Pulsatile Tinnitus

• Affects 50 million Americans

In patients with pulsatile tinnitus, nearly 57%–100% of all examinations will reveal imaging abnormalities, though the diagnostic relevance of some imaging findings such as jugular bulb variants is controversial. Some authors consider the presence of these abnormalities as a “positive scan,” whereas others regard these findings as incidental because they are relatively common in the general population and are usually asymptomatic. If these variants are excluded, the yield of imaging is lowered by approximately 20%–30%.

Vattoth, AJNR 2010

• Middle ear
  • Glomus tumor
  • Aberrant/dehiscent ICA
  • Jugular bulb variants
  • Persistent stapedial artery
  • Cavernous hemangioma (rare)
• Temporal bone
  • Otosclerosis
  • Paget
• Intracranial
  • Verstibular schwannoma
  • Aberrant AICA loops
  • Brain stem lesions (auditory nuclei)
  • Pseudotumor
  • Dural venous sinus stenosis
  • AVM
  • Dural AVF
• Neck
  • Carotid artery stenosis/dissection
• TMJ
Arterial causes

• Carotid artery stenosis
• Carotid occlusion
• Dissection
• Fibromuscular dysplasia
• Persistent stapedial artery
• Aberrant or lateralized ICA course
• Dural AVF
Venous causes

- Benign intracranial hypertension
- A high-riding or dehiscent jugular vein
- Venous stenosis
- Venous diverticulum
- Abnormal condylar and mastoid emissary veins
- Turbulent flow through a dominant jugular vein
Investigating vascular sources of pulsatile tinnitus

• 16 patients – prospectively
• Normal otologic exam (no middle ear masses)
• CT performed after 22-25 seconds (both arterial and venous opacification)
• T-bone reconstructions
Findings

• 5/16 – no vascular or temporal bone abnormalities, codominant venous sinuses
• 6/16 – strongly dominant venous systems
  • 5 of these 6 had tinnitus on the side of the dominant sinus
  • 3 of these 6 had thinned sigmoid plate on the side of the dominant sinus
• 1/16 had a dural venous sinus diverticulum
• 1/16 had a dural venous sinus stricture
• 1/16 had a high riding jugular bulb
Distal transverse sinus diverticulum
Transverse sinus stricture


Objective Pulse-Synchronous "Essential" Tinnitus due to Narrowing of the Transverse Dural Venous Sinus.

Russell EJ, De Michaels BJ, Wiet R, Mevor J.
Venous anomalies: Incidental or causative?

• All the patients who had pathology that their tinnitus could be attributed to had venous anomalies.
• Many of these venous anomalies are very common in the general population.
Treatment

Endovascular Interventions for Idiopathic Intracranial Hypertension and Venous Tinnitus: New Horizons

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NMH MRI Protocols

Pulsitile Tinnitus  (revised April 2014)

- Optimize FOV according to patient
- If significant metal artifact use DIXON in place of a chemically selective fat saturation
- Any contrast enhanced angiographic imaging will be done independently and will require a separate order.
- Contrast dosage 0.1ml/kg Gadavist
- Gadavist Dosing

1. SCOUT
2. SAG T1 TSE (whole brain)
3. AXIAL FLAIR (whole brain)
4. AXIAL DIFFUSION (whole brain)
5. AXIAL T2 TSE (3mm cover whole brain)
6. AXIAL T1 TSE (3mm cover through IAC)
7. AXIAL TOF (above COW to skull base, mip left right and posterior)

Inject Contrast

8. AXIAL T1 TSE FS (3mm cover through IAC)
9. AXIAL MPRAGE (whole brain)