ST VINCENT'S HOSPITAL SYDNEY

ST VINCENT'S PRIVATE HOSPITAL SYDNEY

Pulsatile Tinnitus

Types of tinnitus

- Tinnitus is defined as the sensation of a sound not associated with external noise.
- Often divided into Subjective tinnitus and Objective tinnitus (which is divided into pulsatile tinnitus or mechanical tinnitus)
- Subjective tinnitus is by far the most common and can be manifest as any number of sounds. People of describe, ringing, cicada type sounds, grumbling mechanical sounds amongst many others
- Pulsatile tinnitus is often in time with the pulse, whereas mechanical tinnitus is not and can be associated with bodily movement.

Subjective Tinnitus

- At least 15% of adult population
- 2% Intrusive

- Initial logical explanation essential
  - Exclude serious pathology
  - Minimise intrusiveness

Generator-Preceptor Model

- An initial injury to the cochlear leads to generation of the tinnitus which is then modified by central connections to the limbic system and trigeminal nucleus.

- Any physiologic or emotional stress will amplify the tinnitus

Management

- **Audiologic**
  - Improve hearing
  - Sound enrichment
- **Physiologic**
  - Reduction in any form of stress
- **Psychologic**
  - Tinnitus Retraining: cognitive behavioural therapy

Objective or Conductive Tinnitus Often Pulsatile

- Commonest is the most benign and related to a degree of eustachian tube dysfunction
- Clicking and crackling on swallowing indicates resolving eustachian tube dysfunction

Why don’t we all have pulsatile tinnitus ?

- The carotid artery sits often < 2mm away from the cochlear

Increased sensitivity to normal internal sounds

- Conductive hearing loss
- Inner ear dysfunction (hyperacusis)
- Generalised neural hypersensitivity (migraine)

Bilateral Pulsatile Tinnitus

- Hyperdynamic states
- Pagets Disease
- Benign Intracranial Hypertension

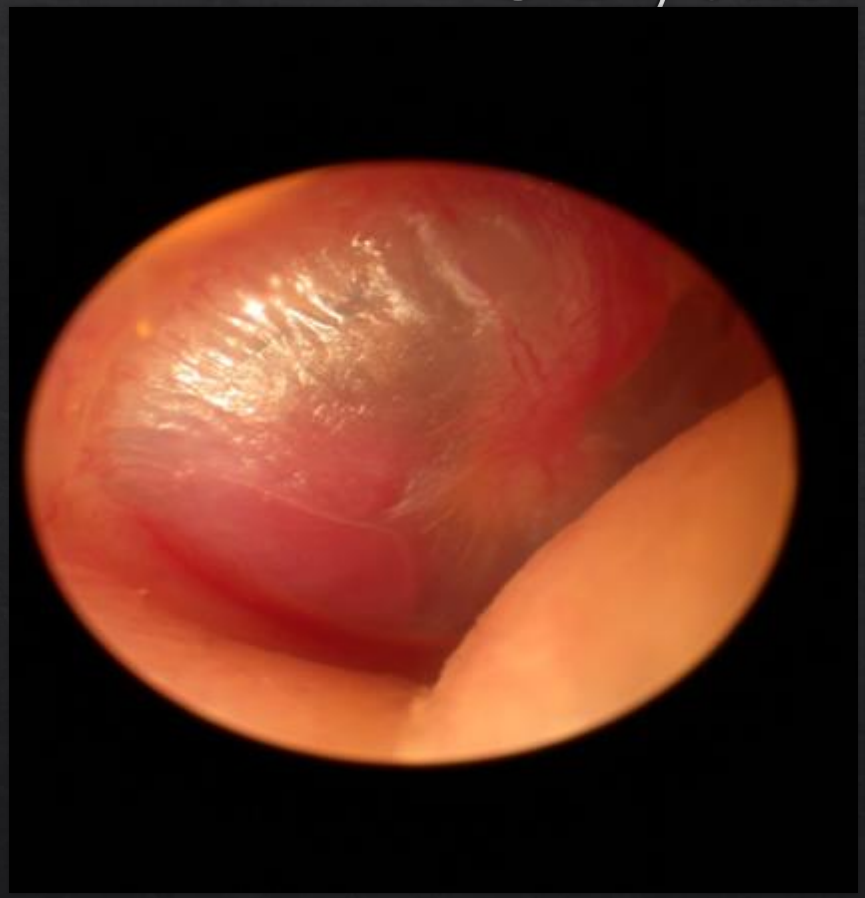
MRI scan showing dilated optic sheaths suggestive of raised intracranial pressure

True Pulsatile Tinnitus: Pathologic

- Originates from vascular structures within the head, skull base, neck , and thoracic cavity, and it is transmitted to the cochlea by bony or vascular structures.
- Increased blood flow or
- Stenosis
- Arterial or Venous

Acute otitis media with pulsatile tympanic membrane due to significant inflammatory fluid behind the tympanic membrane

34 year old woman



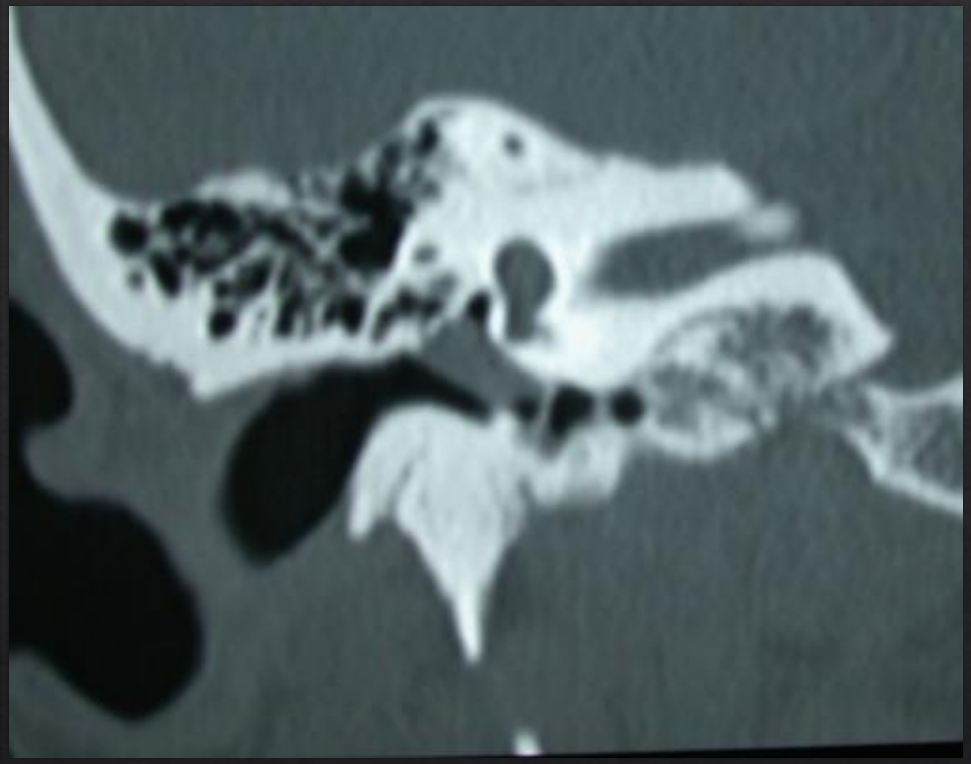
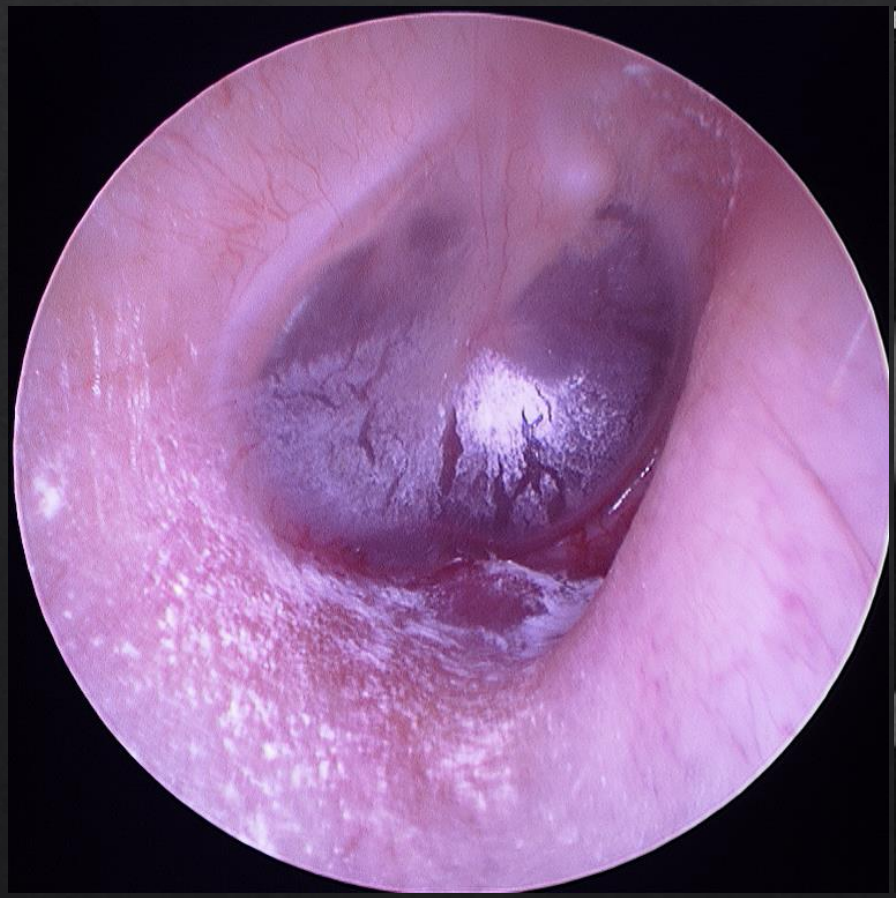


Image of a red mass behind the tympanic membrane, which is limited to the middle ear, making the diagnosis of a glomus tympanicum (Type A paraganglioma)

Pulsatile mass behind the tympanic membrane: due to highly vascular tumour

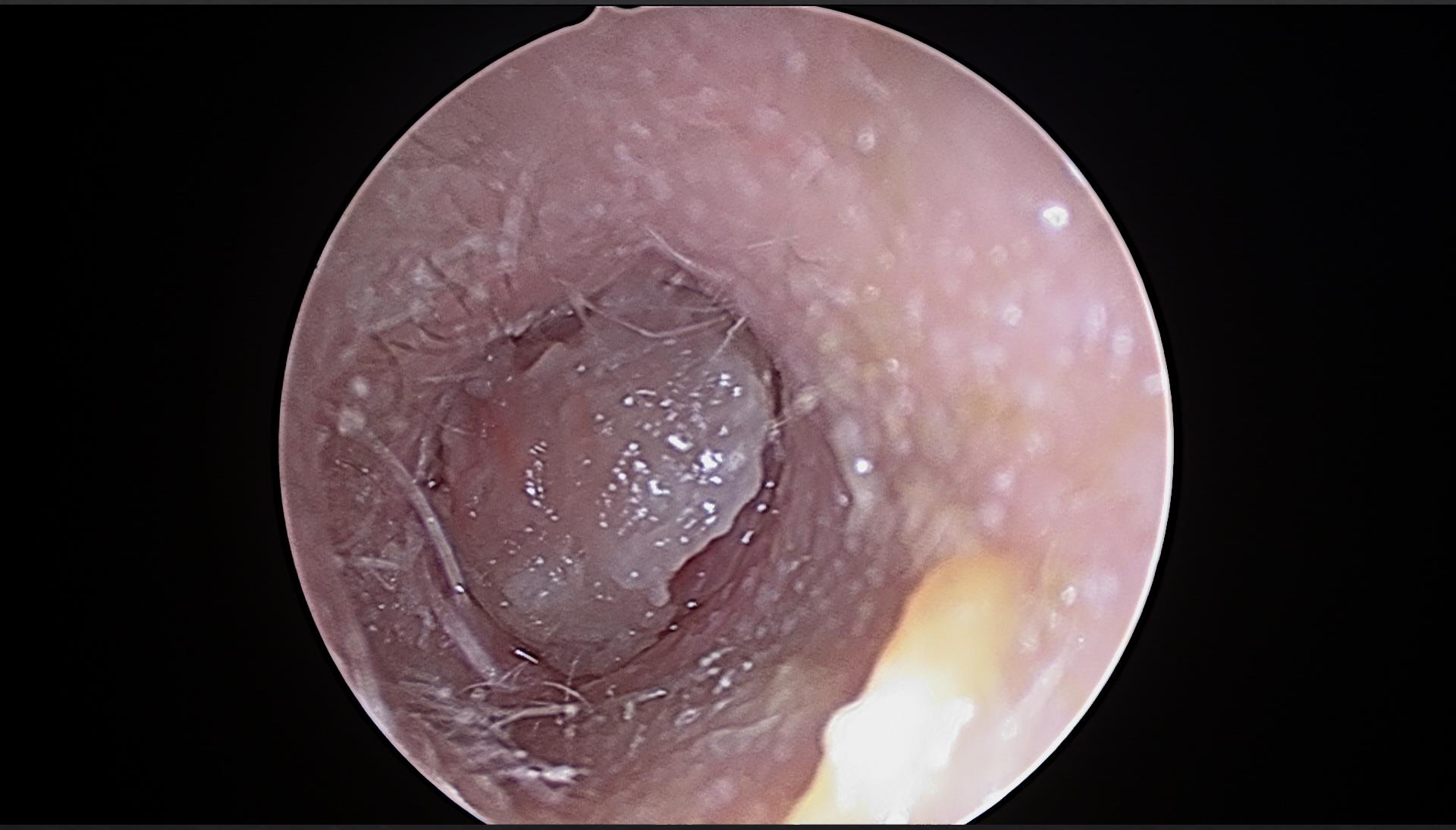
23 year old lady



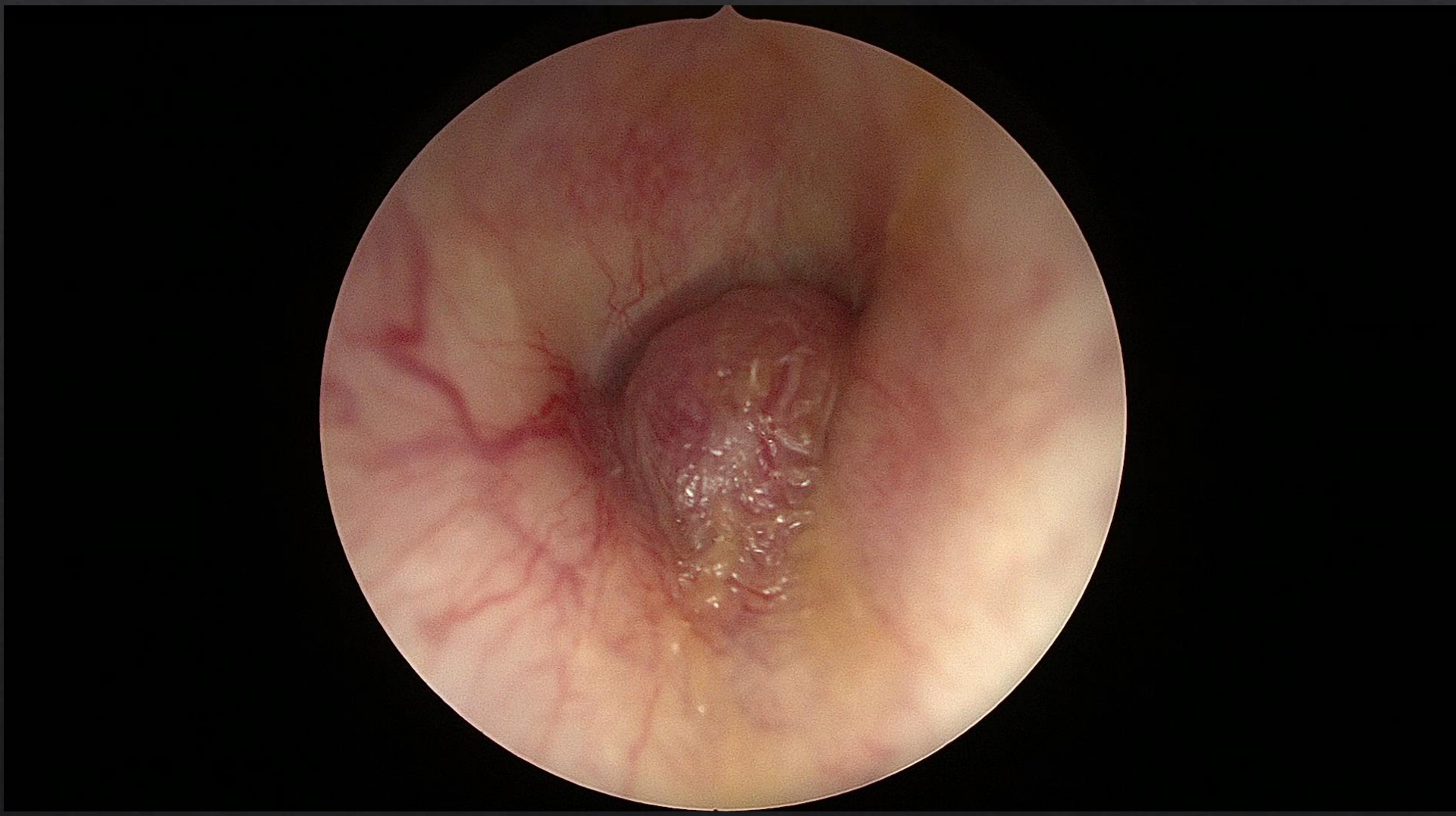
Normal hearing, lower cranial nerves and facial nerve function

Pulsatile lesion both behind and just lateral to the tympanic membrane

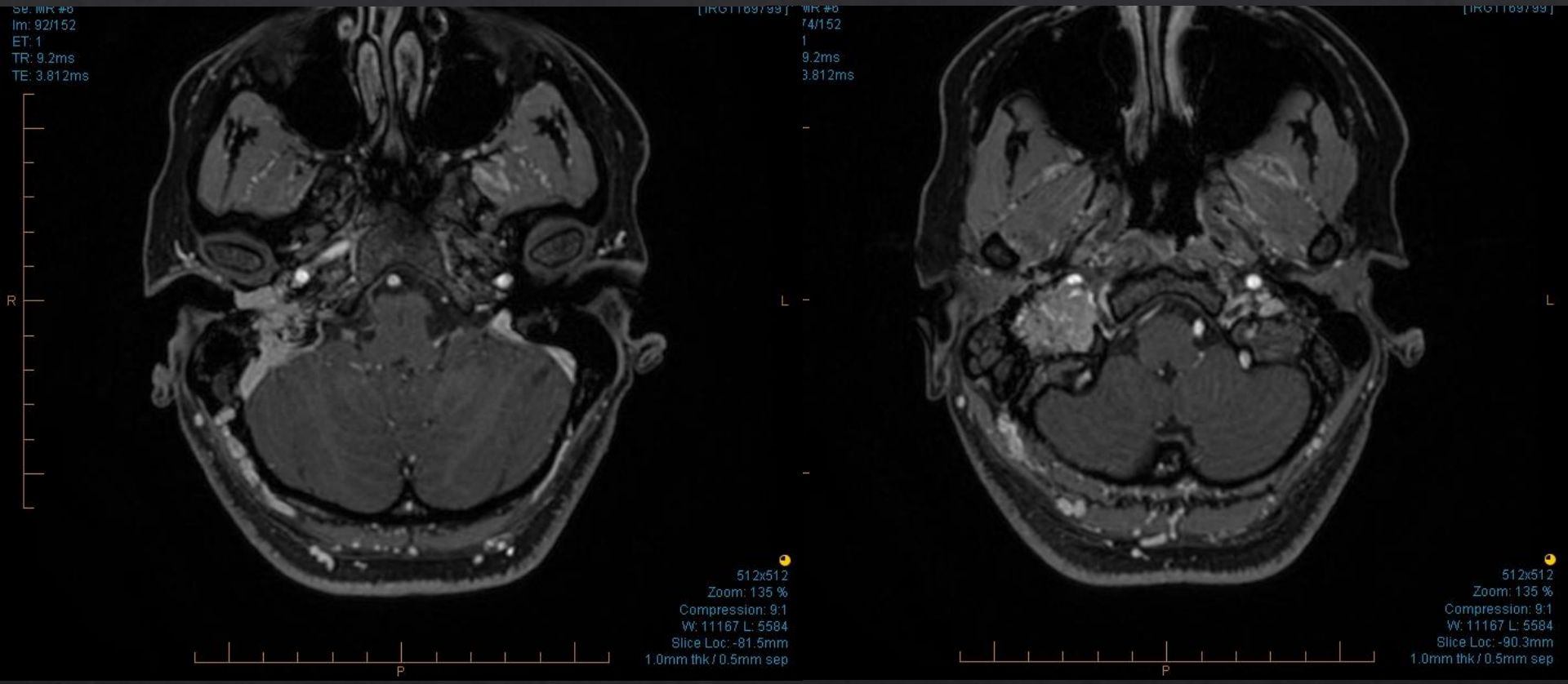
This scan shows the same type of tumour arising from the jugular bulb extending into the middle ear. This makes the diagnosis a glomus jugulare (jugulotympanic paraganglioma



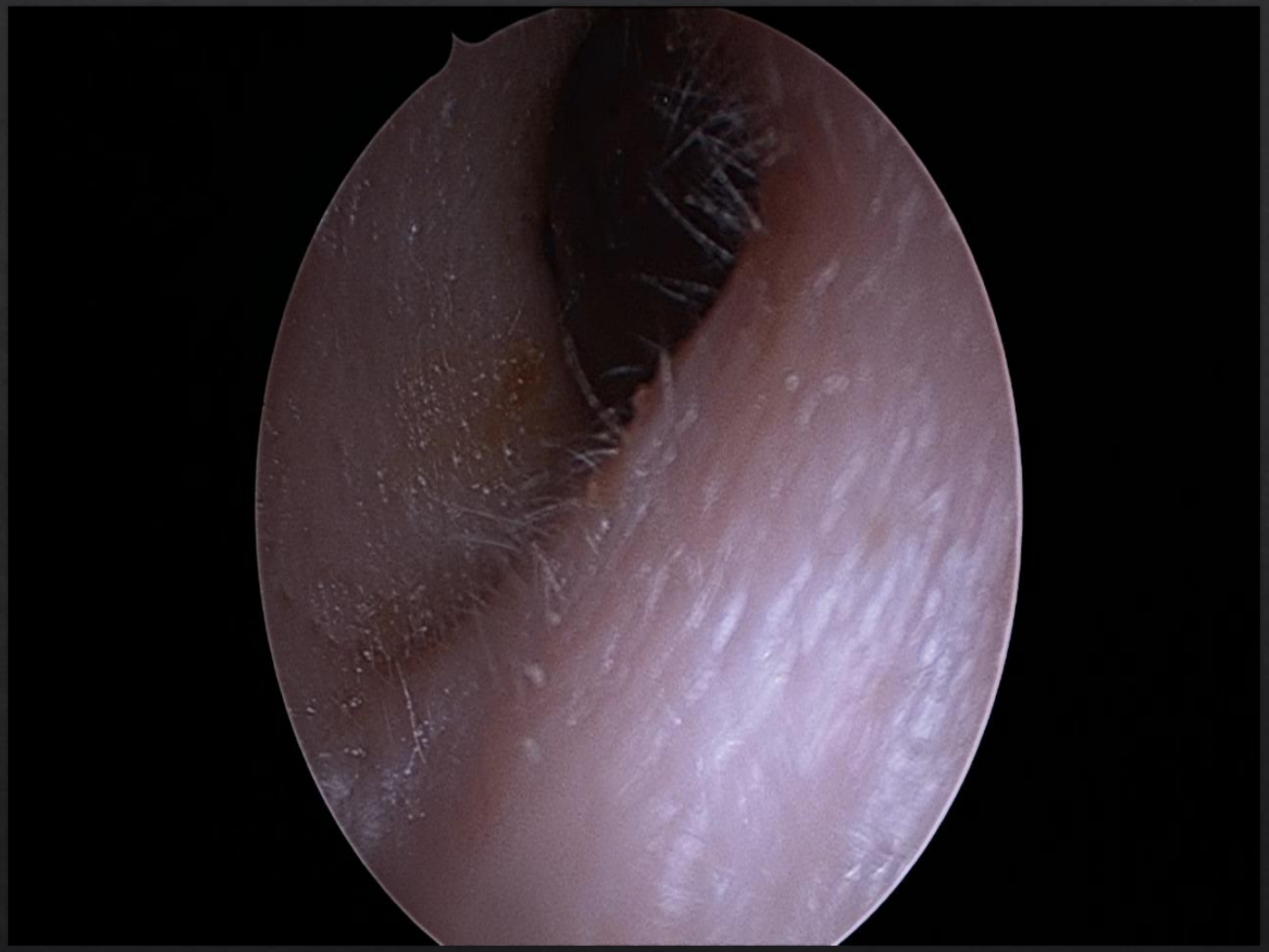
Picture of the same patient some 10 years later with growth the size of the lesion now occluding the entire ear canal. The patient now has a complete conductive hearing loss and worsened pulsatile tinnitus



The same patient following radiotherapy which has shrunk the tumour (at least to some degree)



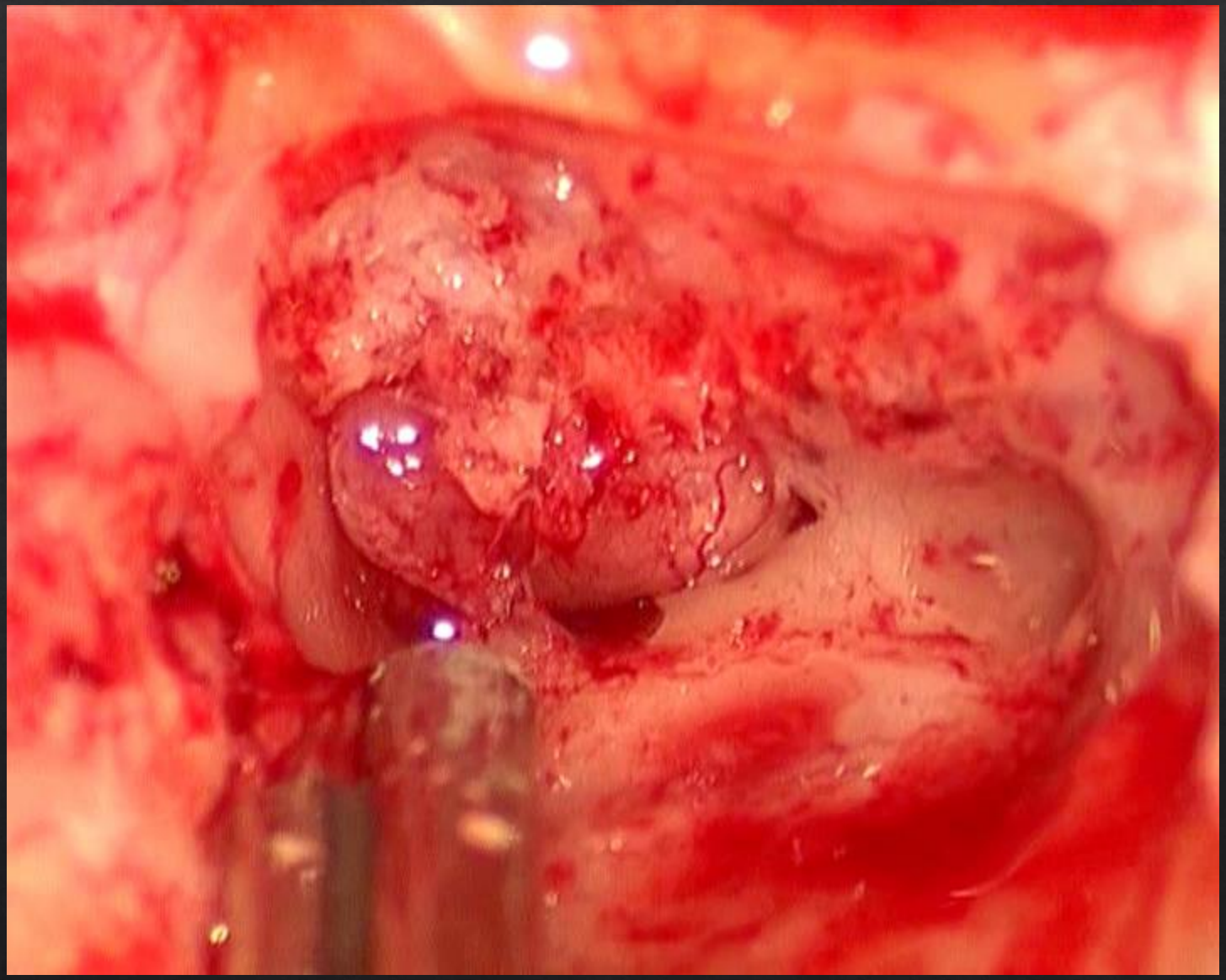
MRI scans showing large vascular mass centred on the right jugular foramen with extension down the external auditory canal: the scanning characteristics show the salt and pepper features suggesting the highly vascular nature of the tumour



Another video showing a pulsatile mass: this time a rare meningioma that has extended from the brain into the ear

Meningoencephalocele

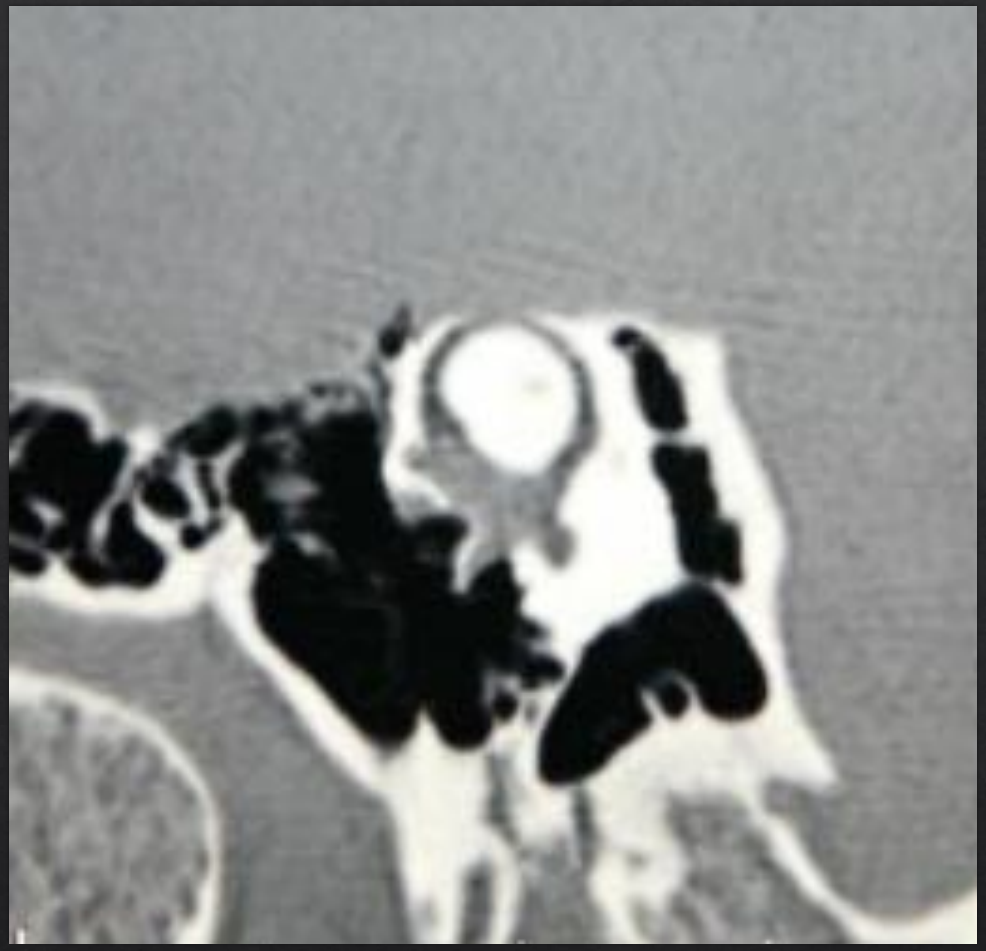
Where the brain sags down through the roof of the ear




Multiple Meningo-encephalic
Herniations

Superior semicircular canal dehiscence

- Pulsatile type tinnitus
- Sound and pressure induced dysequilibrium
- Autophony
- Conductive hyperacusis



CT scan showing loss of bone over the superior semicircular canal leading to transmission of brain pulsations into the inner ear

VEMPs

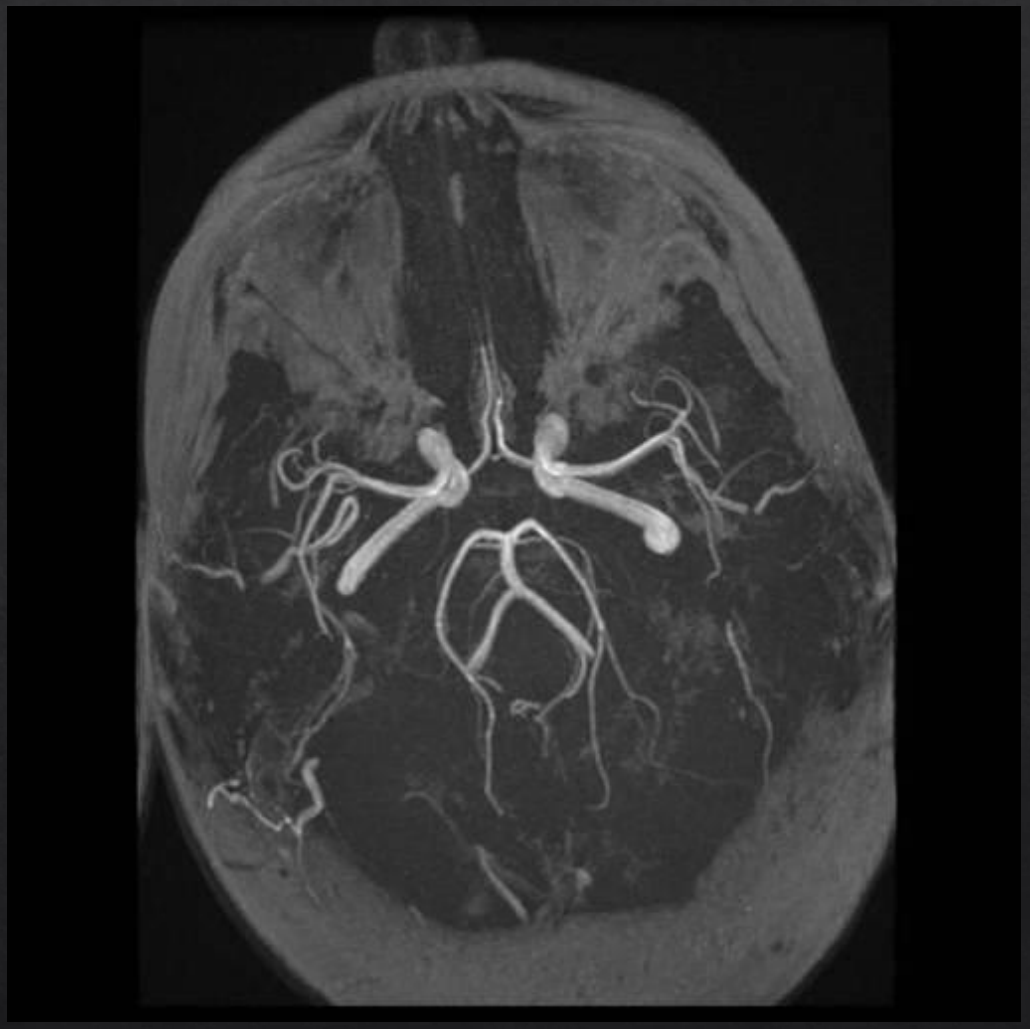
- CVEMP threshold:

  R= 95dB L= 65dB

- OVEMP threshold:

  R= 100dB L= 65dB

Arterial

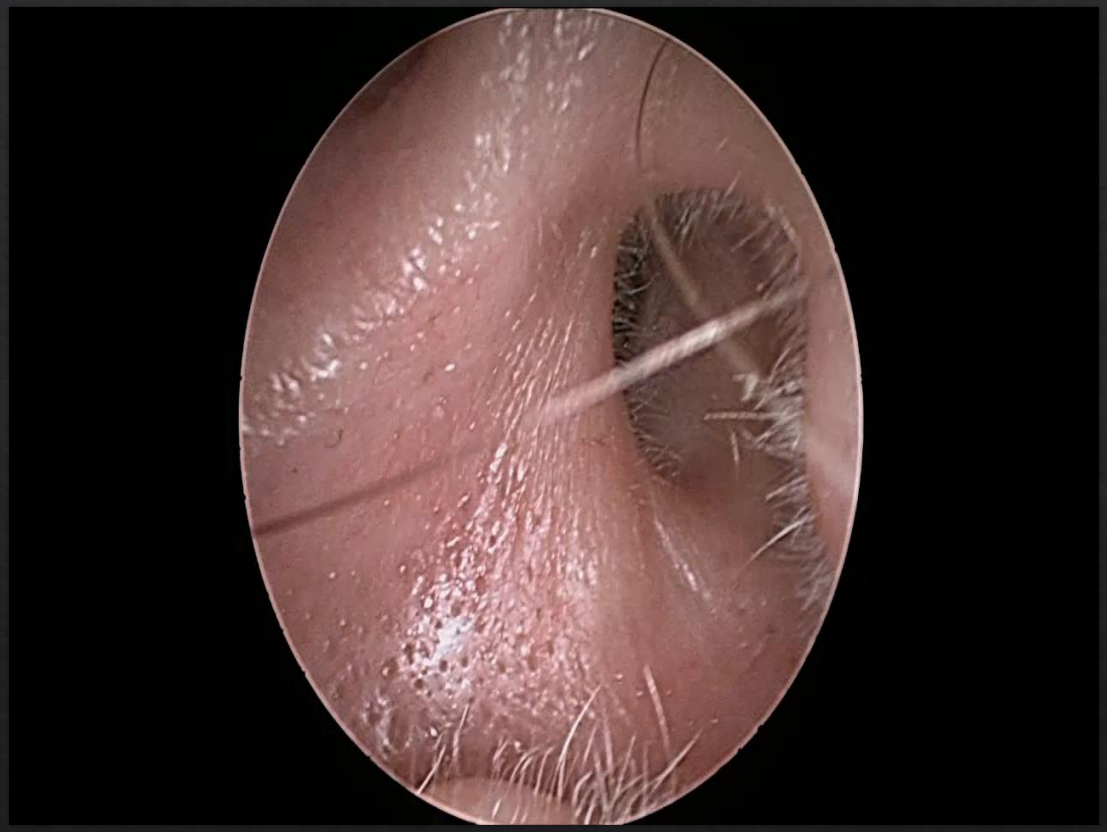


MRA showing evidence of a right arteriovenous fistula

Venous

MRV showing stenosis at the junction of the transverse and sigmoid sinus

Dehiscent jugular bulb seen in the floor of the middle ear

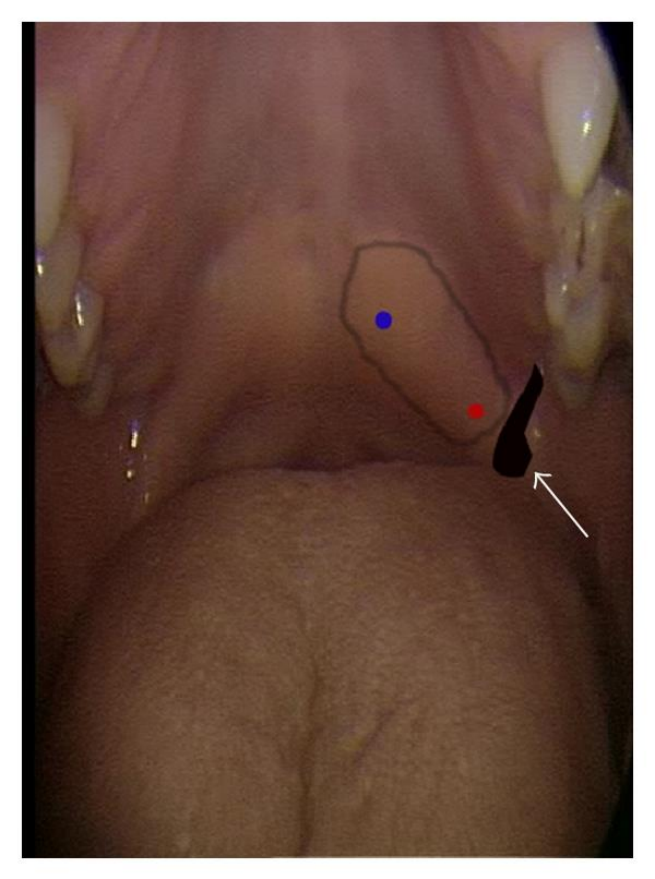


CT scan showing the jugular bulb extending into the middle ear. Interestingly this patient also had a meningoencephalocele (that cannot been seen on otoscopy)

Muscular Causes

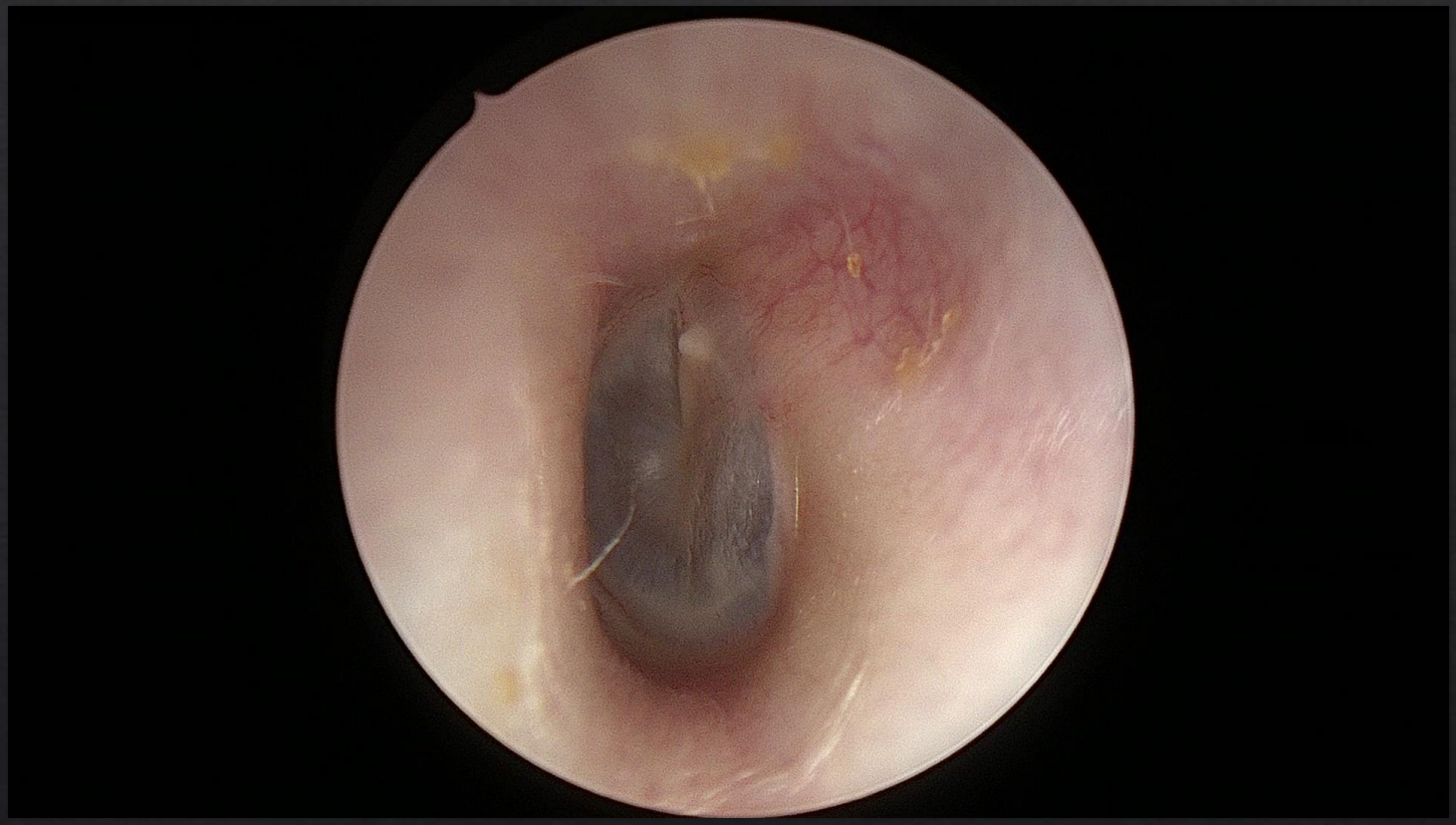
- Palatal and stapedial myoclonus
  - Auditory ear click is occurs more commonly in essential palatal myoclonus
  - Stapedius spasm can occur post facial nerve injury as part of synkinesis
- Requires MRI scan to exclude rare central cause
- Clonazepam, anti-epileptics
- Botox
- Surgical section of muscle

Botox: EMG guided



- 7 Units red
- 3 Units blue

Patulous eustachian tube



Movement of the tympanic membrane on nasal respiration

Summary of Initial Investigations

- Tinnitus in all its forms is common, with a serious underlying cause very rare
- Asymmetric tinnitus or hearing requires MRI scan
- Almost all persisting pulsatile tinnitus require MRI, MRA, MRV if normal otoscopy.
- Initial CT if abnormality noted on otoscopy
- Duplex of neck vessels, cardiac investigations