



# Pulsatile Tinnitus

## -On the Viewpoint of Neurointerventionist



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## Pulsatile tinnitus

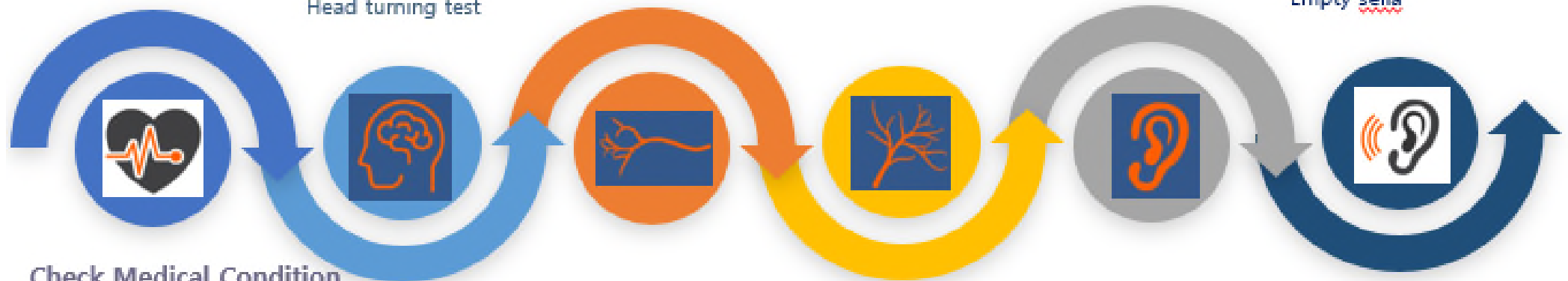


### Vascular lesion

Auscultation  
IJV compression  
Head turning test

### Anatomic variation

Otosclerosis  
Labyrinth fistula  
Empty sella



### Check Medical Condition

HBP  
Anemia  
Hyperthyroidism  
Diabetes

### Arterial type

**ACAD**  
Aneurysm  
Carotid artery dissection  
Aberrant course of ICA  
Tortuous ICA  
Hyperdynamic state

### Arteriovenous type

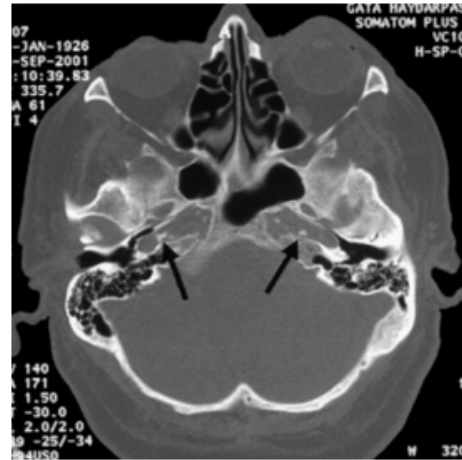
Dural AVF  
AVM  
Glomus tympanicum or jugulare  
Tumor

### Venous type

BIH  
High riding jugular bulb  
Sigmoid sinus diverticulum  
Dominant sigmoid sinus with dehiscence

## ACAD

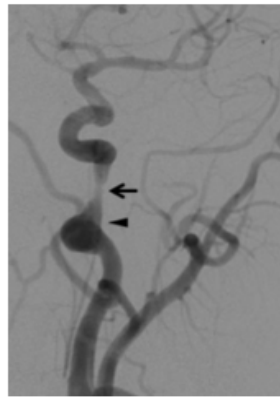
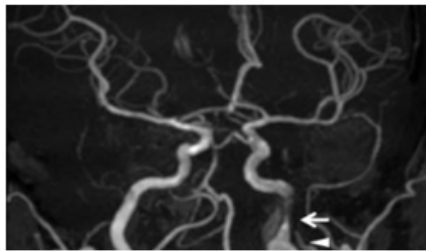
- Pulsatile tinnitus usually occurs in one ear only, and it is an important variant among tinnitus patients. This symptom may result from a wide variety of diseases.
- One of the reported etiologies of pulsatile tinnitus is atherosclerotic disease of the carotid arteries .



HRCT images show atherosclerotic calcifications in ICA.

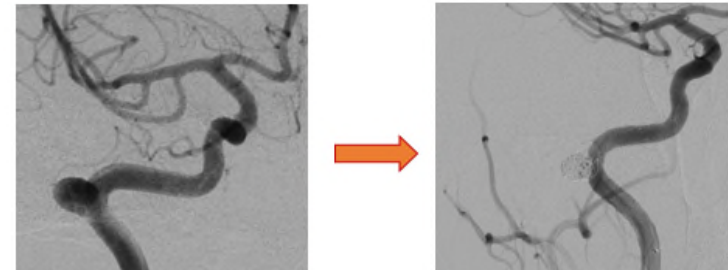
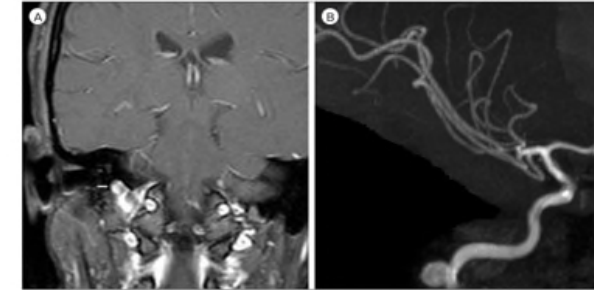
## Carotid artery dissection

- 38/F, left-sided pulsatile tinnitus shortly after stumbling and falling forward with no direct injury to the head or neck.



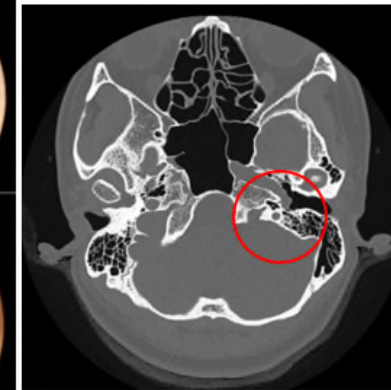
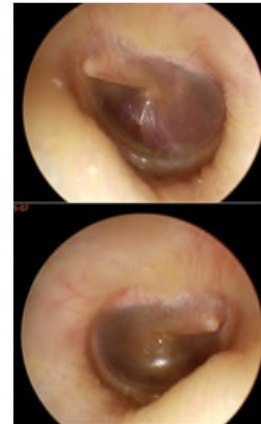
## Aneurysm

- 41/F
- Otorhinolaryngology department complaining of a headache and a drumming sound in her right ear.
- Otolaryngologic examination did not reveal any pathological findings.



## Aberrant course of ICA

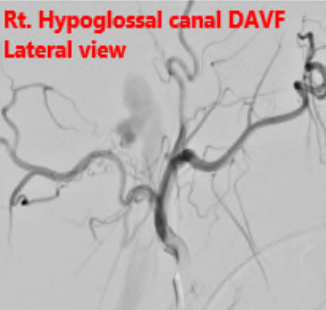
- 38/F with left side pulsatile tinnitus & otalgia & earfullness
- Aberrant course of ICA displaced inferolateral side, touching the left malleus handle in the left middle ear cavity





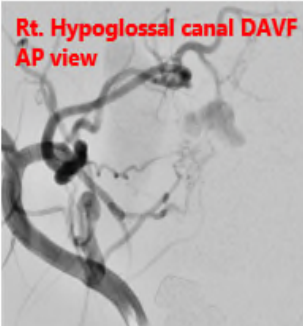
# Dural AVF

Rt. Hypoglossal canal DAVF  
Lateral view



- 49/M with right side pulsatile tinnitus.
- At the neuromeningeal trunk of ascending pharyngeal artery including hypoglossal canal, venous sac is observed.
- Multiple feeders are converging at that point.
- After the bony part, multiple fistular tract is connected to jugular bulb and internal jugular vein to be drained.

Rt. Hypoglossal canal DAVF  
AP view

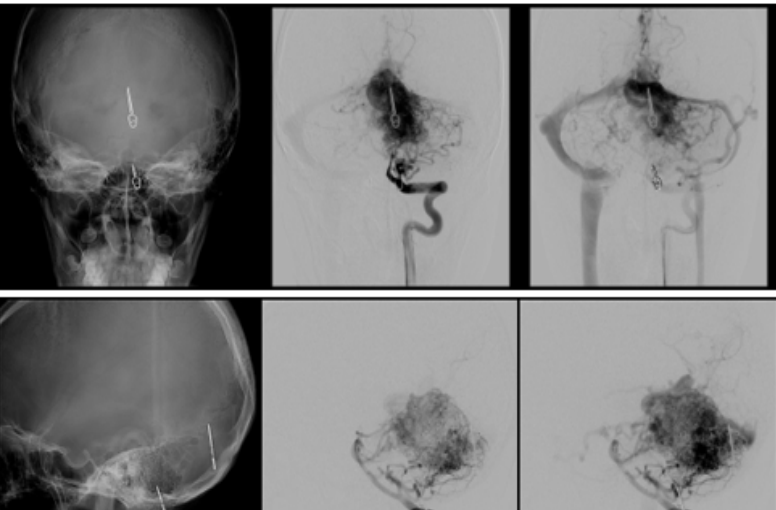


Lateral sinus DAVF



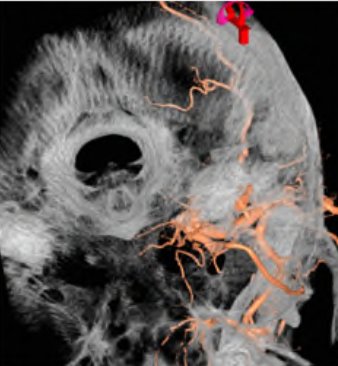
- 38/F with headache and tinnitus.
- Osteodural type of skull base dual AVF drains into downstream of the left sigmoid sinus near the jugular bulb.
- Numerous feeders mainly from the left occipital artery, left posterior auricular artery, left vertebral artery, and numerous dural feeders of the right ECA branches.
- Antegrade and retrograde sinus reflux to the ipsi sigmoid sinus and cavernous sinus.

# Brain AVM



- 7M/F
- Cerebellar AVM surgical removal performed.
- Rebleeding, reccured AVM → embolization.

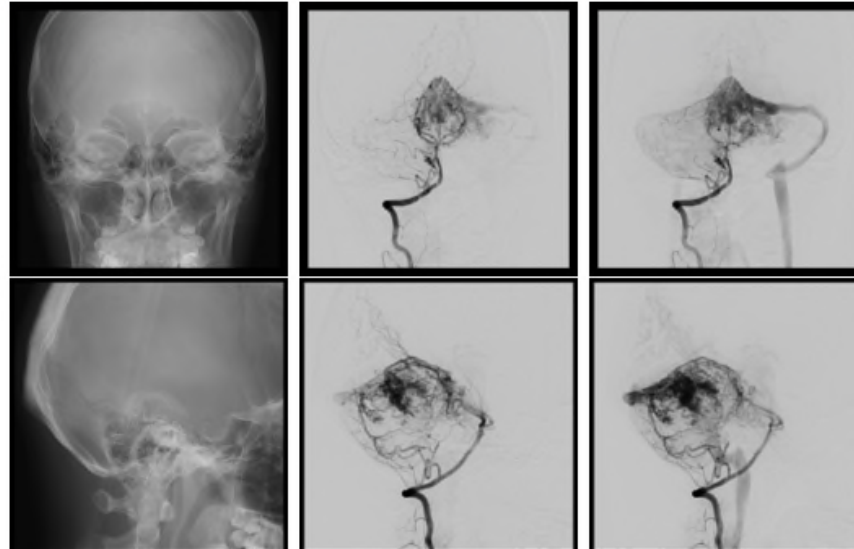
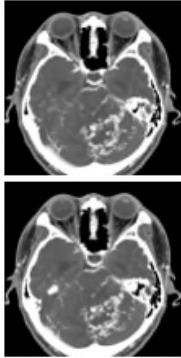
# Glomus tumor



- 57/F with left side pulsatile tinnitus & hearing loss
- About 1.2 cm well-defined lobulated mass in the left middle ear cavity, lateral to cochlear promontory.\* diverticular high and medial left jugular bulb.
- A hypervascular tumor in left middle ear cavity, mainly fed by branches of left ascending pharyngeal artery and occipital artery

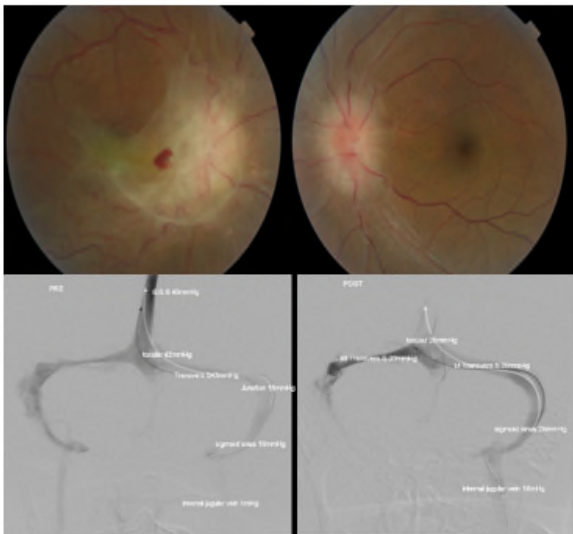
# Hypervascular tumor(Hemangioblastoma)

- 19/F
- Lt. side sx.
- Malignant tumor with shunts



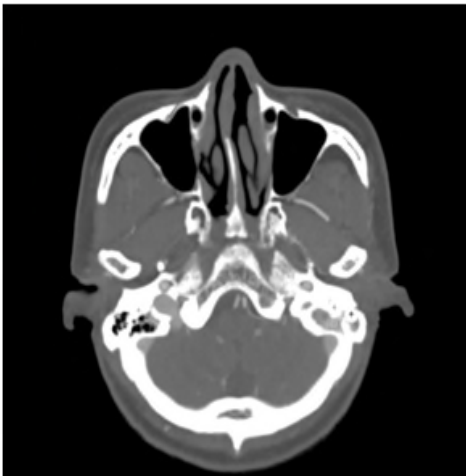
# BIH with papilledema

- 54/F, right side pulsatile tinnitus with bilateral 6<sup>th</sup> nerve palsy.
- Significant pressure gradient of the left transverse sinus lesion.
- Improved pressure gradient after self-expandable stent placement.

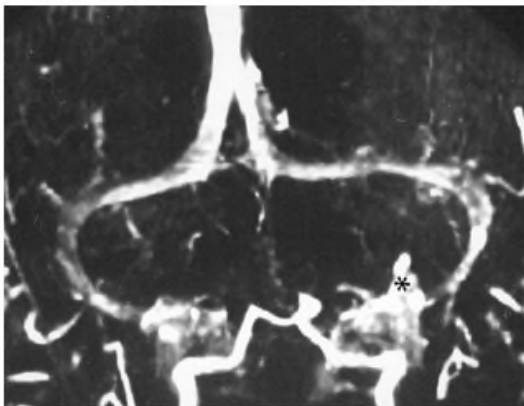
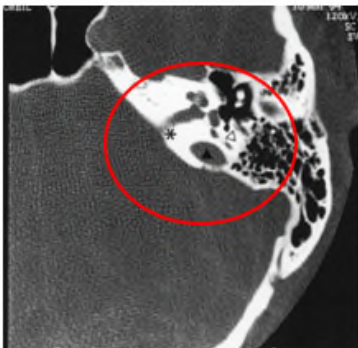


# Jugular vein compression and narrowing Right high riding jugular bulb

- 59/F, right side pulsatile tinnitus with hearing loss
- Right high riding jugular bulb.
- Compression of both internal jugular bulb between styloid process and spinal transverse process, C1 (Rt > Lt).



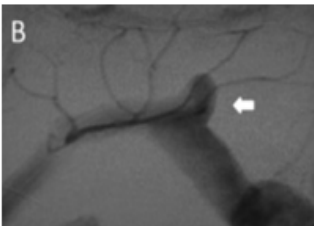
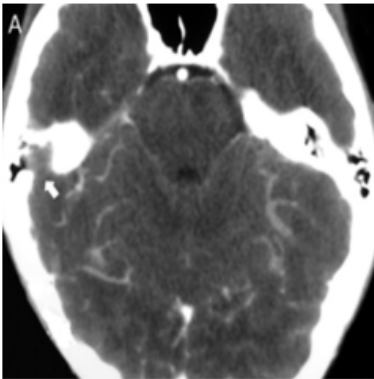
# High-riding jugular bulb



Diverticular high and medial left jugular bulb

- 54/F
- High and medial left jugular bulb (▲) in the triangular area between the inner acoustic meatus (\*), posterior surface of the petrous bone and posterior semicircular canal (△)

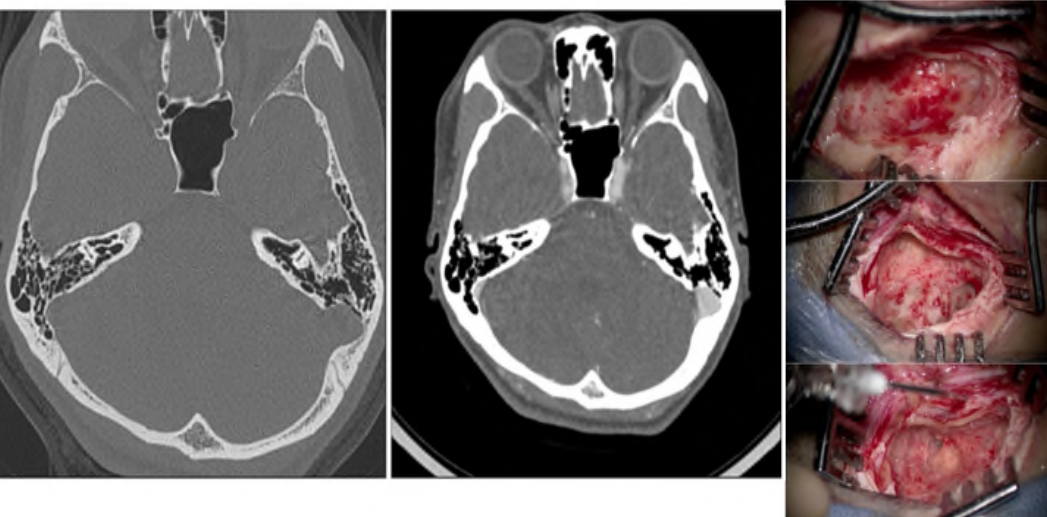
# SS Diverticulum



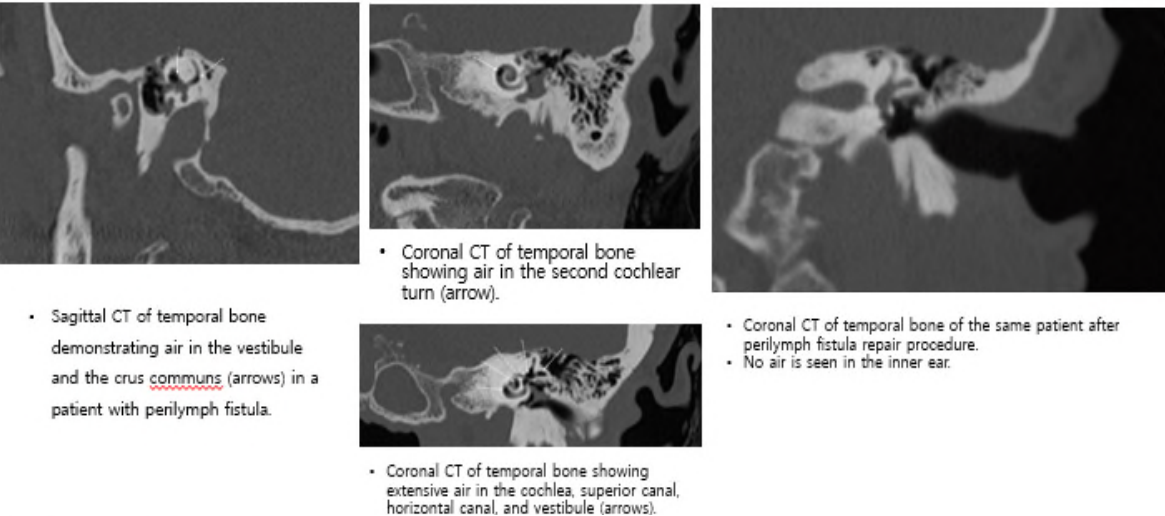
- 28/F
- A. Computed tomography angiography (CTA), axial view: note the enhancing lesion breaching the posterior part of the right petrous bone (arrow), and its proximity to the middle and inner ear.
- B. Digital subtraction angiography (DSA) during the venous phase, skewed lateral view: note the transverse-sigmoid sinus (TSS) diverticulum on the right side (arrow), and that the aneurysm is implanted on the dominant sinus.



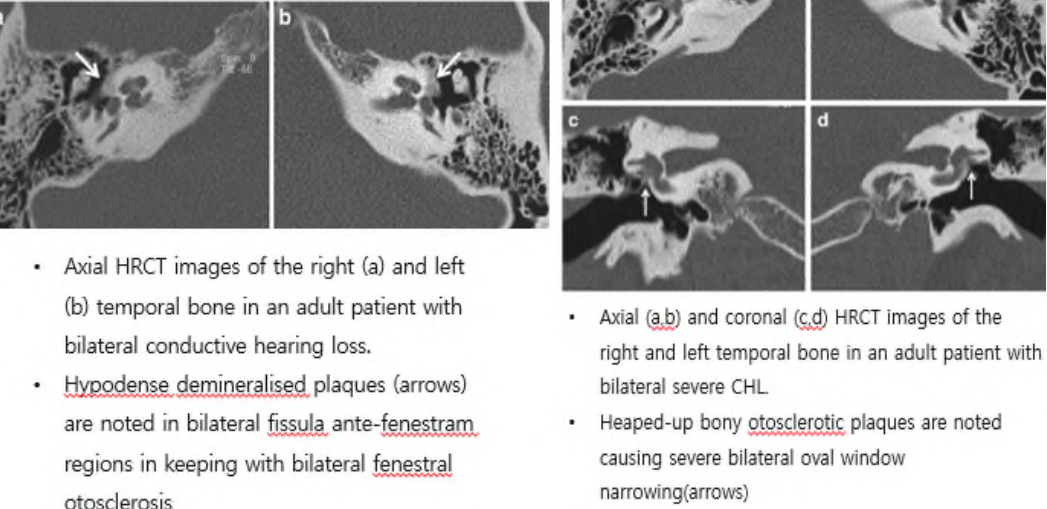
# Dominant sigmoid sinus dehiscence



# Labyrinth fistula(=Perilymphatic fistula)



# Otosclerosis



# Empty sella

