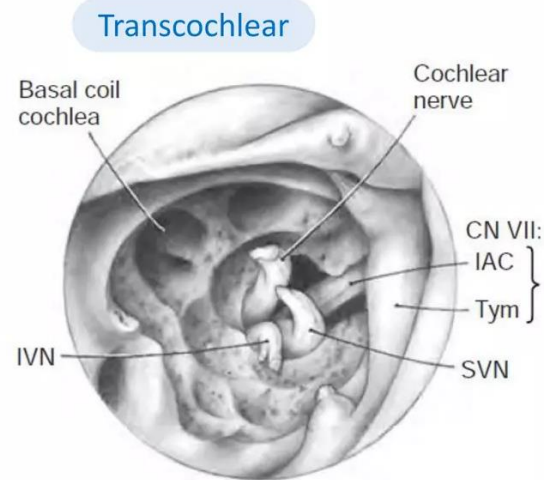


Endoscopic Ear Surgery,  
Marchioni and Presutti, 2014

# Interventions

## Ablative Surgery

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

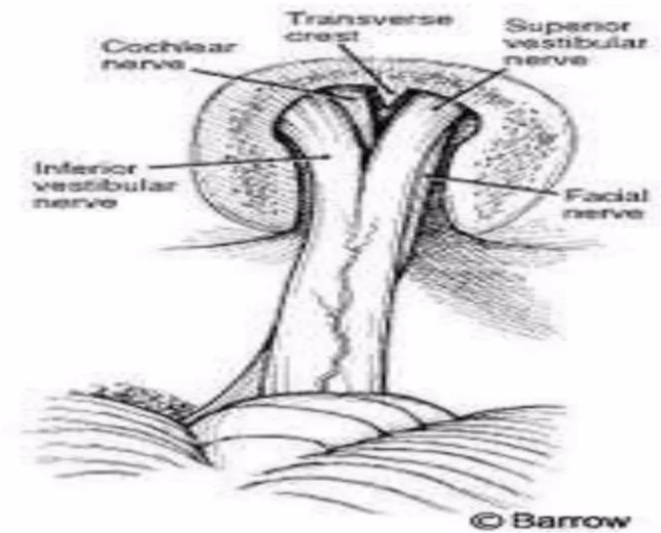
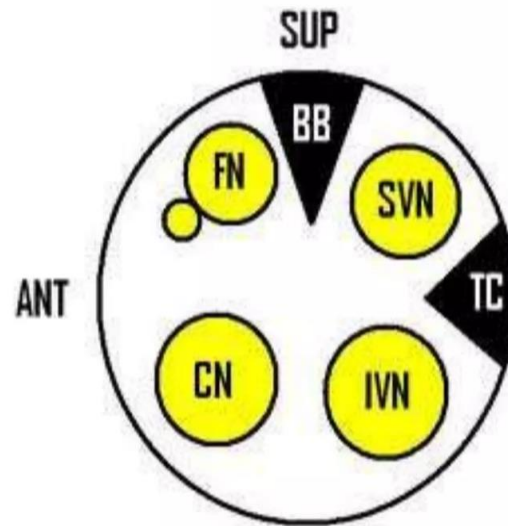




# Interventions

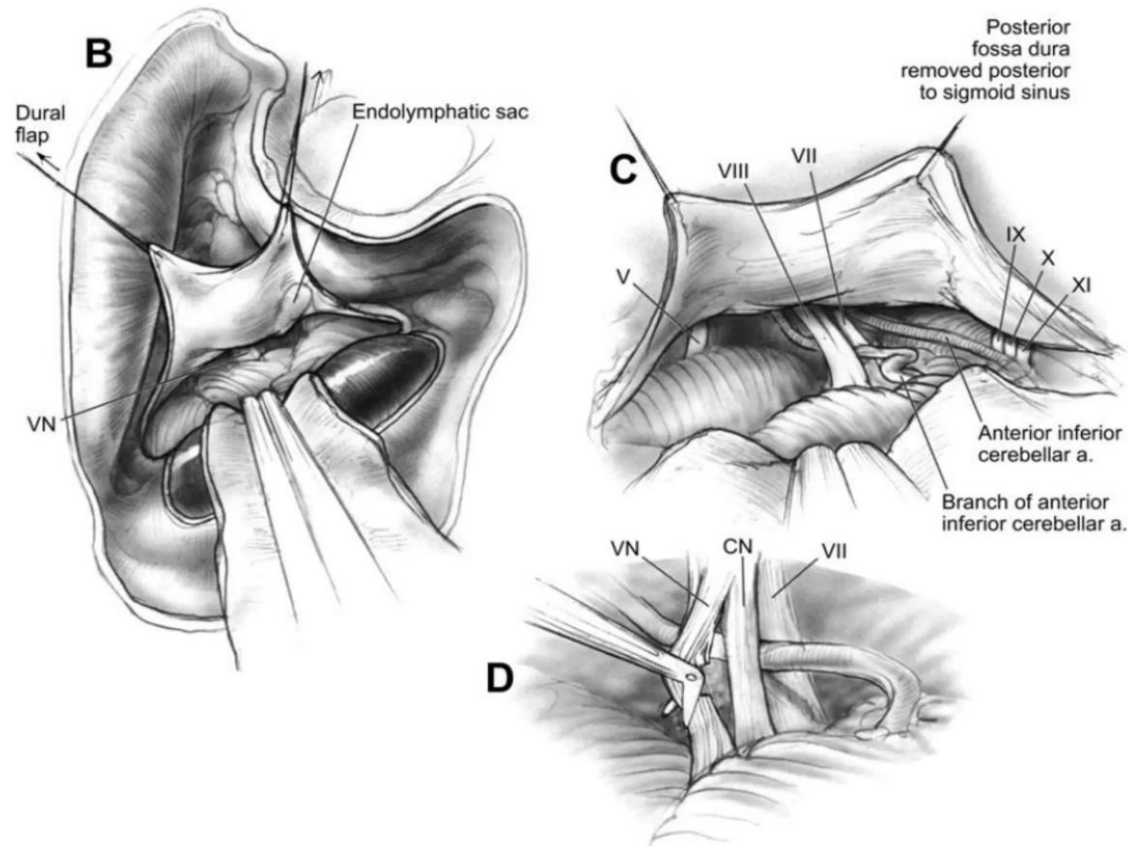
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Ablative  
Surgery



# Interventions

## Ablative Surgery

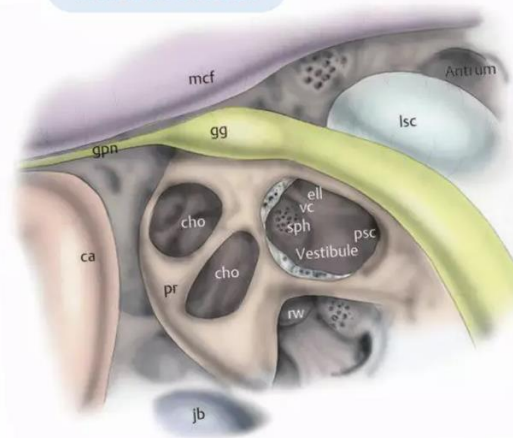


# Interventions

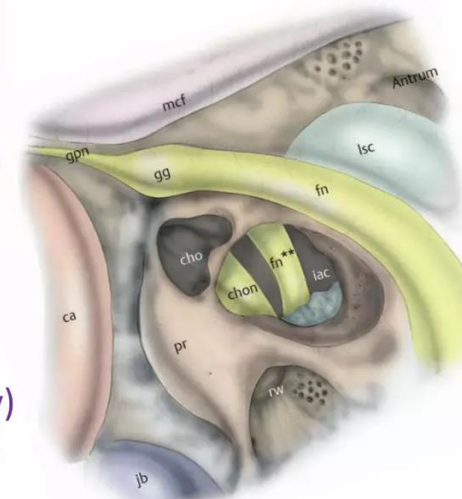
## Ablative Surgery

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

Transcochlear



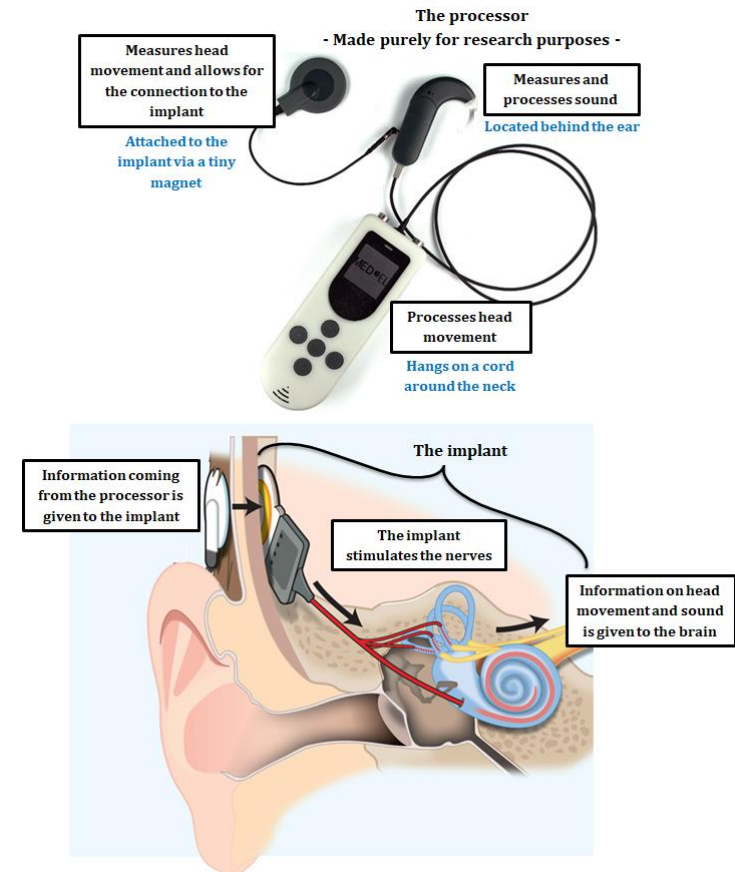
Translabyrinthine



Endoscopic Ear Surgery,  
Marchioni and Presutti, 2014

# Vestibular implantation

- Gong and Merfeld: The first in restoring lost vestibular function using a vestibula 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

