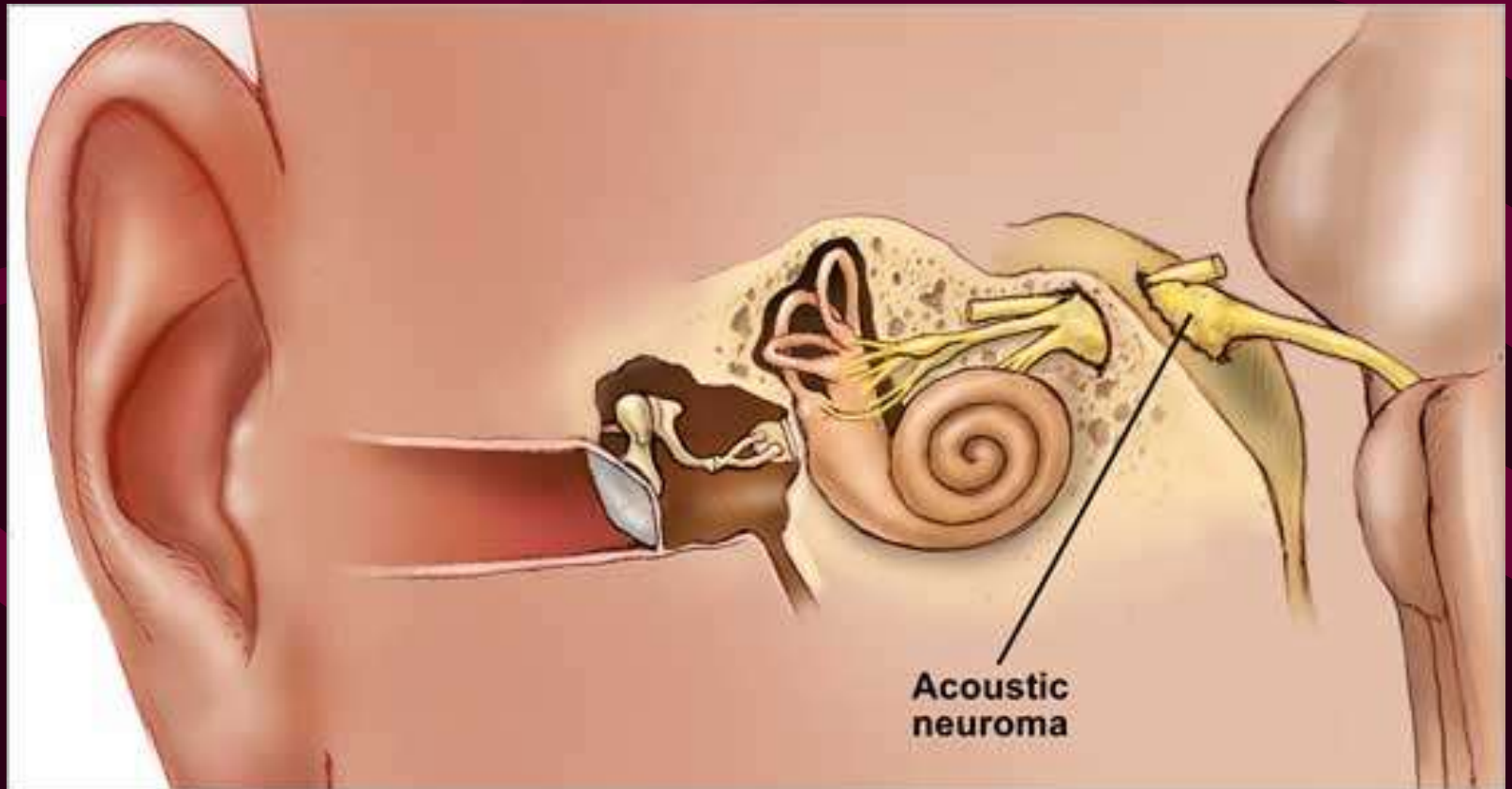


# **VESTIBULAR SCHWANNOMA**

## **(ACOUSTIC NEUROMA)**

# DEFINITION

- Benign tumor of vestibular nerve schwan cells

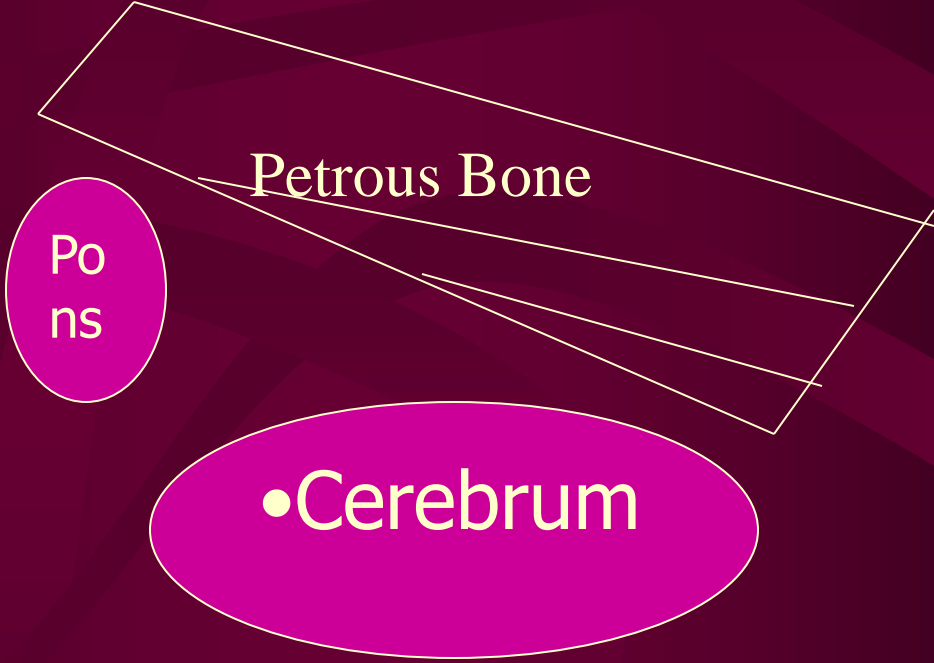


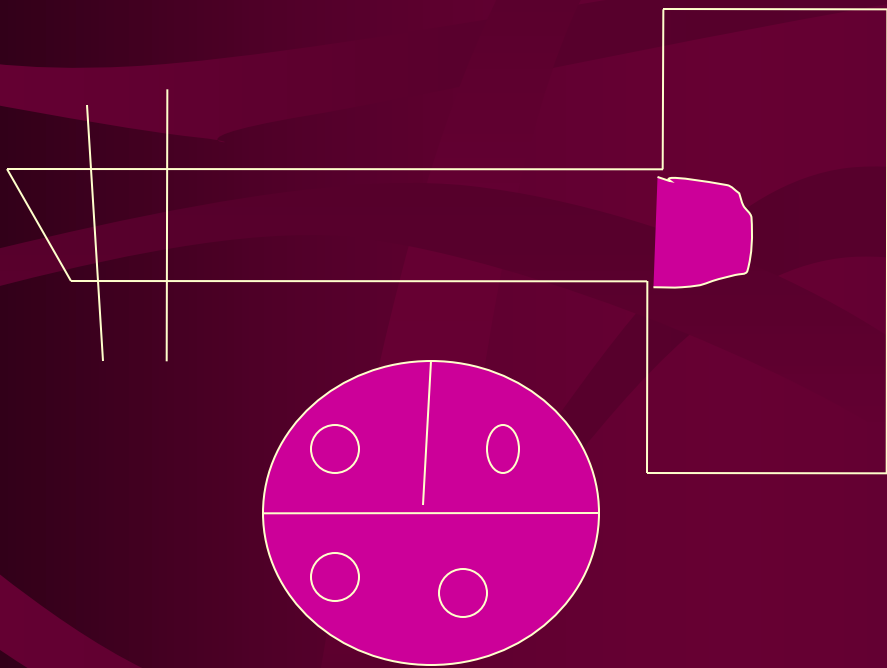
# VESTIBULAR SCHWANNOMA

- **6 % of all Intracranial tumors**
- **80 - 90% of CPA tumors**
- **Majority adulthood**
- **95% Unilateral**
- **5% Neurofibromatosis type 2 (bilateral)**
- **No known race, gender predilection**

# ANATOMY OF CP ANGLE

- Triangular area
- Lateral                      Posterior surface of temporal bone
- Medial                      Edge of pons
- Posterior                    Anterior surface of cerebellum
- Superior                    Trigeminal nerve
- Inferior                     IX, X, XI cranial nerves



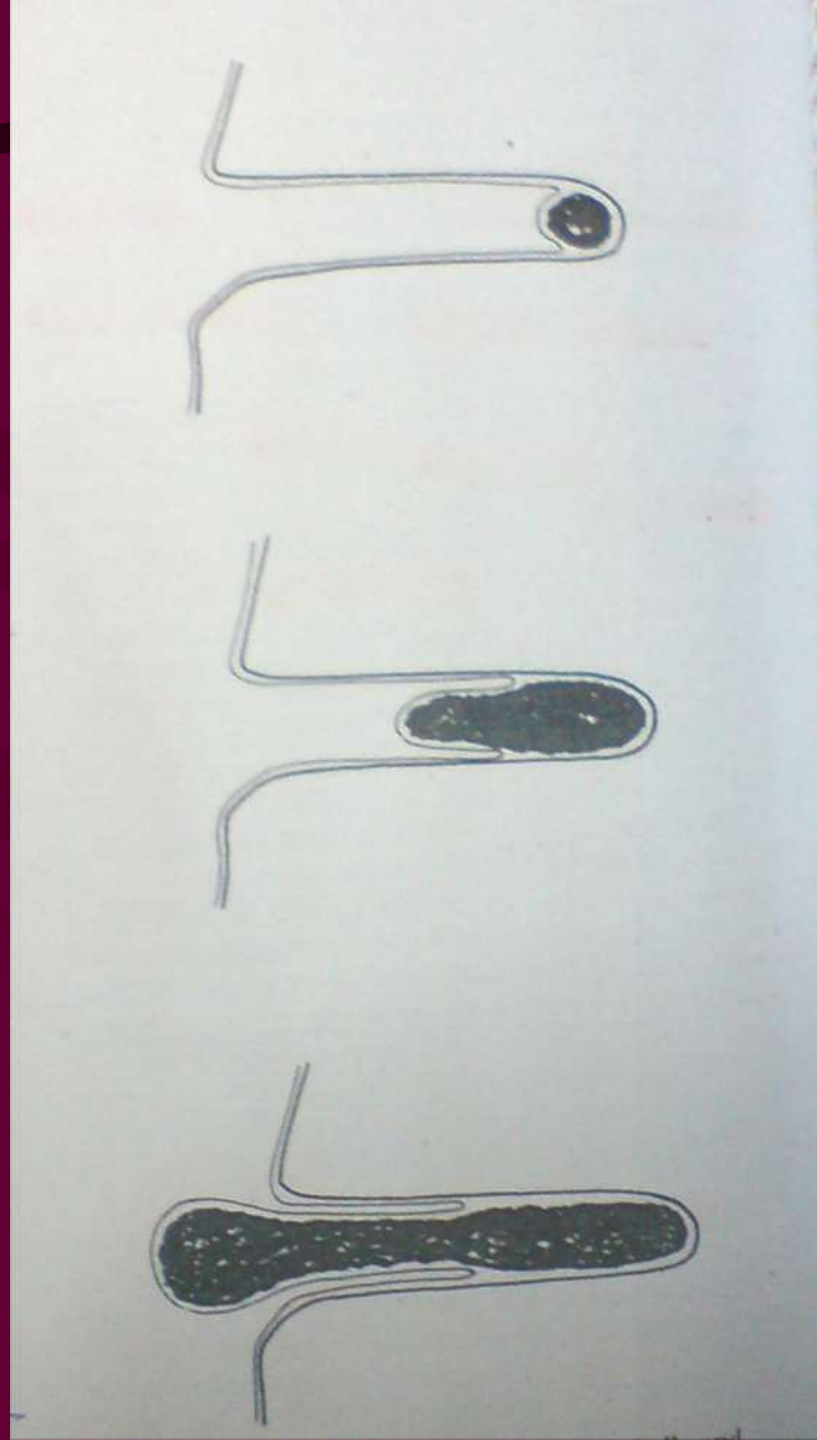


# SITE OF ORIGIN

- Schwann cells which envelop distal portion of VIIIth nerve
- Within the IAC

# GROWTH PATTERN

- Grows medially
- Invested by double arachnoid layer





# EFFECTS ON INNER EAR

- Compressive effect on cochlear nerve
- Vascular occlusion of internal auditory artery
- Atrophy of organ of Corti
- Vacuolization of stria vascularis

# APPEARANCE

- Firm
- Well encapsulated
- Interior soft
- Sometimes filled with serous or hemorrhagic fluid

# STAGES

- 1 Otological stage (< 2 cm)
- 2 Trigeminal nerve involvement (2-2.5 cm)
- 3 Brain stem and cerebellar compression (2.5-4 cm)
- 4 Increasing intracranial pressure
- 5 Terminal stage

# STAGE 1

## OTOLOGICAL STAGE

- Deafness
  - Unilateral, gradual
- Tinnitus
  - Non-pulsatile
- Imbalance
- Trigeminal nerve involvement
- Facial nerve involvement

# STAGE 2

## TRIGEMINAL NERVE INVOLVEMENT

- Tumor size 2-2.5 cm
- Irritation in eye
- Pain, tingling, numbness on face
- Feeling of cold on face

# STAGE 3

## BRAIN STEM AND CEREBELLAR COMPRESSION

- Ataxia
- Gait disturbance
- Tremors
- Nystagmus

# STAGE 4

## INCREASING INTRACRANIAL PRESSURE

- Headache occipital
- Nausea Vomiting
- Papilloedema

# STAGE 5

## TERMINAL STAGE

- Failure of vital centres in brain stem



# EXAMINATION

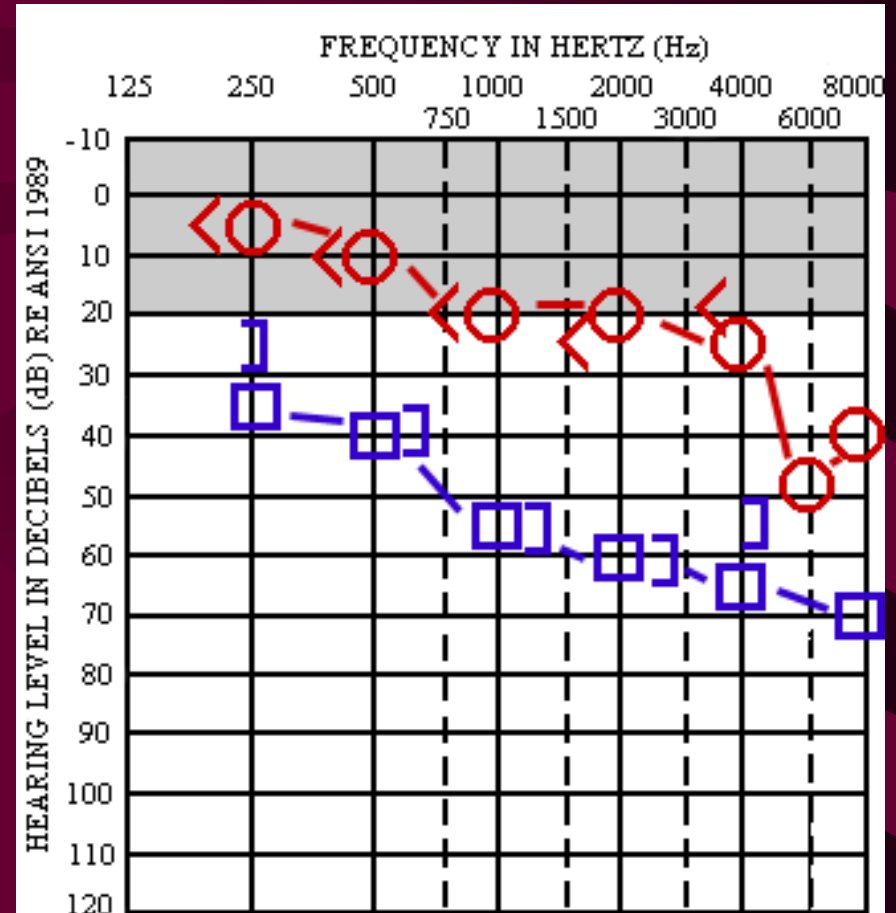
- Cutaneous lesions (neurofibromas)
- Otoscopy: Normal
- Tuning fork tests:
  - Unilateral sensorineural deafness
- Trigeminal Nerve
- Facial nerve
- Eye examination

# EXAMINATION

- Finger nose test
- Romberg's test
- Unterberg's test

# INVESTIGATIONS

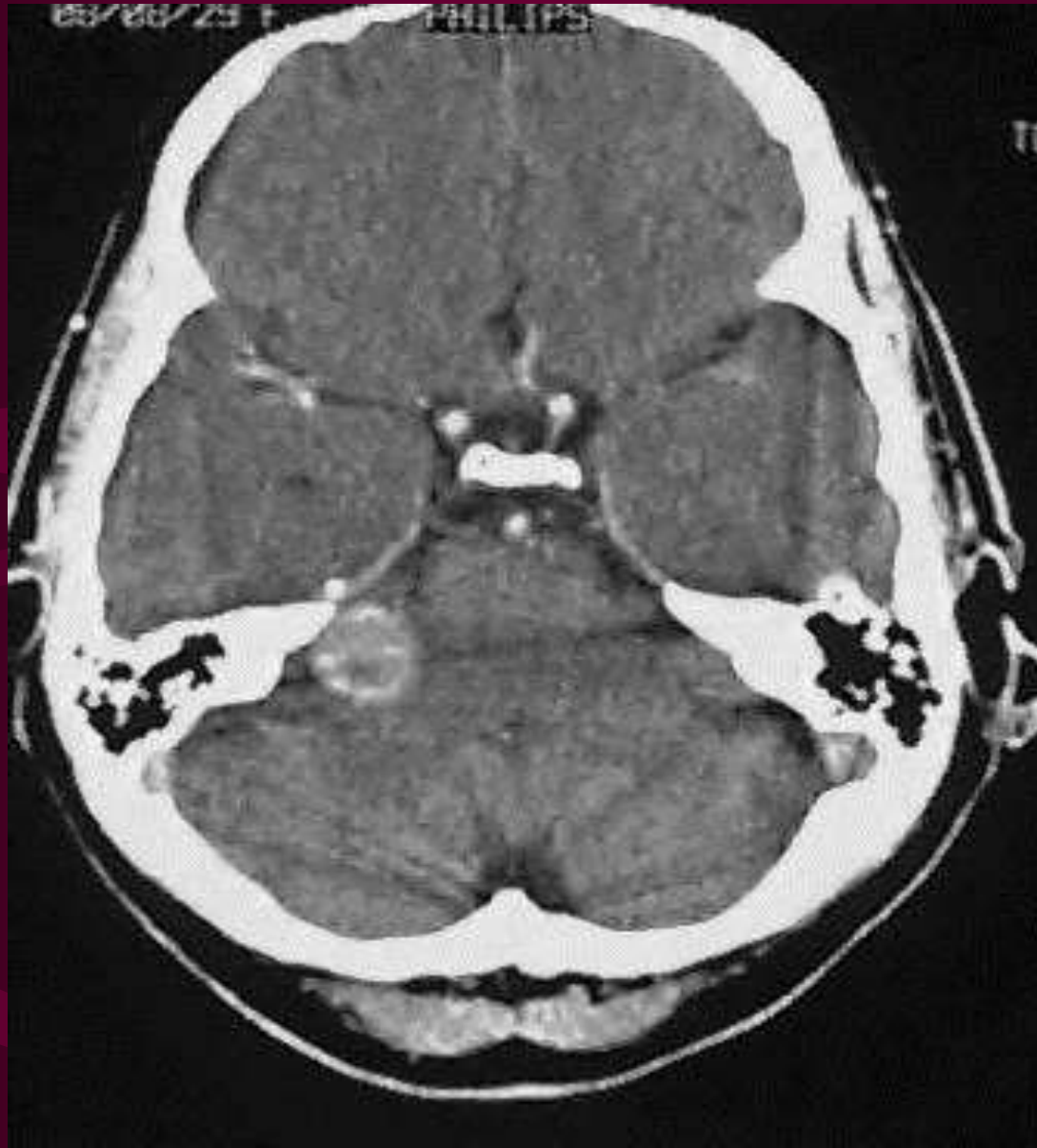
- Speech test
- Speech audiometry
- PTA
- Stapedial reflex
- Electrocochleography
- ABR
- Caloric test



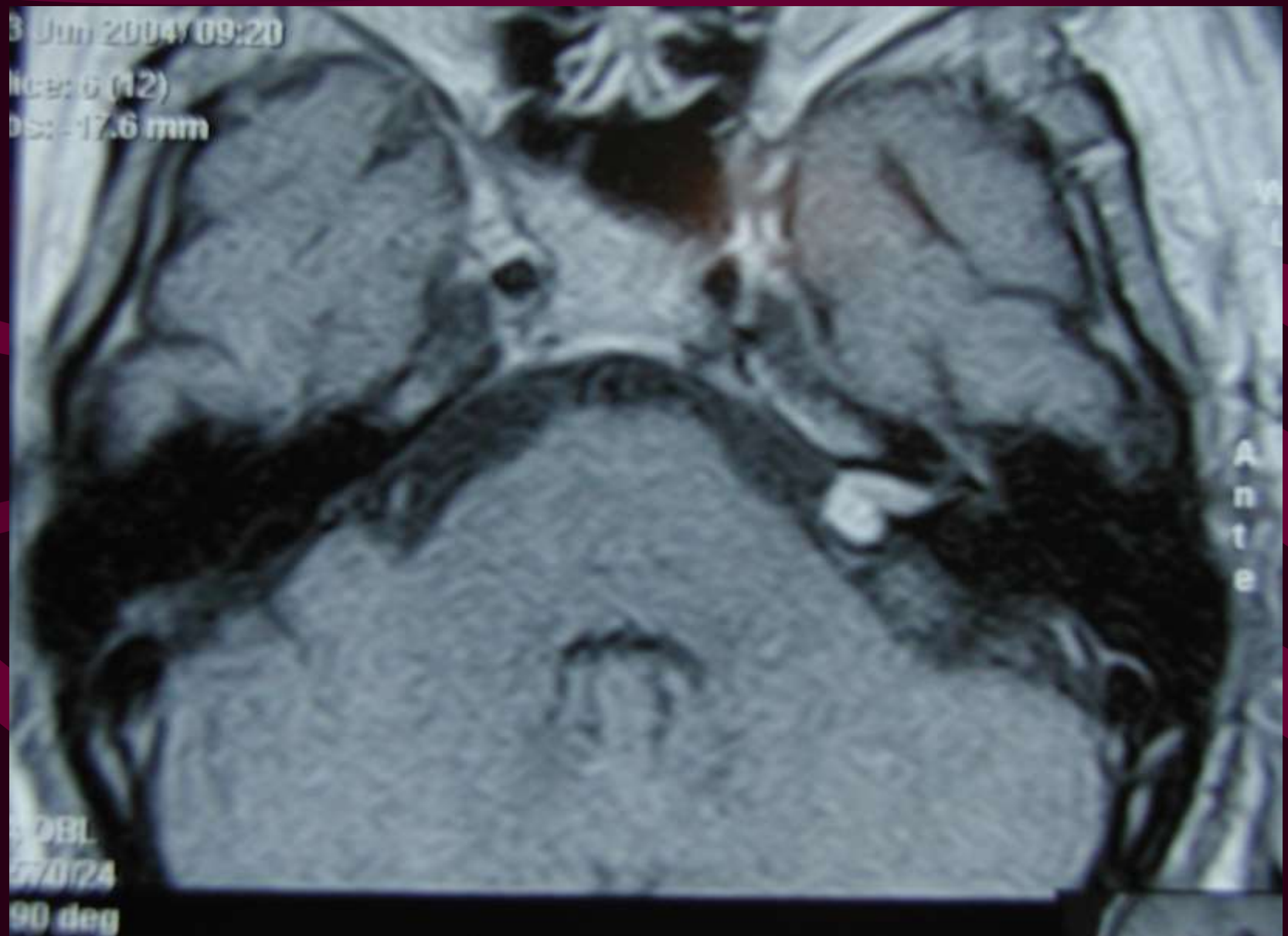
# RADIOLOGICAL INVESTIGATIONS

- Temporal bone radiology (PLAIN)

# CT-SCAN WITH CONTRAST



# MRI BRAIN



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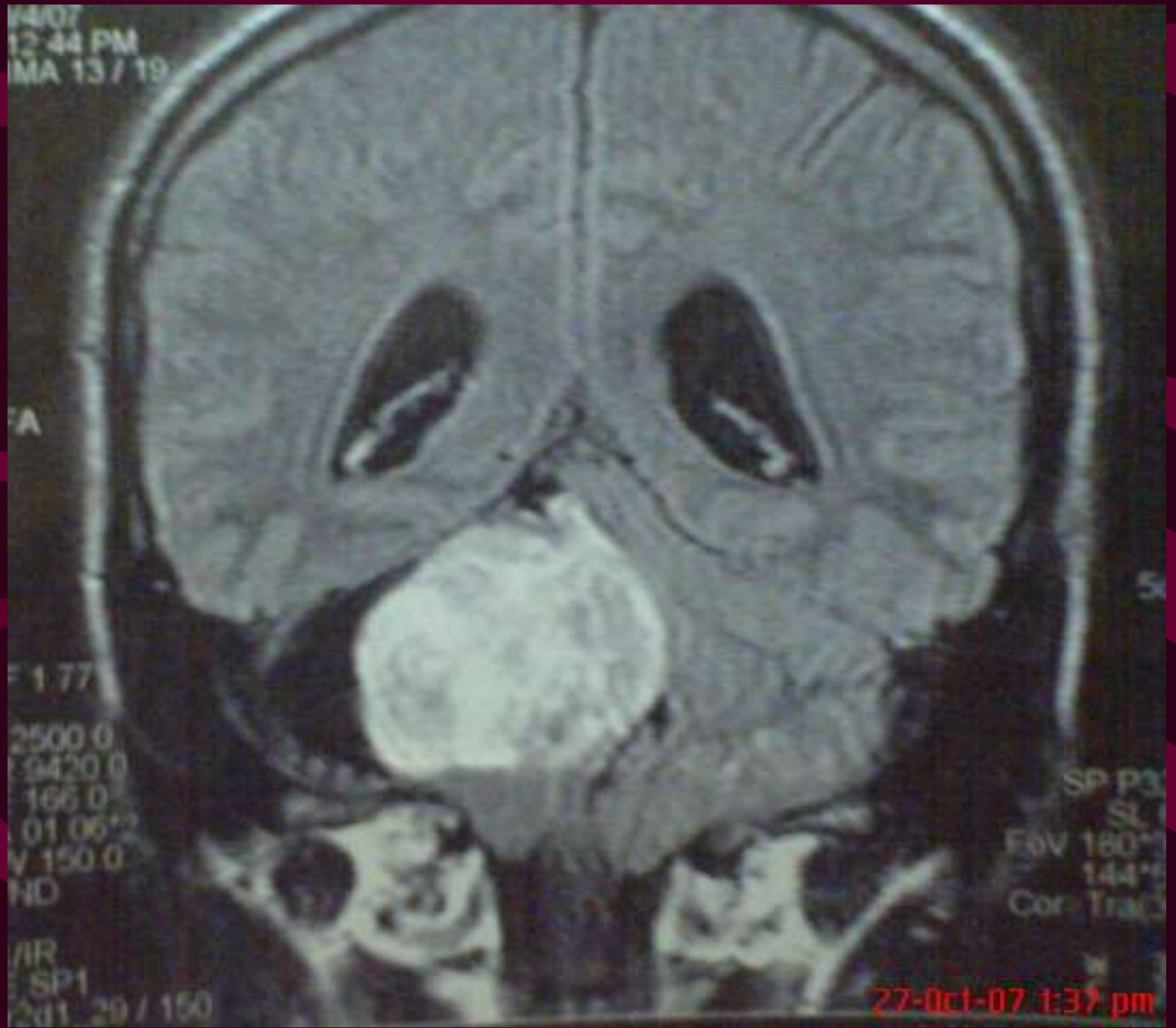
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# DIFFERENTIAL DIAGNOSIS

- Meningioma
- Primary cholesteatoma
- Arachnoid cysts
- Facial neuromas
- Lipoma
- Choroid plexus papilloma
- Glomus jugulare



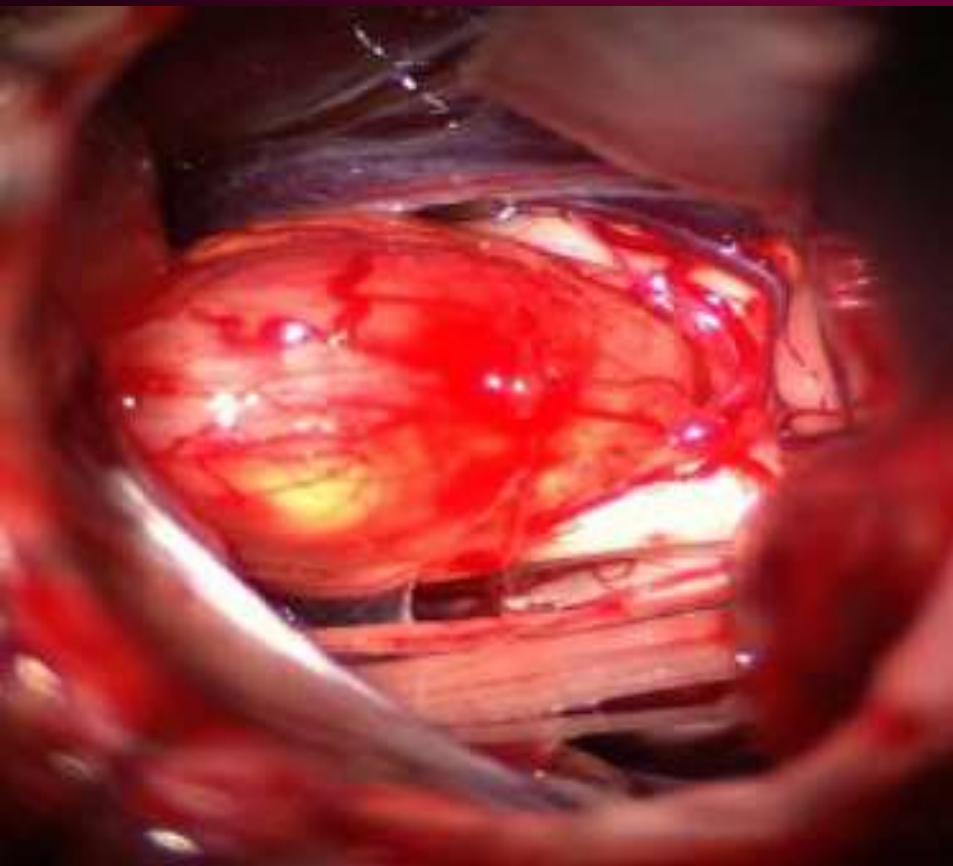
# TREATMENT

- **Observation**
- **Surgery**
- **Radiotherapy**
  - **Conventional**
  - **Stereotactic**

# STEREOTACTIC RADIOSURGERY

## Indications

- Patient who is poor surgical risk (age, medical condition, etc.)
- Tumor < 3 cm
- Younger patients with < 3 cm tumor who refuse surgery



# SURGERY

- Middle fossa approach
- Translabyrinthine approach
- Retrosigmoid approach

# CONSERVATIVE MANAGEMENT

- **Advanced age ( $> 65$  )**
- **Short life expectancy ( $< 10$  years)**
- **Slow growth rate**
- **Poor surgical candidate / poor general health**
- **Minimal symptoms**
- **Only hearing ear**
- **Patience preference**



**THANK YOU**

# GLOMUS TUMOURS

# Glomus Tumors

- They are the most common benign neoplasm of middle ear
- Arise from glomus bodies, which are similar to carotid bodies in structure.
- They consist of paraganglionic cells derived from the neural crest.
- 1. Glomus jugulare
- 2. Glomus tympanicum



# GLOMUS JUGULARE

- Collection of ganglionic tissue within the temporal bone in close relation with the jugular bulb

# TYPES

- Glomus jugulare
  - Dome of jugular bulb
  - IX, XII nerve involvement
- Glomus tympanicum
  - Promontory
  - Aural symptoms
  - VII nerve involvement

# PATHOLOGY

- Not very active
- Well-defined thin fibrous capsule
- Locally invasive
- They are sheets of epithelial cells with number of thin walled blood sinusoids so they are highly vascular.
- Destructive to bone and facial nerve
- Invasion to mastoid air cells and Skull base

# EPIDEMIOLOGY

- SEX
  - Female: Male 6:1
- AGE
  - Middle age groups
- INCIDENCE
  - Familial

# ENDOCRINE ACTIVITY

- Non-chromaffin paragangliomas
- 10% secretory
- Urine for VMA

# MULTICENTRICITY

- Both ears
- With other paragangliomas

# SPREAD

- Initially middle ear
- TM perforation
- Labyrinth, petrous pyramid, mastoid
- Jugular foramen
- Eustachian tube
- Intracranially
- Metastasis to lungs, bones

# CLASSIFICATION (FISCH)

- Type A localized to middle ear cleft
- Type B Tympanomastoid tumor no bone destruction in infralabyrinthine compartment
- Type C Invading infralabyrinthine region and its destruction
- Type D Intracranial extension



# CLINICAL FEATURES

- Slow growing
- Pulsatile tinnitus
- Conductive deafness
- Otalgia
- Aural bleeding
- Cranial nerve involvement (Facial)

# EXAMINATION

- Red mass behind intact tympanic membrane
  - (Rising sun sign)

# INVESTIGATIONS

- Baseline
- CT-scan head with contrast
- MRI
- MR Angiography



# RADIOLOGICAL ASSESSMENT

Radiological assessment of 'rising sun'

Axial CT-scan

Jugular fossa enlarged

Normal Jugular fossa

Cortex eroded

Cortex normal

Coronal CT-scan

Normal carotid canal

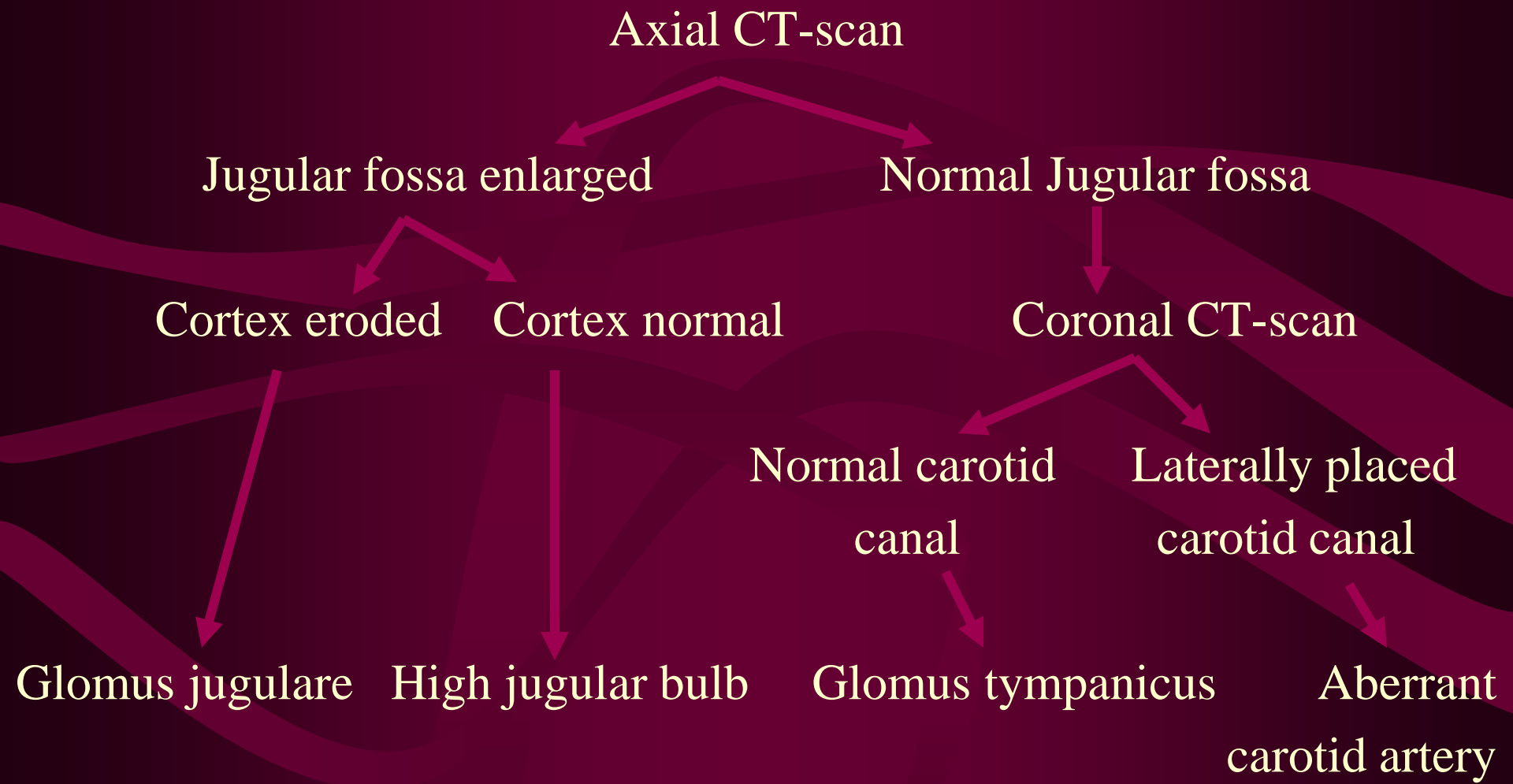
Laterally placed carotid canal

Glomus jugulare

High jugular bulb

Glomus tympanicus

Aberrant carotid artery



# MANAGEMENT

- No active treatment observation
- Primary radiotherapy
- Surgical resection
- Surgery + Radiotherapy

# RADIOTHERAPY

- Slow growing tumors
- Elderly

# SURGERY

- Pre-op embolization
- Transmeatal approach
- Extended facial recess approach
- Infratemporal fossa approach



# OTALGIA

# Innervation of ear

- 5<sup>th</sup>, 7<sup>th</sup>, 9<sup>th</sup>, 10<sup>th</sup>
- C2, C3

# Referred pain

- Pinna
- Meatus
- Middle ear
- Mastoid
- Inner ear

# Other causes

- Tonsillitis
- Parotitis
- Thyroid
- Mumps
- Tuberculosis larynx
- Styloid process
- Teeth

# Other causes

- Oral ulceration
- TM joint
- MI
- Malignancy

# CENTRAL CAUSES

- Herpes zoster oticus
- Glossopharyngeal zoster
- Post-herpetic neuralgia
- Trigeminal Neuralgia
- Glossopharyngeal neuralgia
- Geniculate neuralgia
- Migraine
- Acoustic neuroma



**THANK YOU**

# TINNITUS



# CAUSES

- Otologic
  - Wax
  - Fluid in middle ear
  - ASOM CSOM
  - Meniere's disease
  - Otosclerosis
  - Noise trauma
  - Ototoxic drugs
  - Vestibular schwannomma

# OTHERS

- CNS
- Anaemia
- Hypertension
- Hypotension
- Hypoglycaemia
- Epilepsy
- Migraine
- Psychogenic

# TREATMENT

- Reassurance
- Treatment of underlying cause
- Sedation
- Masking



**VERTIGO**

# VERTIGO

- Rotation
  - Episodic (seconds to hours)
  - Hours (weeks)
- Unsteadiness
  - Episodic (second to hours)
  - Prolonged (weeks to months)

# ROTATORY

- Short lived (seconds)
  - Benign Paroxysmal positional vertigo
  - Labyrinthine fistula
  - Post-concussional
  - Vertebrobasilar insufficiency
  - Cervical
  - Caloric effect

# ROTATORY

- Hours
  - Meniere's disease
  - Syphilitic labyrinthitis
  - Delayed endolymphatic hydrops
  - Middle ear surgery

# ROTATORY

- Prolonged (days)
  - Vestibular neuronitis
  - Trauma
  - Ear surgery
  - Labyrinthectomy
  - Labyrinthitis
  - Vascular lesions



# UNSTEADINESS

- Seconds
  - Rapid movement
  - Abnormal visual input
  - Visual inadequacy
  - Vestibular inadequacy

# UNSTEADINESS

- Hours
  - Drugs
  - Travel sickness
  - Perilymph fistula
  - ASOM
  - Functional

# UNSTEADINESS

- Weeks to months
  - Elderly
  - Drugs
  - CNS lesions
  - CSOM

# OTHER CAUSES

- Head trauma
  - Post concussional
  - BPPV
  - Labyrinthine destruction
  - Perilymph fistula
  - Functional

# **SUDDEN SENSORINEURAL HEARING LOSS**

# COCHLEAR

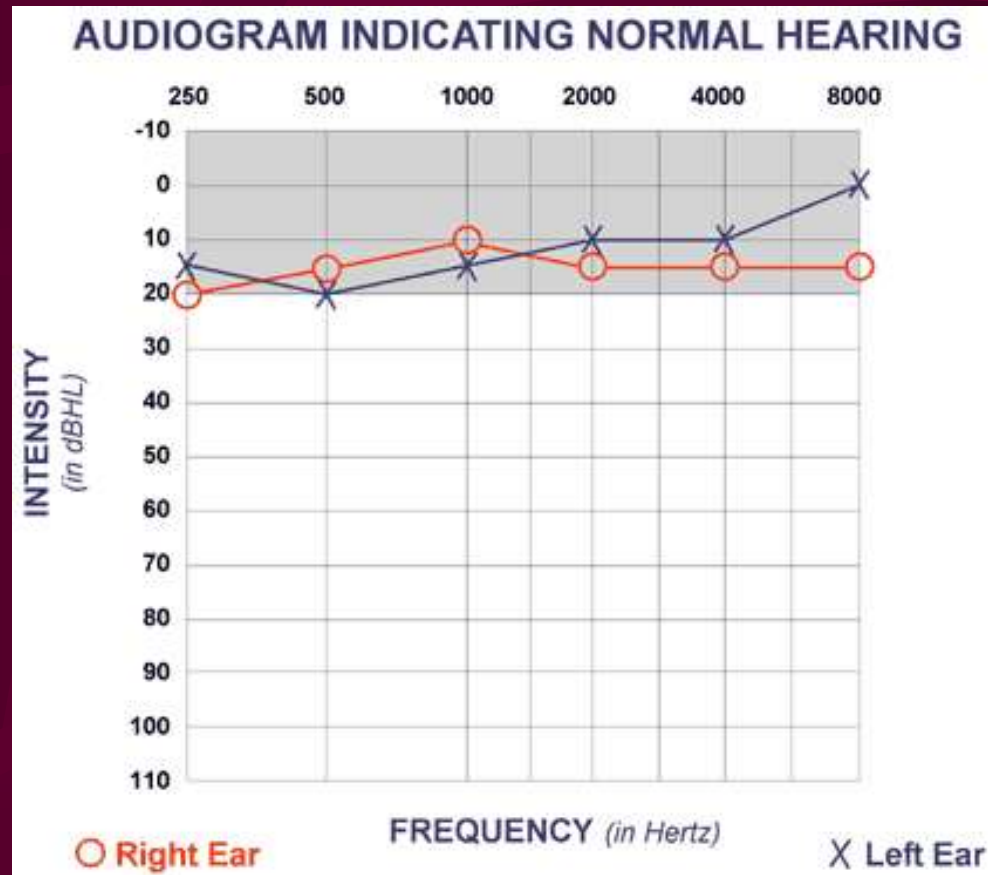
- Inflammatory (bacterial, viral, fungal)
- Traumatic
- Vascular (hypertension)
- Hematological
- Autoimmune
- Endolymphatic hydrops
- Metabolic
- Skeletal
- Ototoxicity

# RETROCOCHLEAR CNS

- Meningitis
- Multiple sclerosis
- Lateral sclerosis
- Tumours
- Friedreich's ataxia
- Idiopathic

# AUDIOMETRY

- Pure tone audiometry
  - Differentiate conductive and sensorineural hearing loss



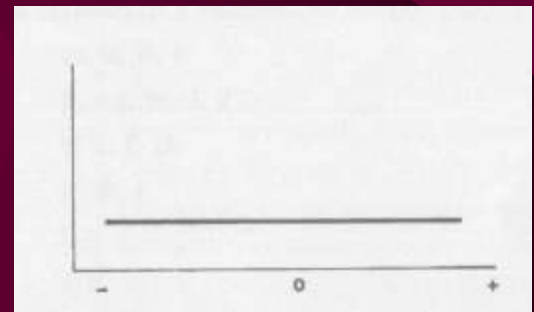
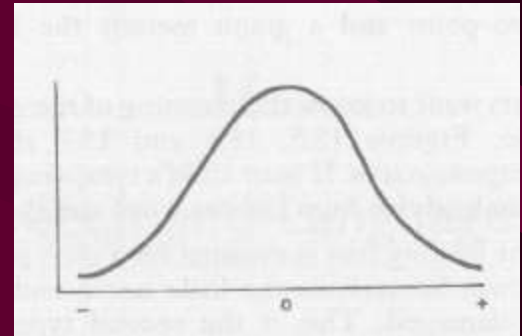


# Speech audiometry

- **Speech reception threshold (SRT)**
  - Minimum intensity at which 50% of words are repeated by patient correctly
- **Speech discrimination score**
  - 30-40 dB above SRT ---> percentage of words heard by the patient

# TYMPANOMETRY

- To measure pressure in middle ear
- Calculate EAC volume
- Types
  - Type A (normal)
  - Type B (Conductive)
  - Type C



# STAPEDIAL REFLEX

- A loud sound of 70dB above normal threshold causes bilateral contraction of stapedial muscles detected by tympanometry

# CALORIC TEST

- Supine position
- Head at 30 degree up
- Irrigate warm (44C) and cold water (30C) in the ear → 40 seconds
- Observe nystagmus
  - Cold water      other side
  - Warm water     same side





**THANK YOU**