Management of Cerebellopontine Angle tumours

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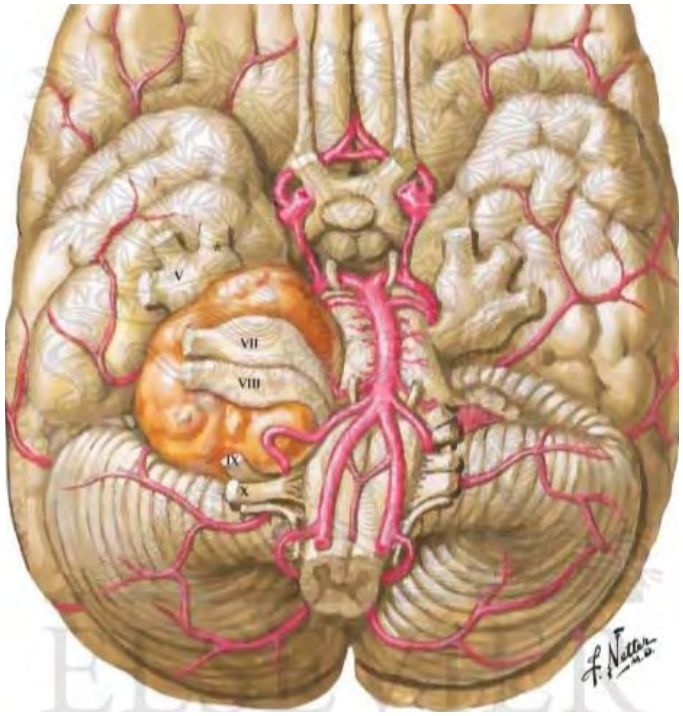
ALNC - VHS

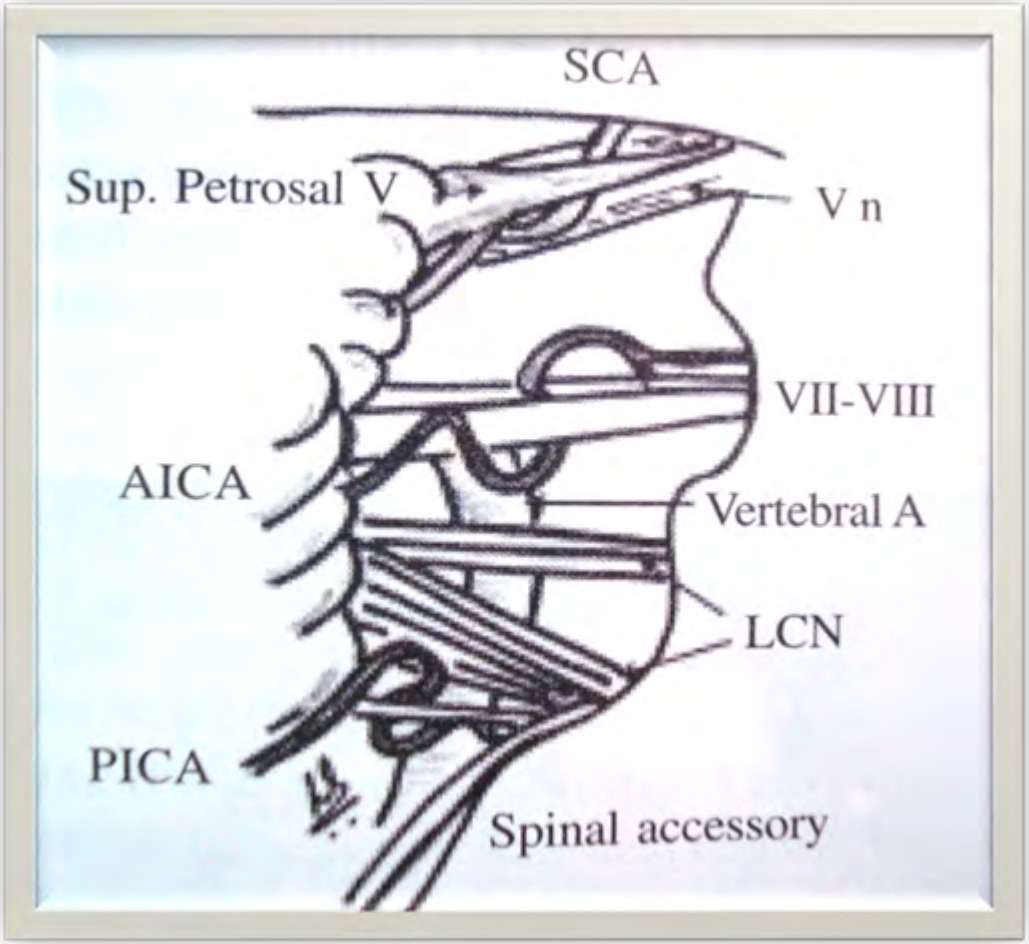


Introduction

- 10% of all intracranial tumors.
- 78% are acoustic neuromas- mostly on vestibular branch.
- Other CPA masses:
  - Meningiomas
  - Epidermoid
  - Other cranial nerve schwannomas
  - Arachnoid cysts
  - metastatic tumors
  - Jugular foramen tumours

HISTORY OF CEREBELLOPONTINE ANGLE SURGERY

- 1st successful complete removal - 1894 by Sir Charles Balance. The tumor was approached via a right posterior fossa craniectomy and removed with the "**finger**".
- H. Cushing (1917) was the first to advocate intracapsular tumor removal and hence recurrence was high.
- W. Dandy(1925) introduced the concept of total tumor removal- to prevent future reocurrences.
- Olivecrona (1967) was 1st to preserve facial nerve
- Leksell introduced Gamma-knife in 1980 as a non surgical treatment.



3 compartments of neurovascular bundles
Superior – Trigeminal nerve and Dandy vein
Middle – facial and vestibulocochlear nerve with AICA
Inferior – glossopharyngeal,vagus, accessory nerve with PICA

Acoustic Schwannomas

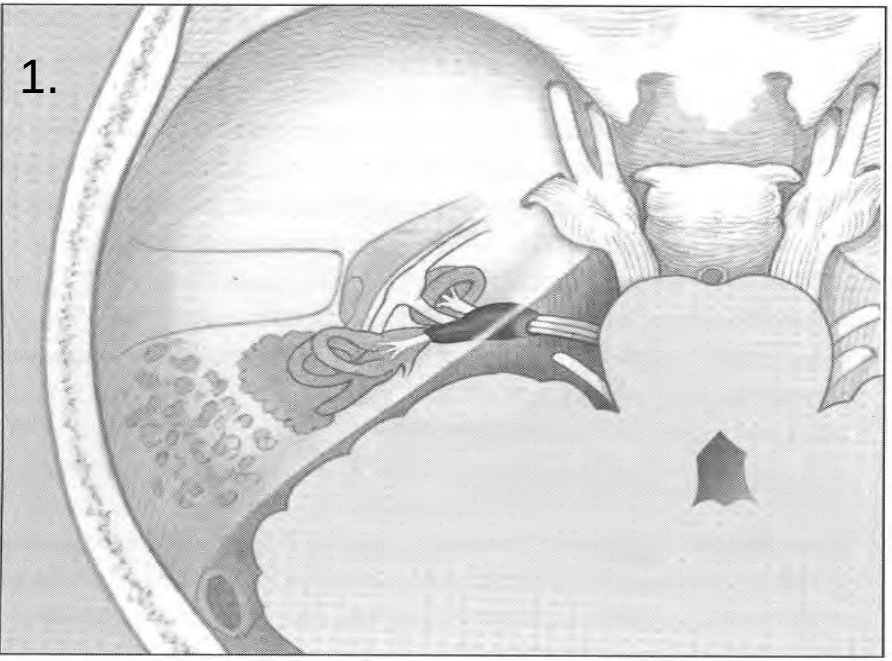
- 8% of intracranial tumour
- The acoustic schwannoma takes origin from the vestibular component of the 8th cranial nerve near the internal auditory meatus, at the transition zone where the Schwann cells replace the oligodendroglia.

Symptoms & signs

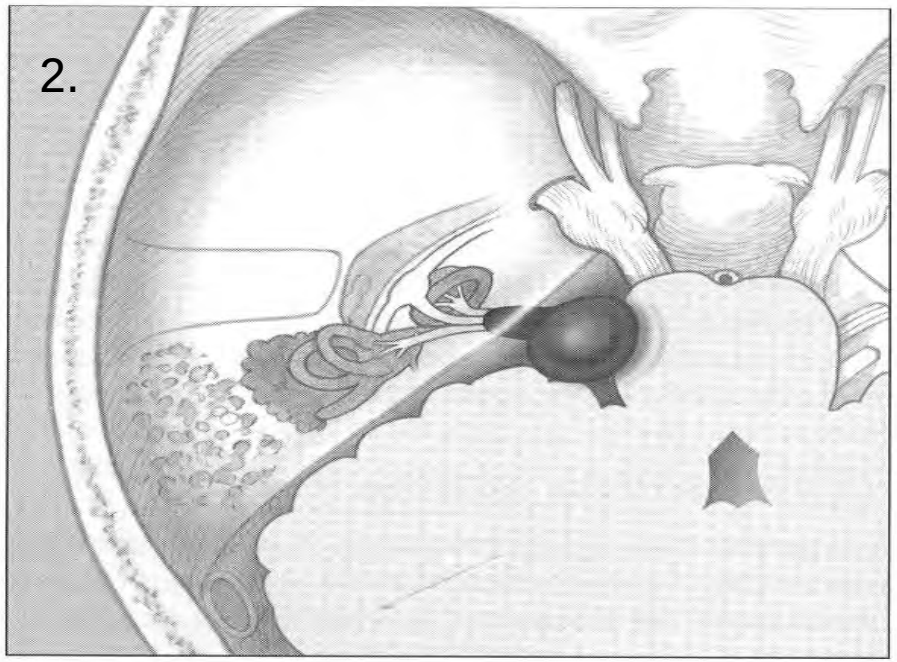
- Intracanalicular:
  - Hearing loss (UL progressive), tinnitus, vertigo
- Cisternal:
  - Worsened hearing and dysequilibrium
- Compressive:
  - Occasional occipital headache
  - CN V: reduced facial sensations, corneal hypesthesia
  - CN VII :loss of taste and reduced lacrimation , LMN facial weakness
  - CN VIII : progressive hearing loss,Tinnitus,vertigo
  - CN IX,X : swallowing difficulty, hoarseness

Symptoms & signs

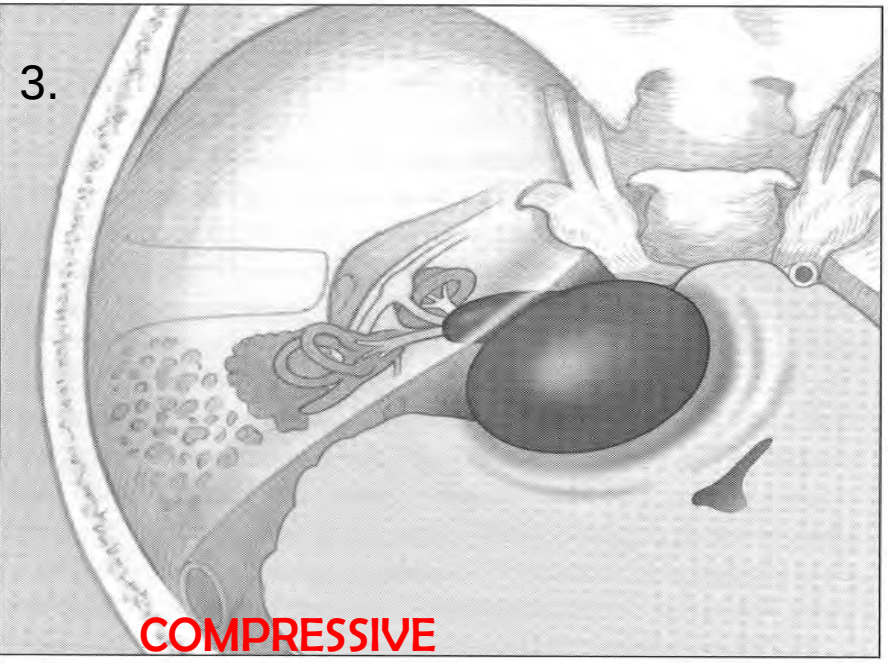
- Hydrocephalic:
  - Fourth ventricle compressed and obstructed
  - Headache, visual changes, altered mental status
  - Nausea and vomiting
- Cerebellar involvement
  - Incoordination , widely based gate , tendency to fall towards affected side
- Brainstem involvement:
  - Ataxia, weakness and numbness of arms and legs with exaggerated tendon reflexes.



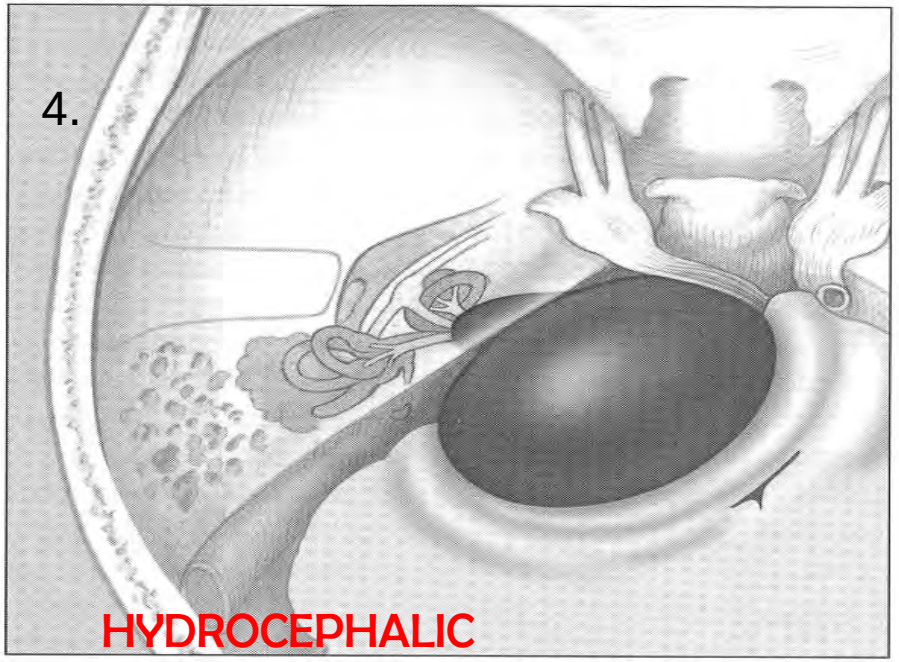
INTRACANALICULAR



CISTERNAL



COMPRESSIVE

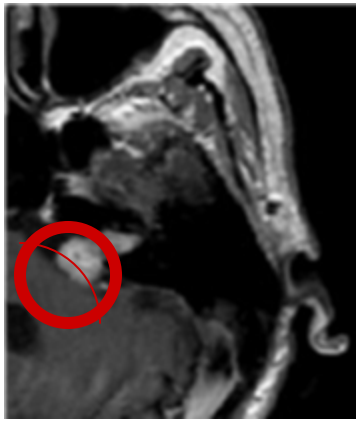


HYDROCEPHALIC

Hannover classification of tumor extension

Class	Extension
T1	Purely intrameatal
T2	Intra- and extrameatal
T3a	Filling the cerebellopontine cistern
T3b	Reaching the brainstem
T4a	Compressing the brainstem
T4b	Dislocating the brainstem and compressing the fourth ventricle

(Samii and co-worker, 1995)



Diagnostic Tests

- Audiometric Testing.
- Electrophysiologic Testing.
- CT Brain contrast with bone cuts.
- MRI brain contrast

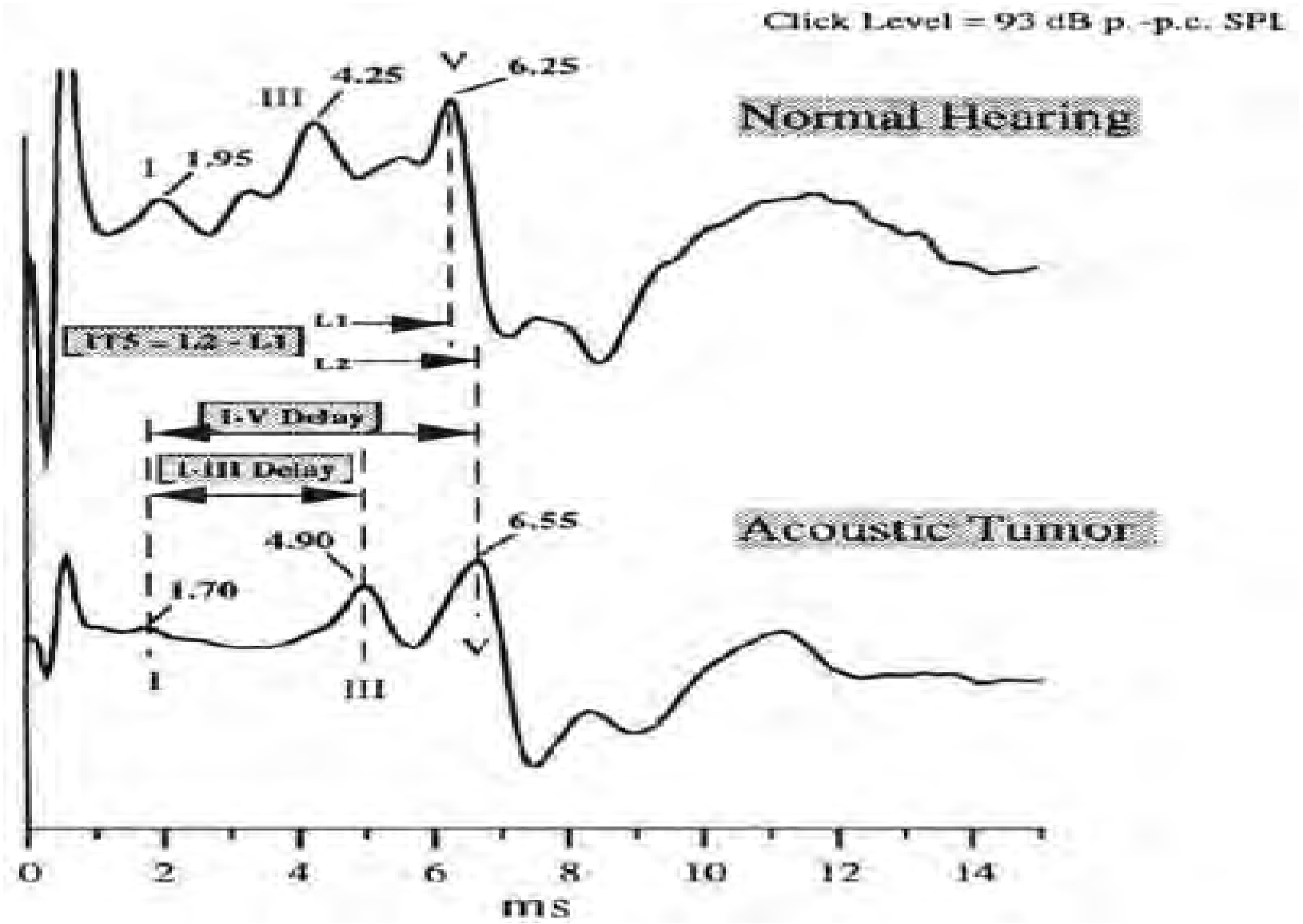
Audiometric Testing

- Pure-tone testing:
  - SNHL- most commonly high frequency (65%).
- Speech discrimination:
  - Scores out of proportion with pure-tone thresholds.
- Acoustic reflex thresholds:
  - typically elevated or absent.
  - If present then reflex **decay** measured.
  - The sensitivity is 85% for detecting retrocochlear problem.

Electrophysiologic Testing

- ABR:
  - Most sensitive & specific audiologic test.
- In patients with VS , the ABR is partially or completely absent , or there is a delay in latency of wave V on the affected side.

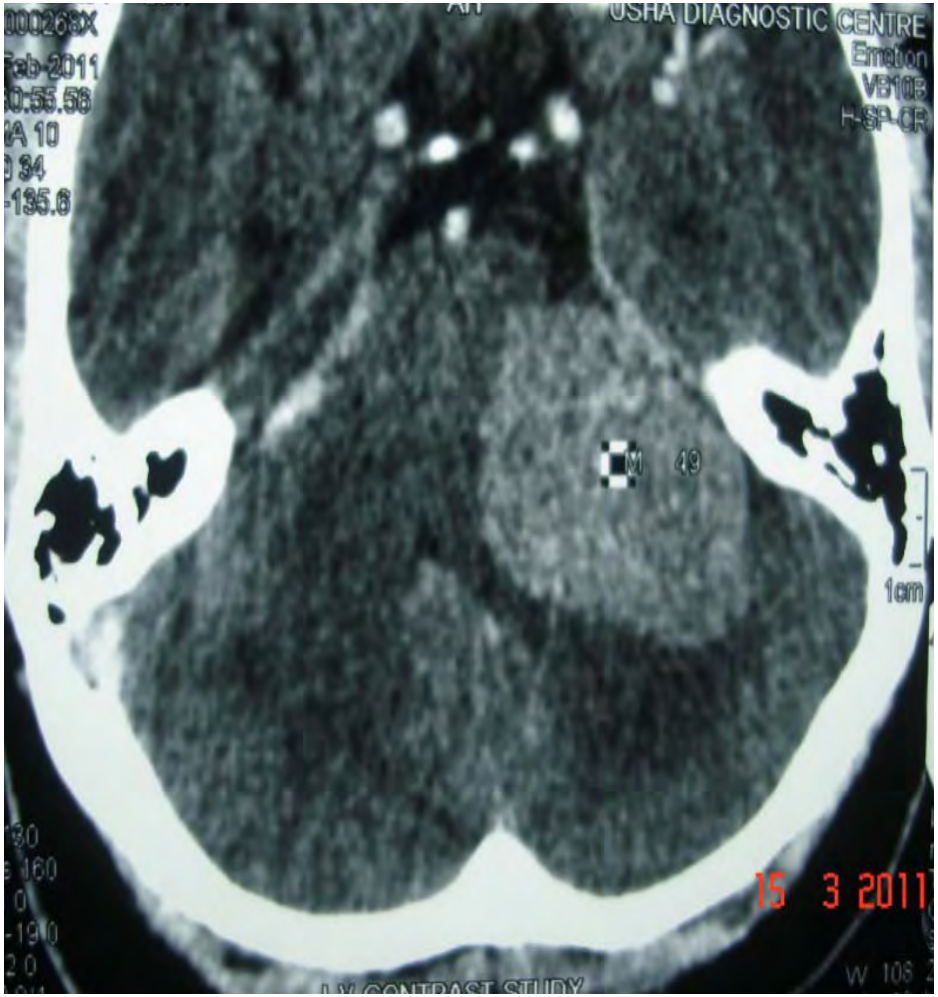
BERA patterns in AN



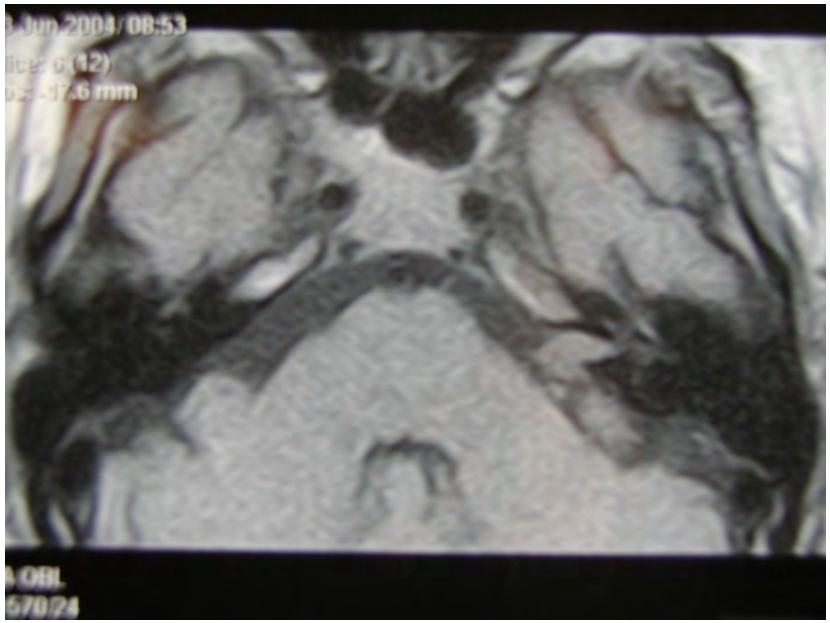
Radiologic Features of vestibular schwannoma

- CT
  - Non-contrast: usually isodense to brain, calcification is rare
  - IV Contrast: Over 90% of non-treated tumors enhance homogeneously
- MRI
  - T1W – isointense to brain, hyperintense to CSF
  - T2W – hyperintense to brain, iso/hypo-intense to CSF
  - Gadolinium – Intense enhancement of tumor on T1W

CT BRAIN



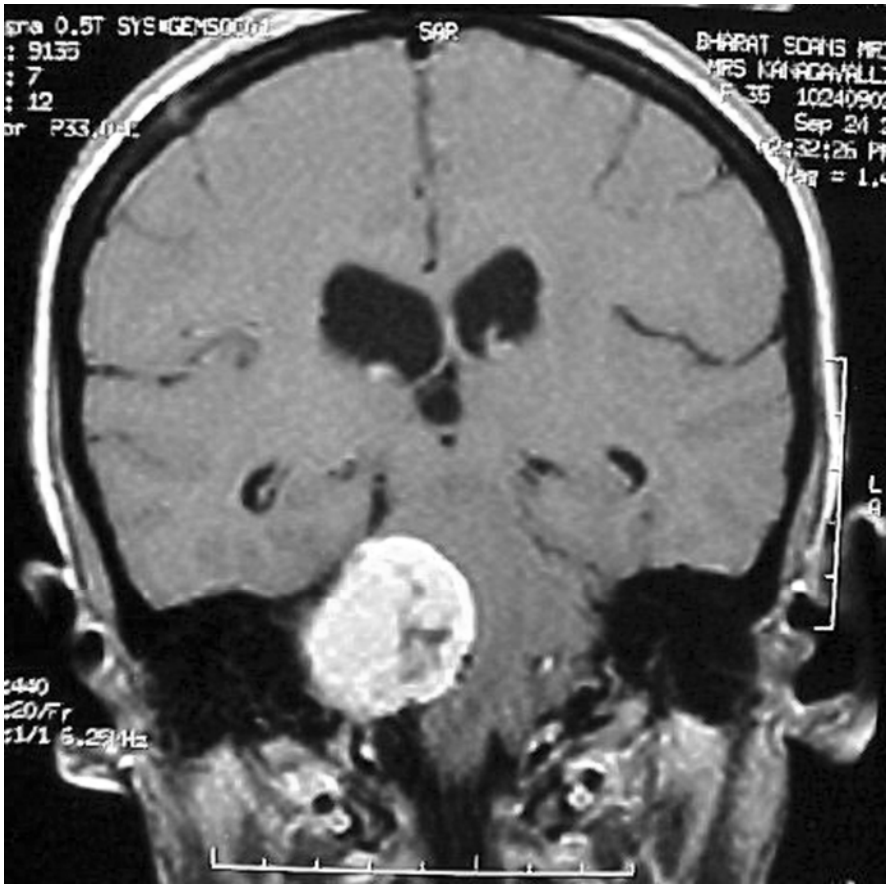
MRI Brain



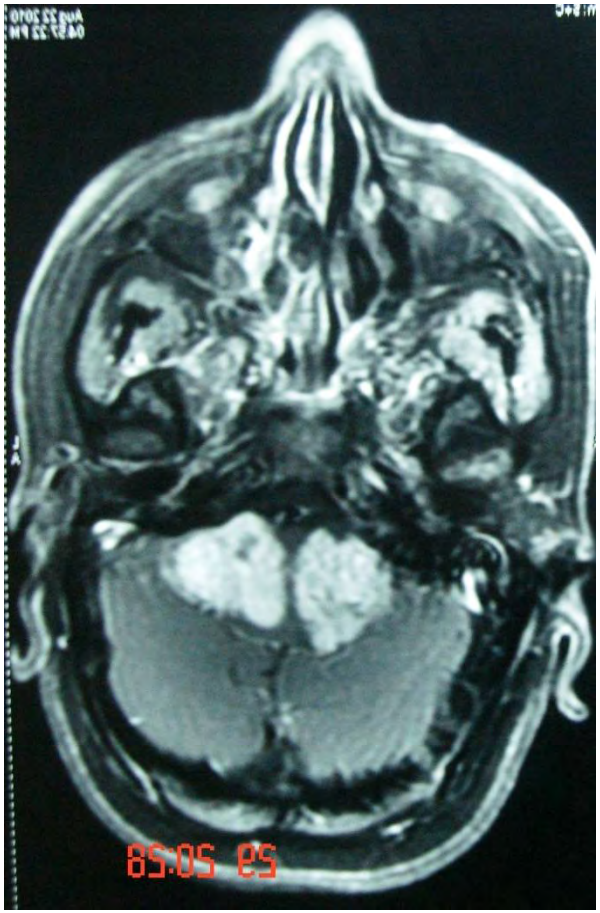
Isointense to brain, hyperintense to CSF

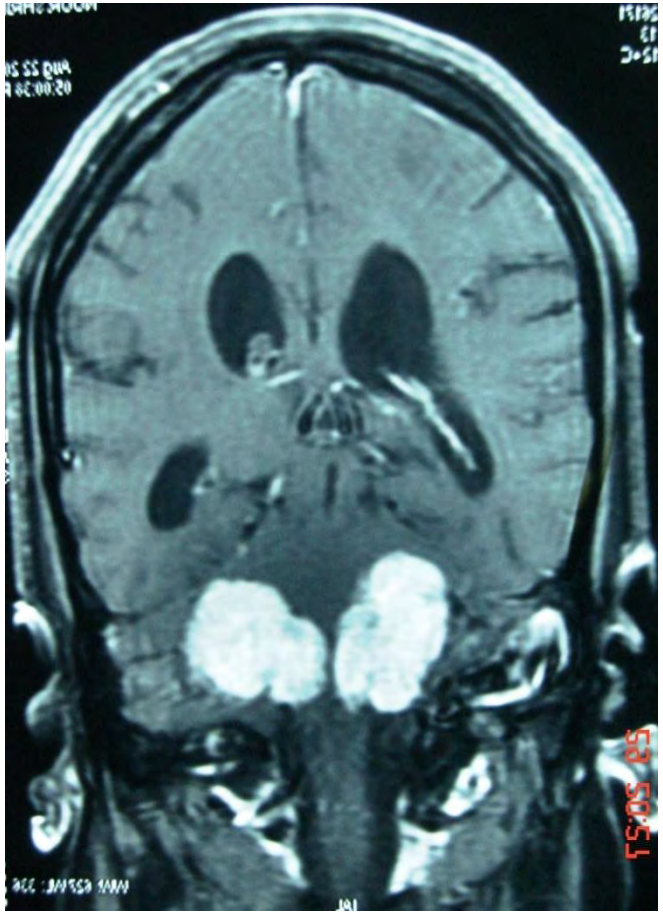
Hyperintense to brain, hypointense to CSF

CONTRAST MRI



NF2





Treatment

- Observation
- Surgery
  - Retrosigmoid
  - Translabrynthine
  - Middle Fossa
- Radiotherapy
  - Conventional radiation therapy
  - Stereotactic radiosurgery

Observation

- Indications
  - Advanced age
  - Poor health
  - Lack of symptoms
  - Non-progression of symptoms
  - Only hearing ear
- Contraindications
  - Young patient
  - Healthy patient
  - Symptomatic progression
  - Compression of brainstem structures

BASIC REQUISITE FOR SURGERY

- CT scan brain plain and contrast
- Bone cuts of the skull base with 1.5 mm cuts to visualise the high lying jugular

- MRI scan brain plain and contrast study

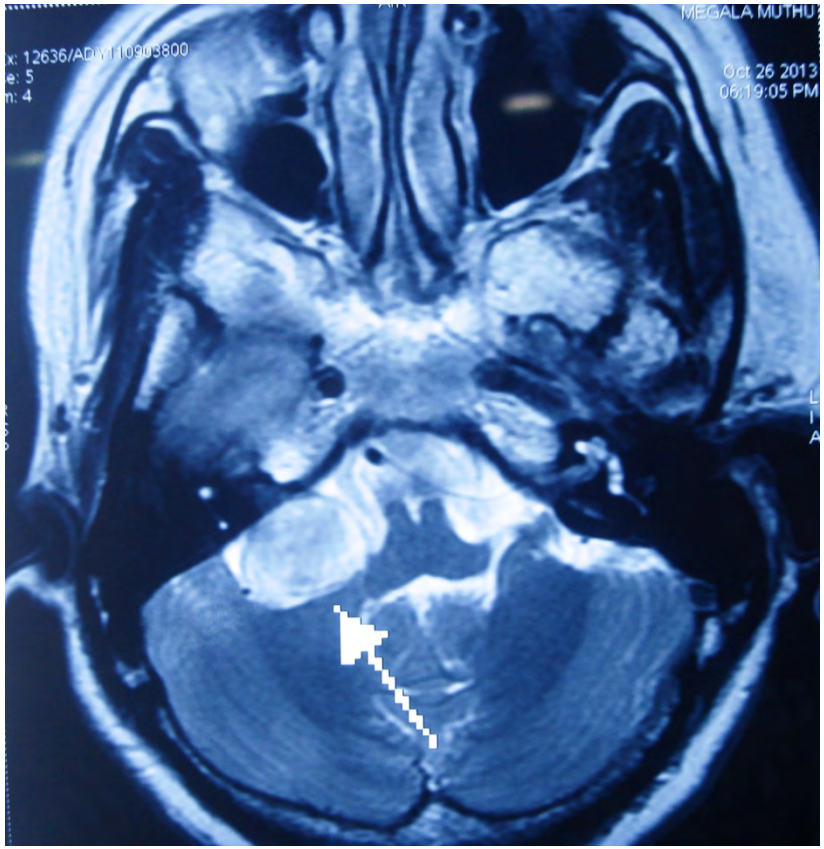
BASIC REQUISITE FOR SURGERY

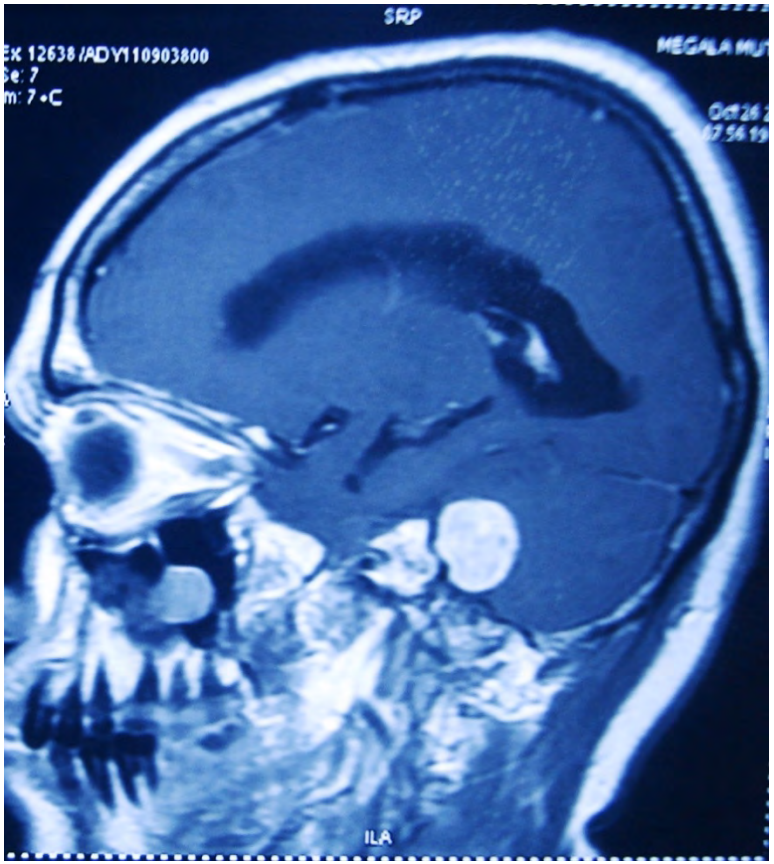
1. Microscope
2. Fine dissector set
3. CUSA (if available)
4. Facial nerve monitor (if available)

Positioning

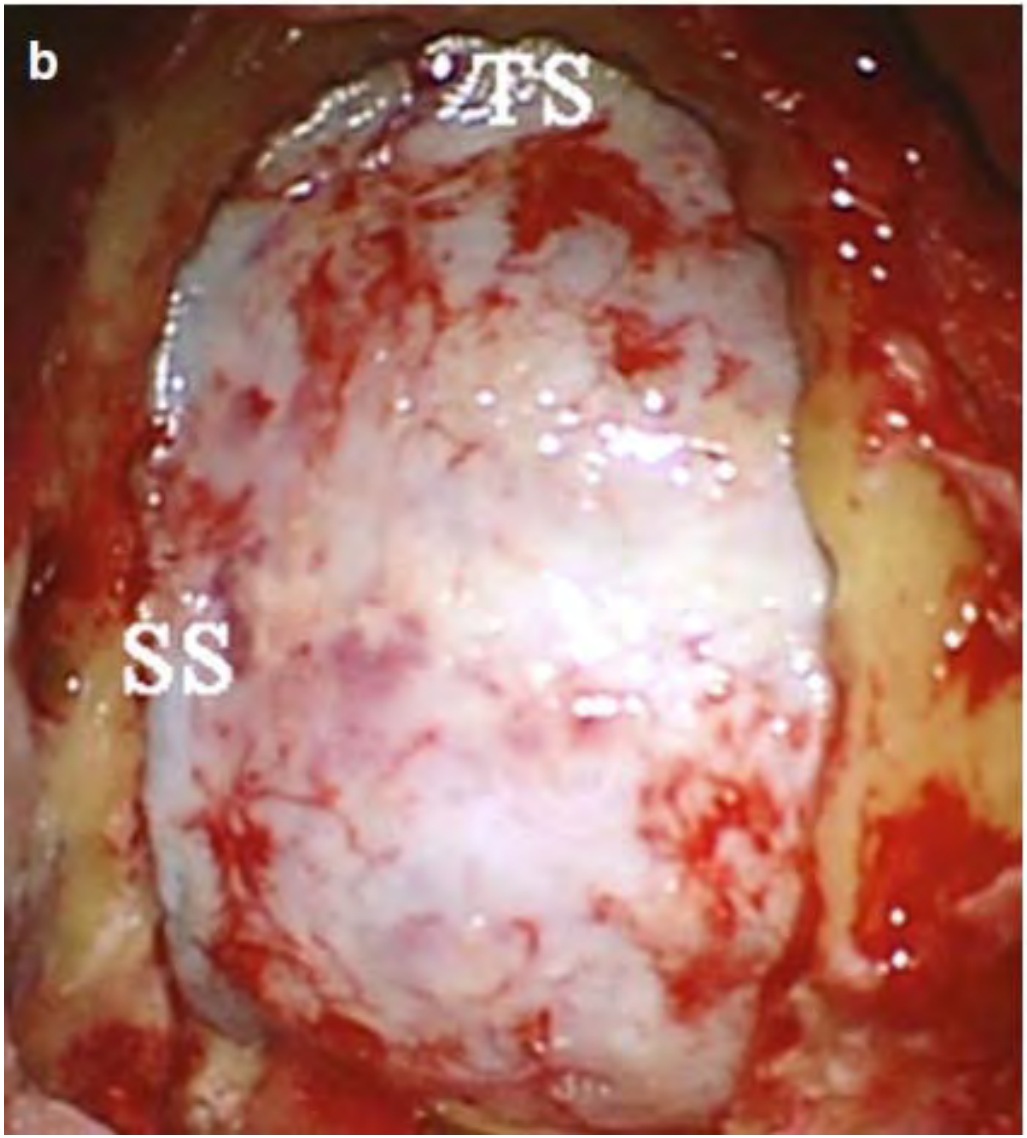
Positioning

PRE OP

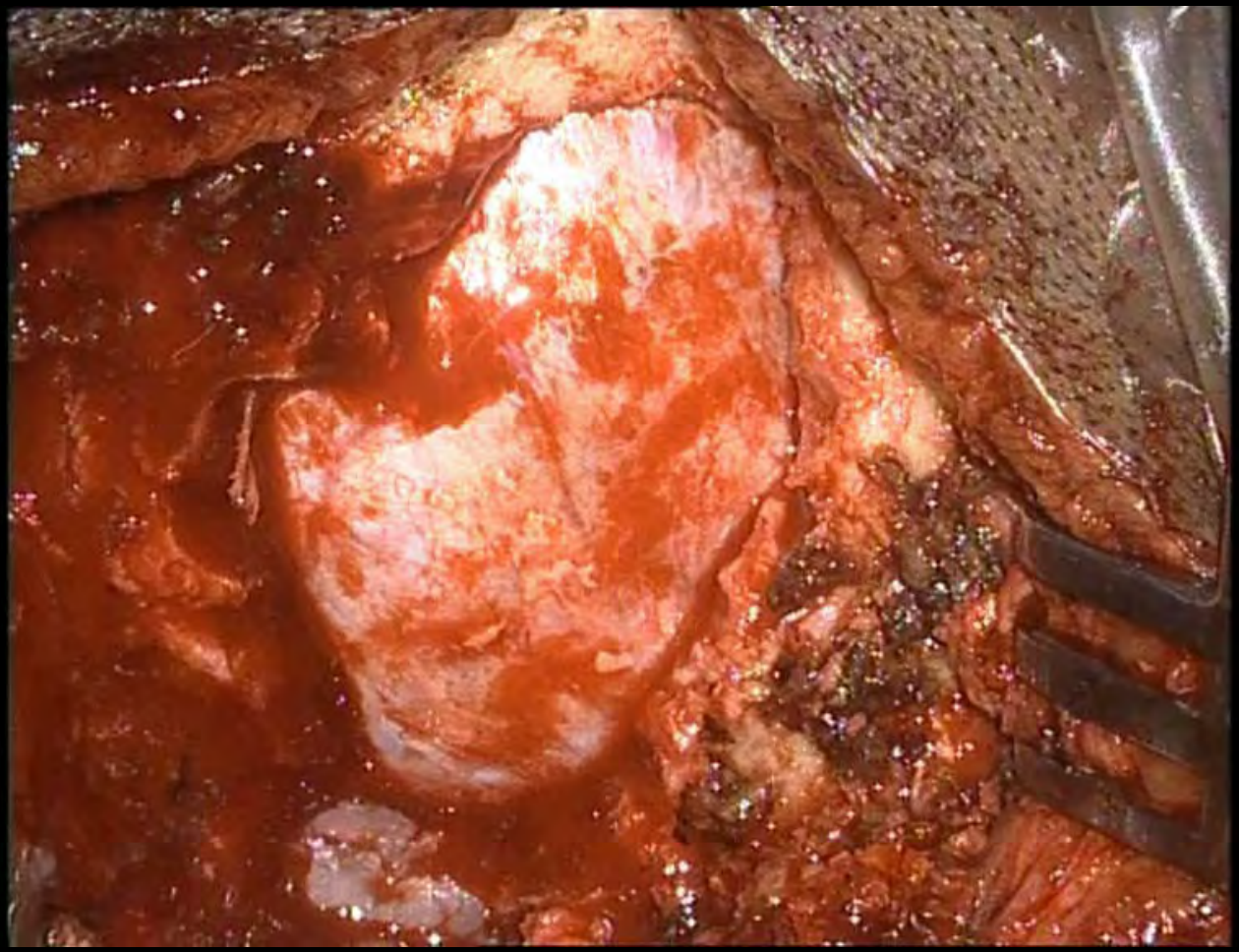




Retromastoid suboccipital approach



Retromastoid suboccipital approach



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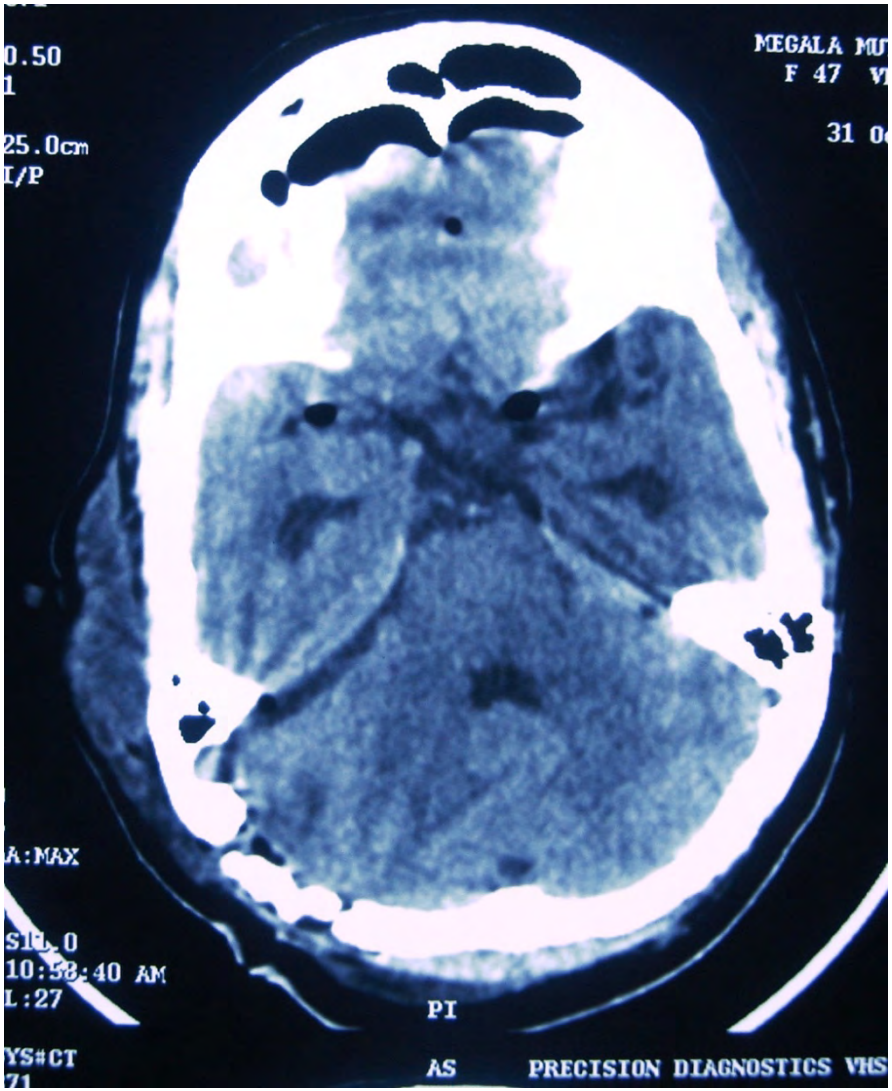
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Translabyrinthine approach

Indications

Lesions where hearing preservation is not aimed at

1. Acoustic neurinoma:

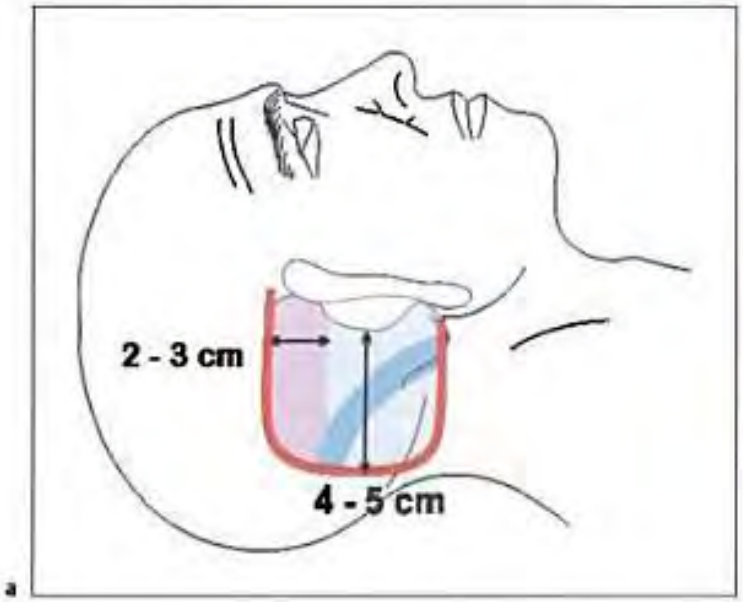
   - with bad preoperative hearing whatever be the size of the tumour
2. Meningiomas posterior to or centered to the internal auditory canal with poor hearing
3. Epidermoids, dermoids etc where poor hearing is present.

Translabyrinthine approach

- Contraindications:

1. Only hearing ear
2. Ipsilateral CSOM

Translabyrinthine approach

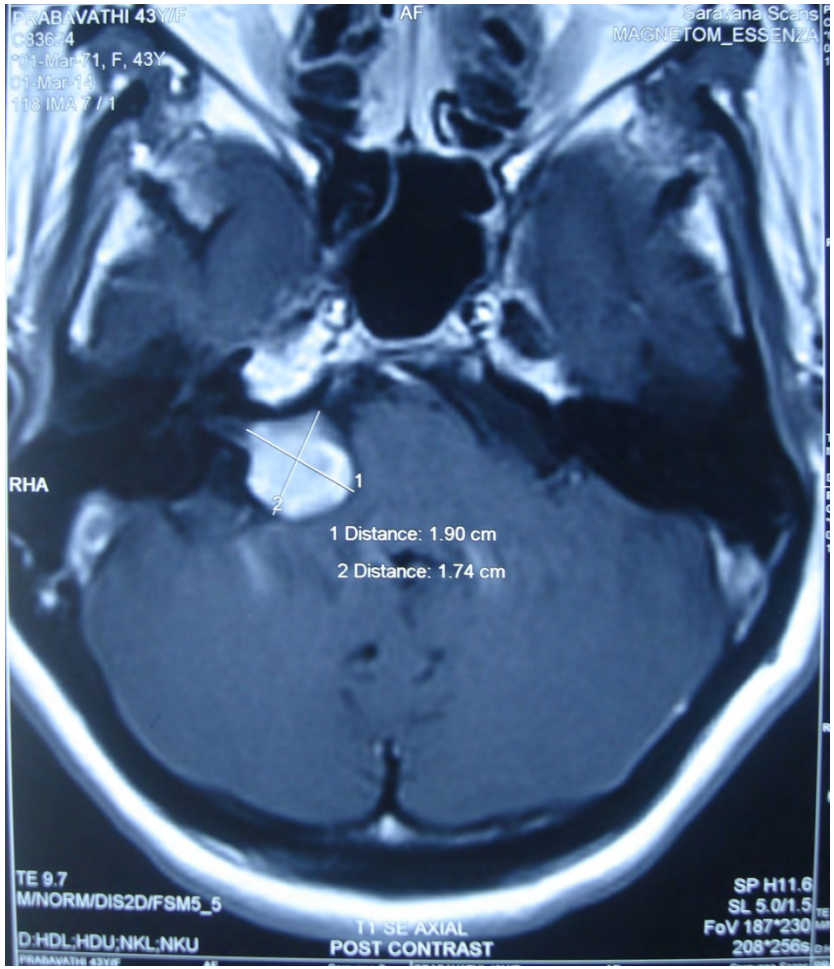


a

b

Fig. 5.5 a, b Right postauricular skin incision.

PRE OP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RHA
1
2
1 Distance: 1.90 cm
2 Distance: 1.74 cm
TE 9.7
M/NORM/DIS2D/FSM5_5
D:HDL;HDU;NKL;NKU
T1 SE AXIAL
POST CONTRAST
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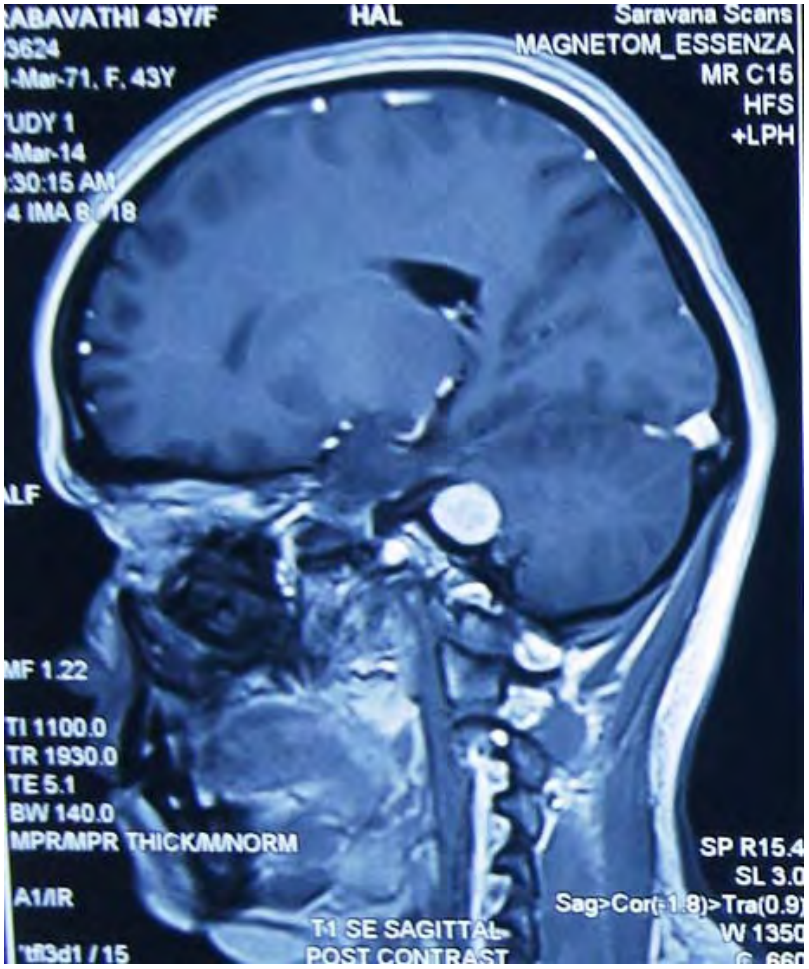
SL 5.0/1.5
FoV 187*230
208*256s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Saravana Scans
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HFS
+LPH
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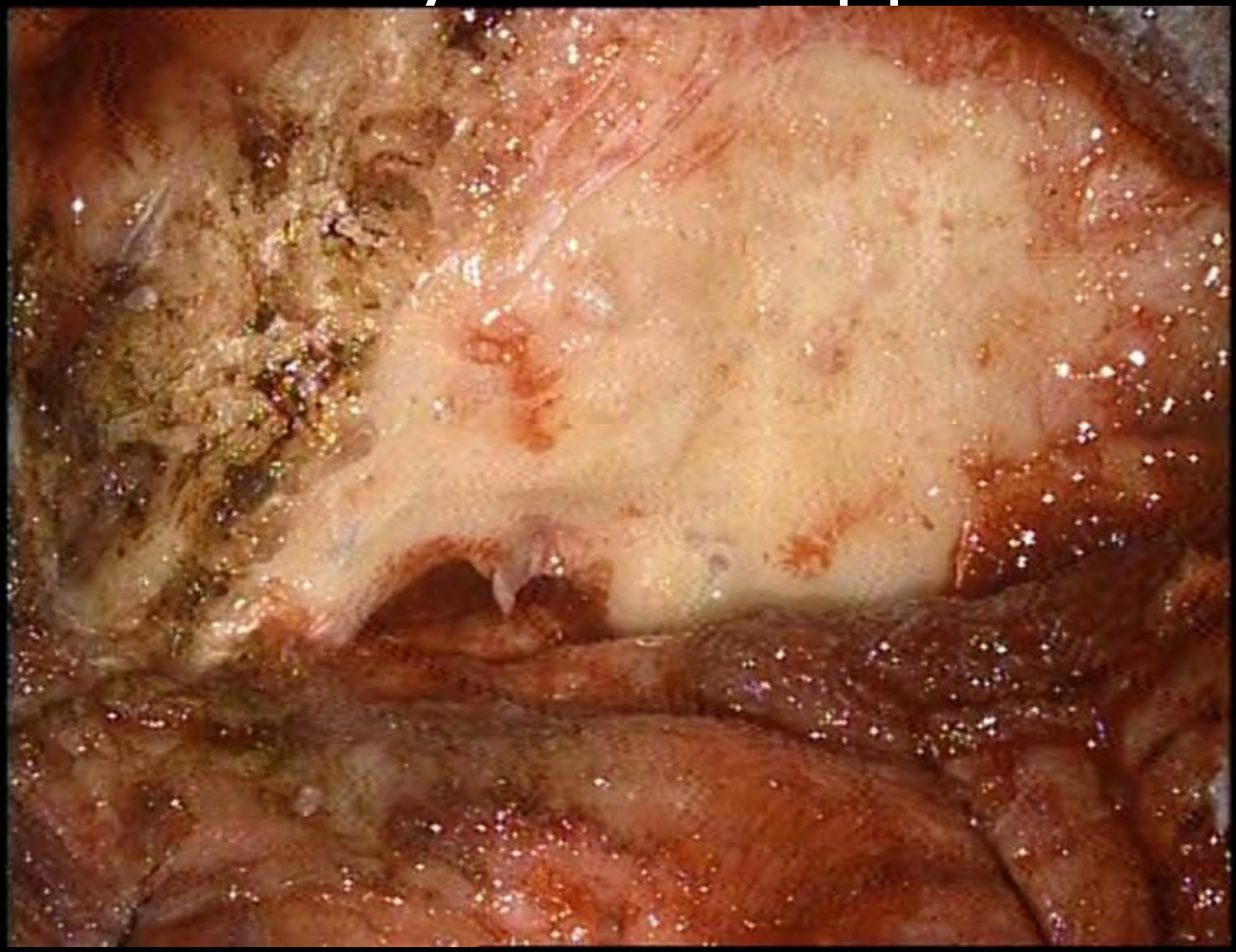
TR 1930.0
TE 5.1
BW 140.0
MPR/MPR THICK/MNORM
A1/R
T1 SE SAGITTAL
POST CONTRAST
SP R15.4
SL 3.0

Translabyrinthine approach



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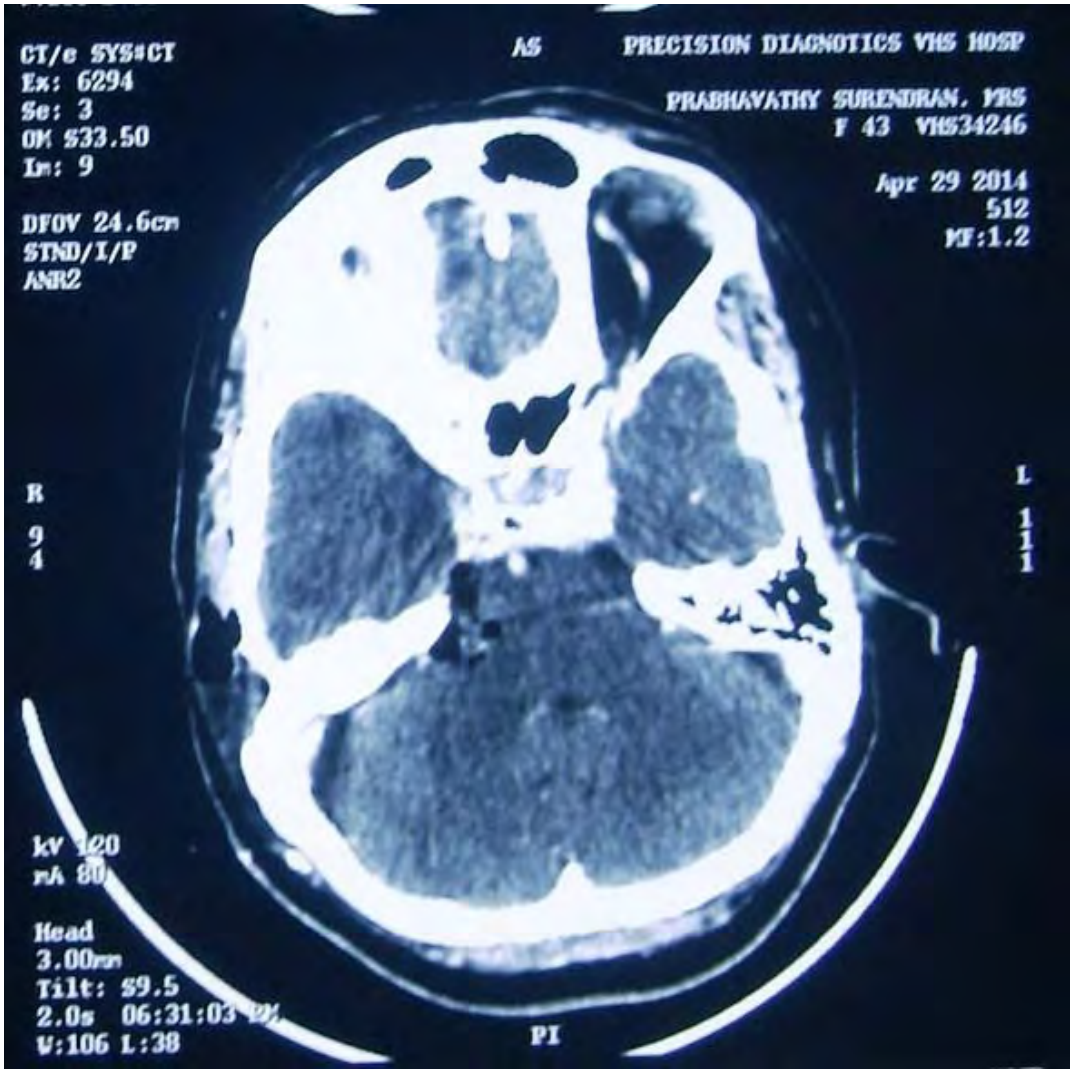
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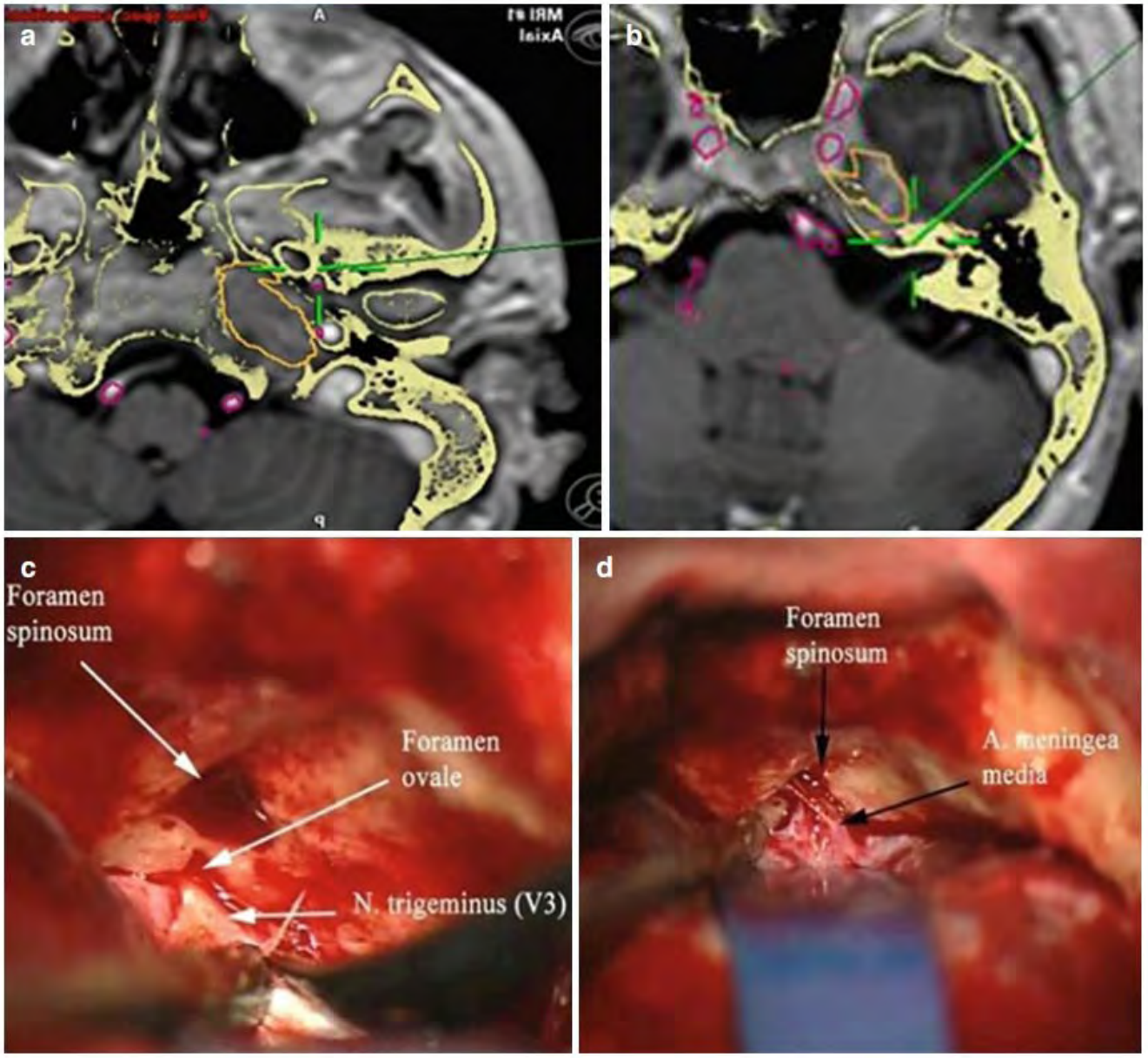
Middle Fossa

- Indications
  - Small tumor
  - Intracanallicular tumor
  - Moderate CPA involvement
  - Adequate hearing (SRT<50 db, Disc >50%)
- Contraindications
  - Large tumors
  - Extensive CPA involvement (> 0.5 – 1 cm)
  - Older patients (> 60 yrs. may have higher rate of bleeding or stroke)

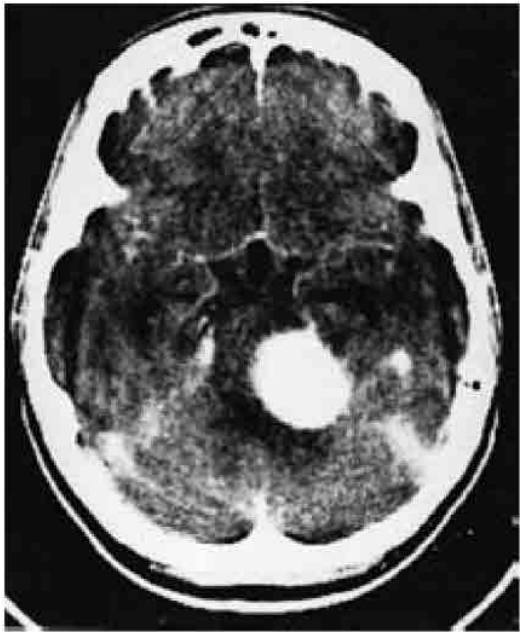

a
b
c
Foramen spinosum
Foramen ovale
N. trigeminus (V3)
d
Foramen spinosum
A. meningea media

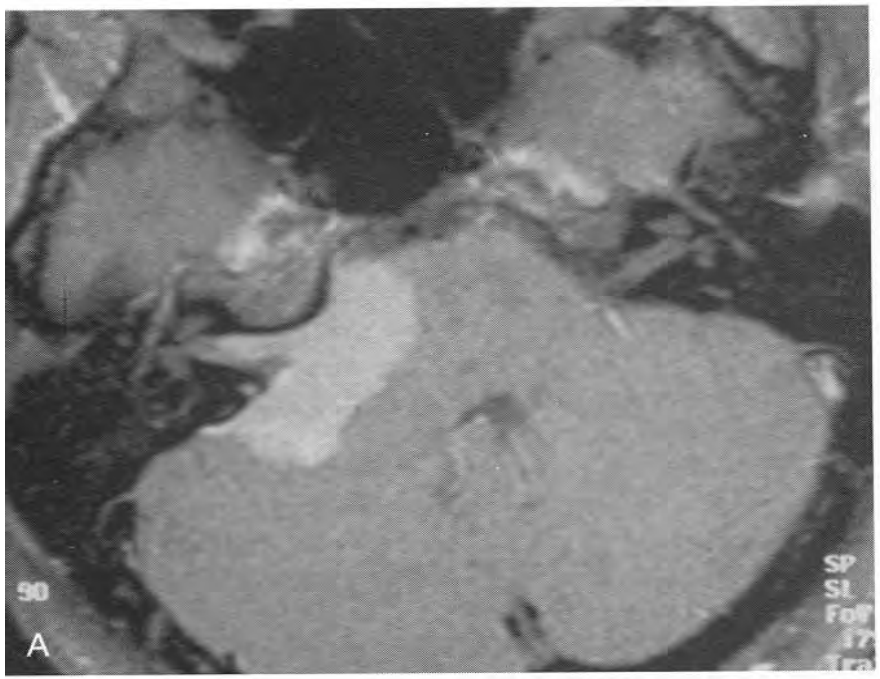
Meningioma

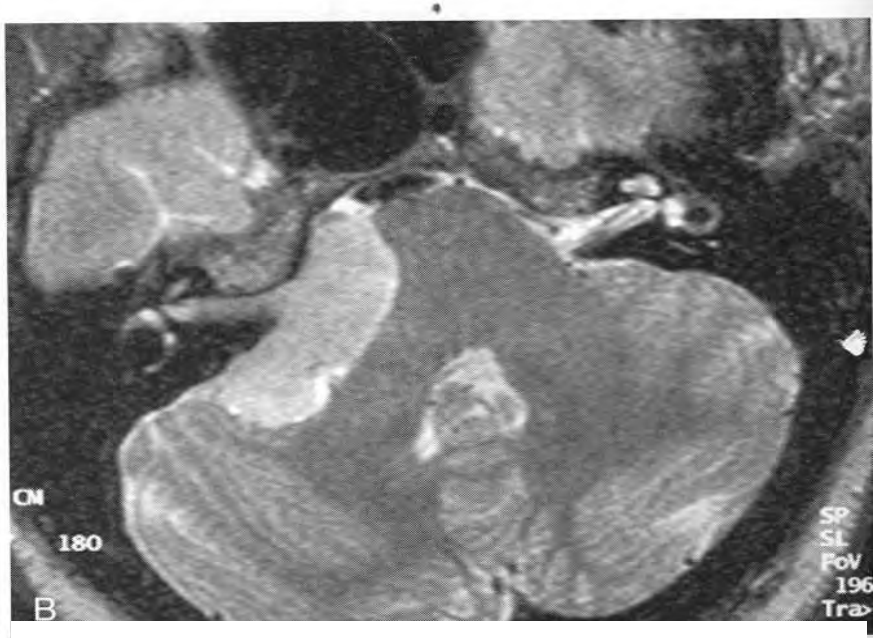
- Second most common CPA lesion 3-7 %.
- Arise from cap cells near arachnoid villi .
- Usually arise from posterior surface of the petrous bone and usually do not extend into IAC.
- Symptoms
  - Ataxia.
  - Nystagmus.
  - Facial hypesthesia.
  - Audiologic findings may show retrocochlear pattern or may be normal.

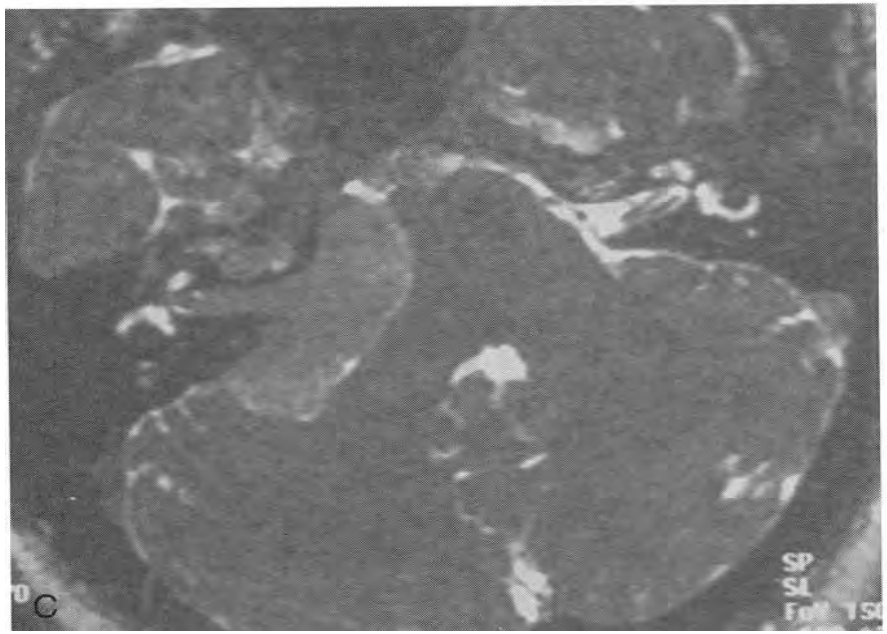
CT Scan

- CT scan appearance shows a tumour of slightly increased density prior to contrast; it enhances uniformly with intravenous contrast. Hyperostosis of the cranial vault may also be seen.









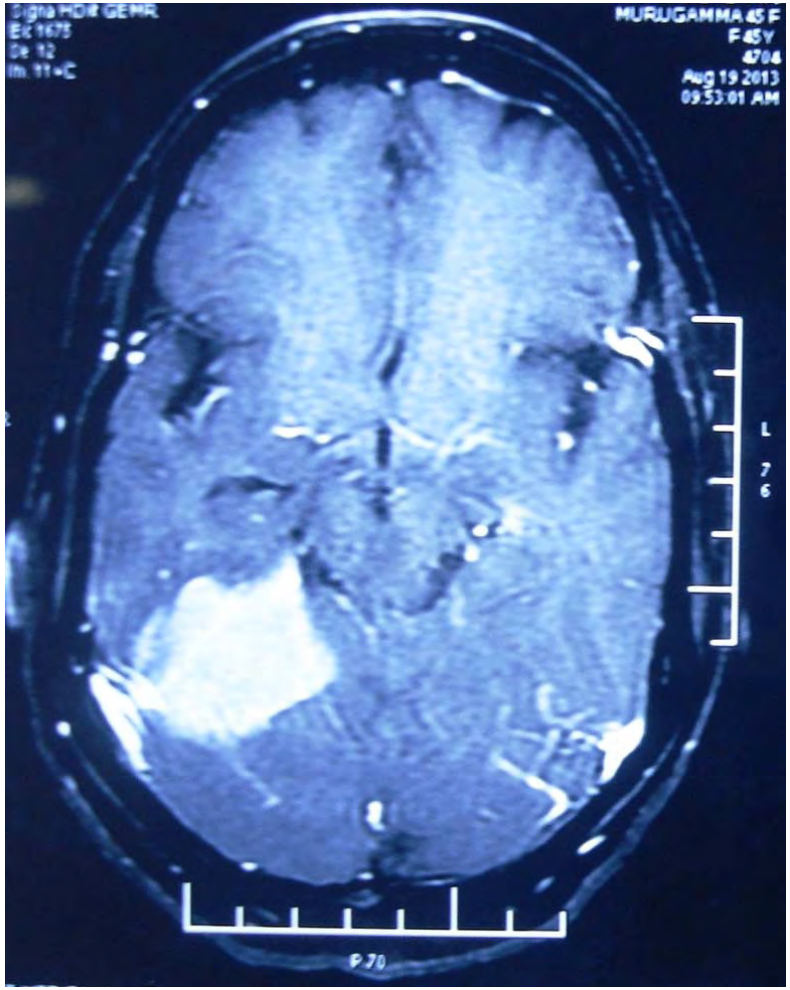
Meningioma Features:

- Arise from surface of petrous bone.
- Obtuse angles to petrous bone.
- Uncommonly involves the IAC.
- Frequently with dural tail.
- Calcifications common.
- Pial vessel flow voids.

Treatment

- The treatment of choice for meningiomas is complete excision of tumour.
- For small residual tumours, Stereotactic radiosurgery(SRS) may be advocated.

PRE OP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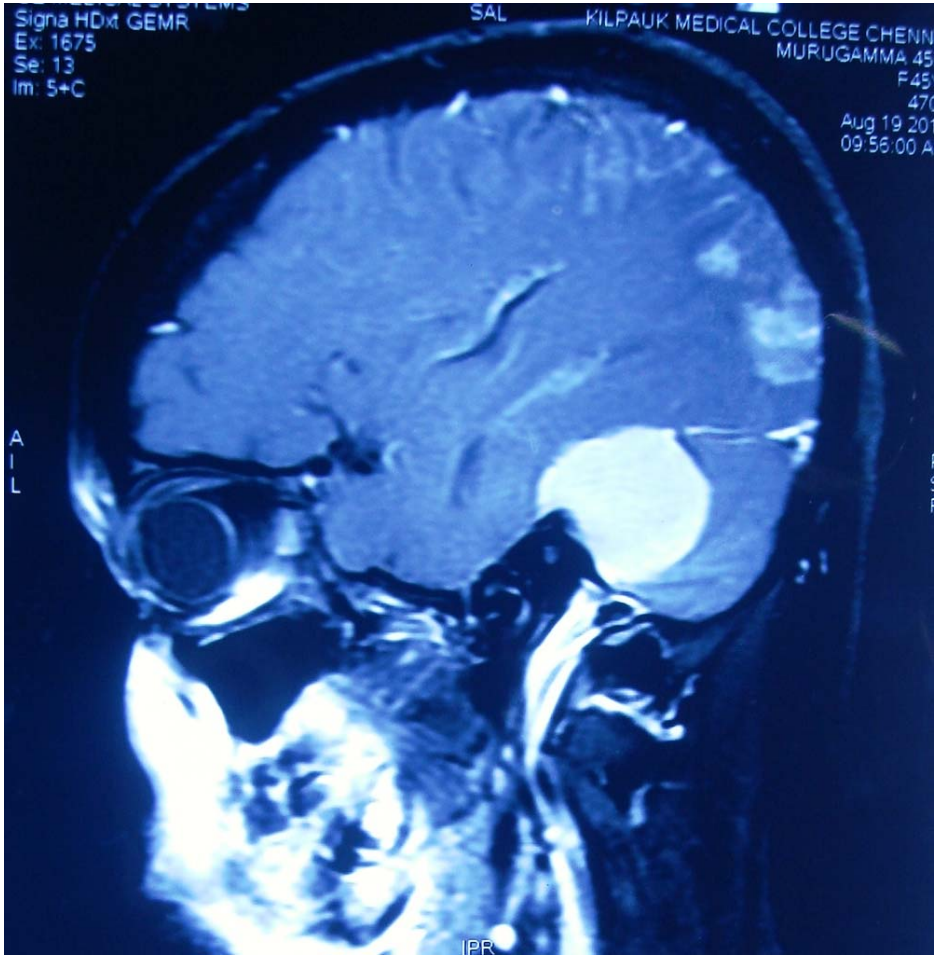
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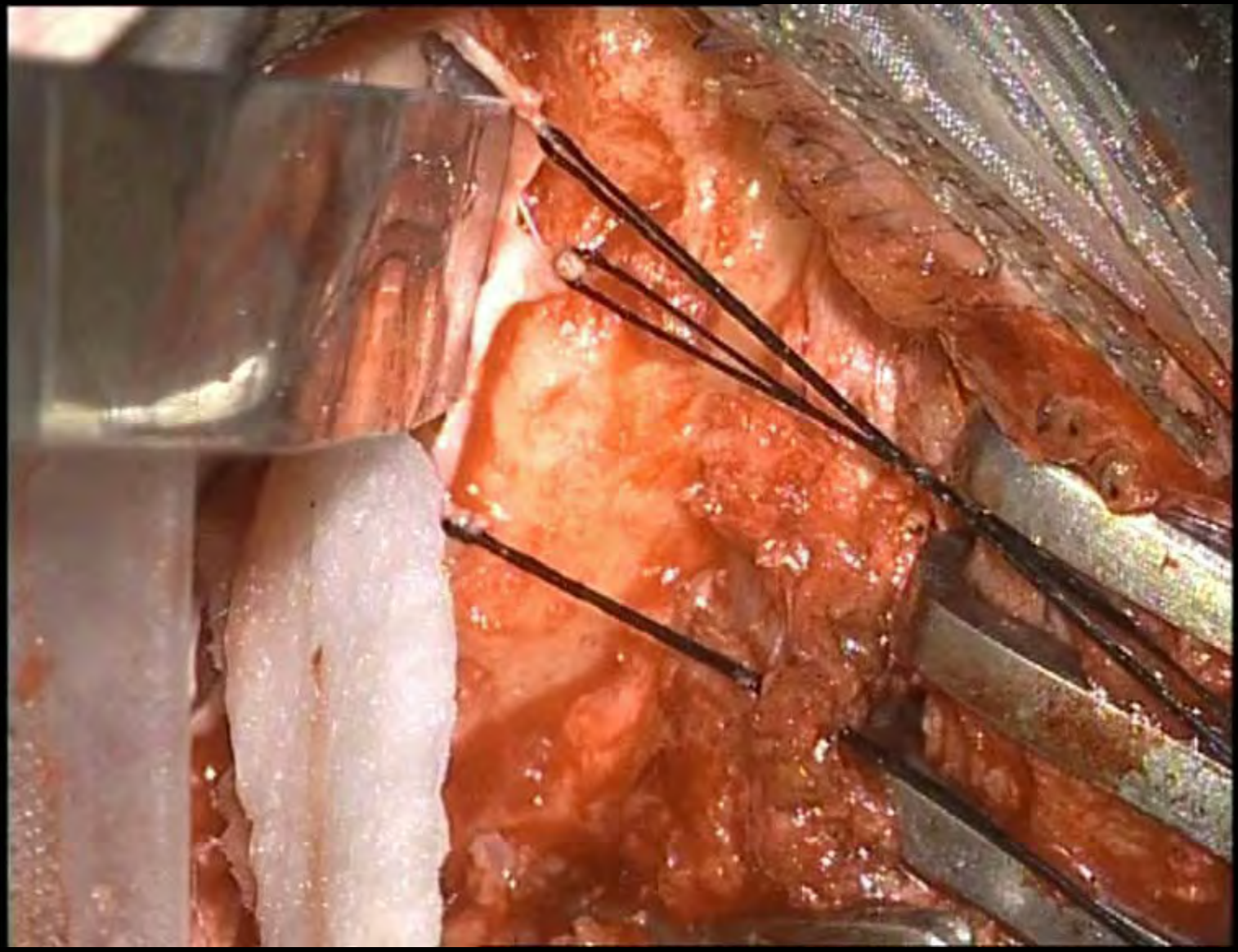
CP ANGLE MENINGIOMA



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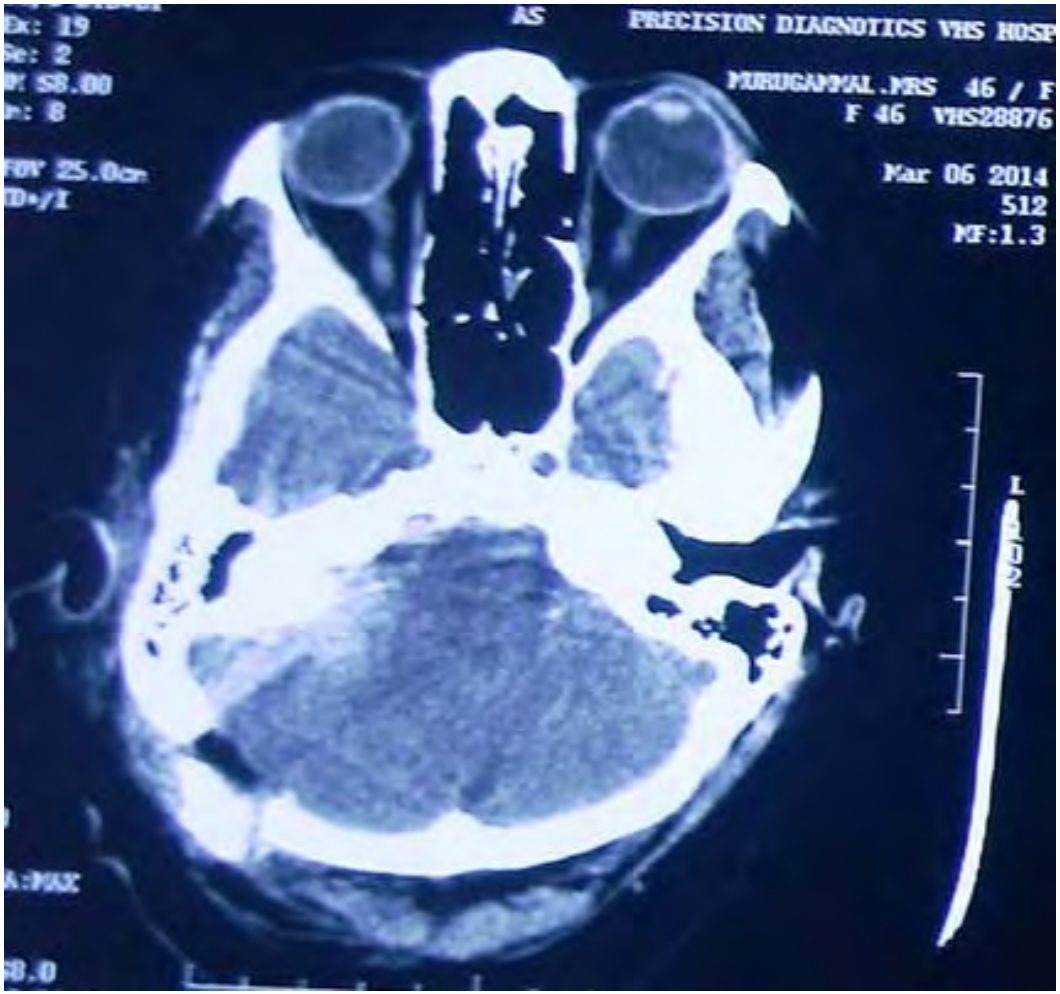
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Epidermoid

- Accounts for 2-6% of CPA masses
- Physiology:
  - Congenital lesions that present in adulthood
  - Rests of ectodermal tissue containing stratified squamous lining and keratin
- May arise within the temporal bone or in the CPA
- Benign and slow growing
- Symptoms
  - Similar to acoustic neuroma and meningioma
  - Facial nerve paresis and facial twitching may occur

Epidermoid

- Radiologic Features
  - Cistern oriented with variable shape with a cauliflower surface appearance

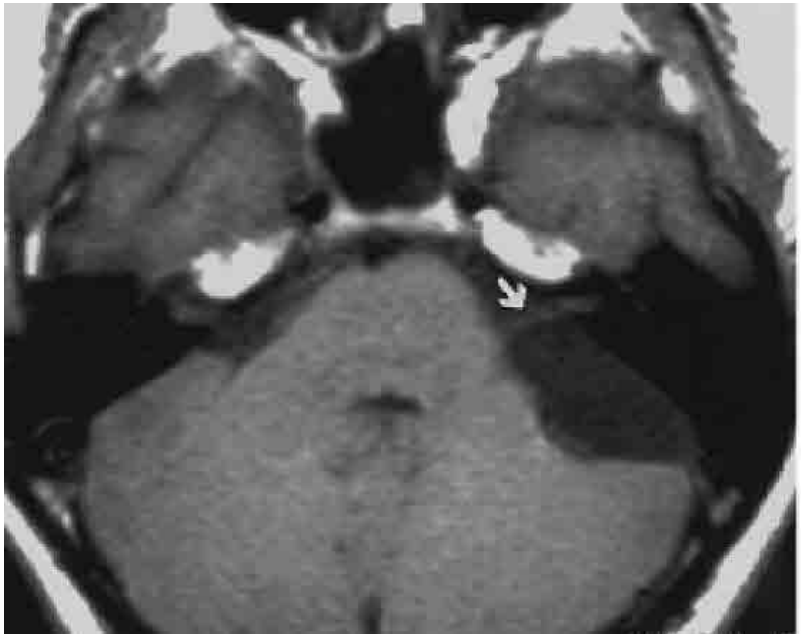

Page: 11 of 34
IM: 11


Page: 11 of 23
Compressed 7:1
IM:11 SE:4

Cerebellopontine Angle Arachnoid Cysts

- Arachnoid cysts are intraarachnoid masses of uncertain origin filled with CSF
- Often present with headache and ataxia.
- If symptoms are few, observation is advocated.
- Symptomatic lesion require Marsupilization of cyst rather than excision or shunting.

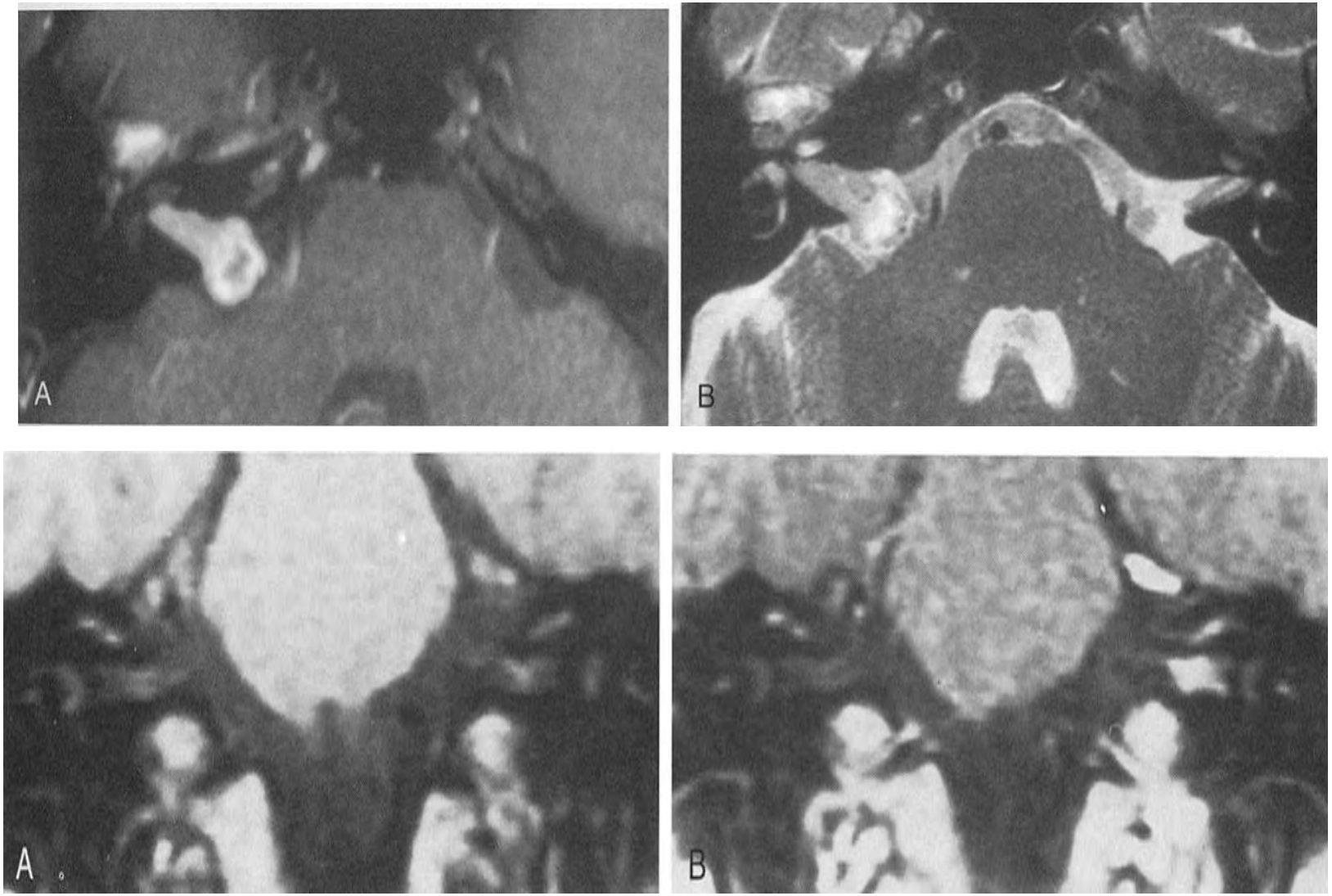
Imaging



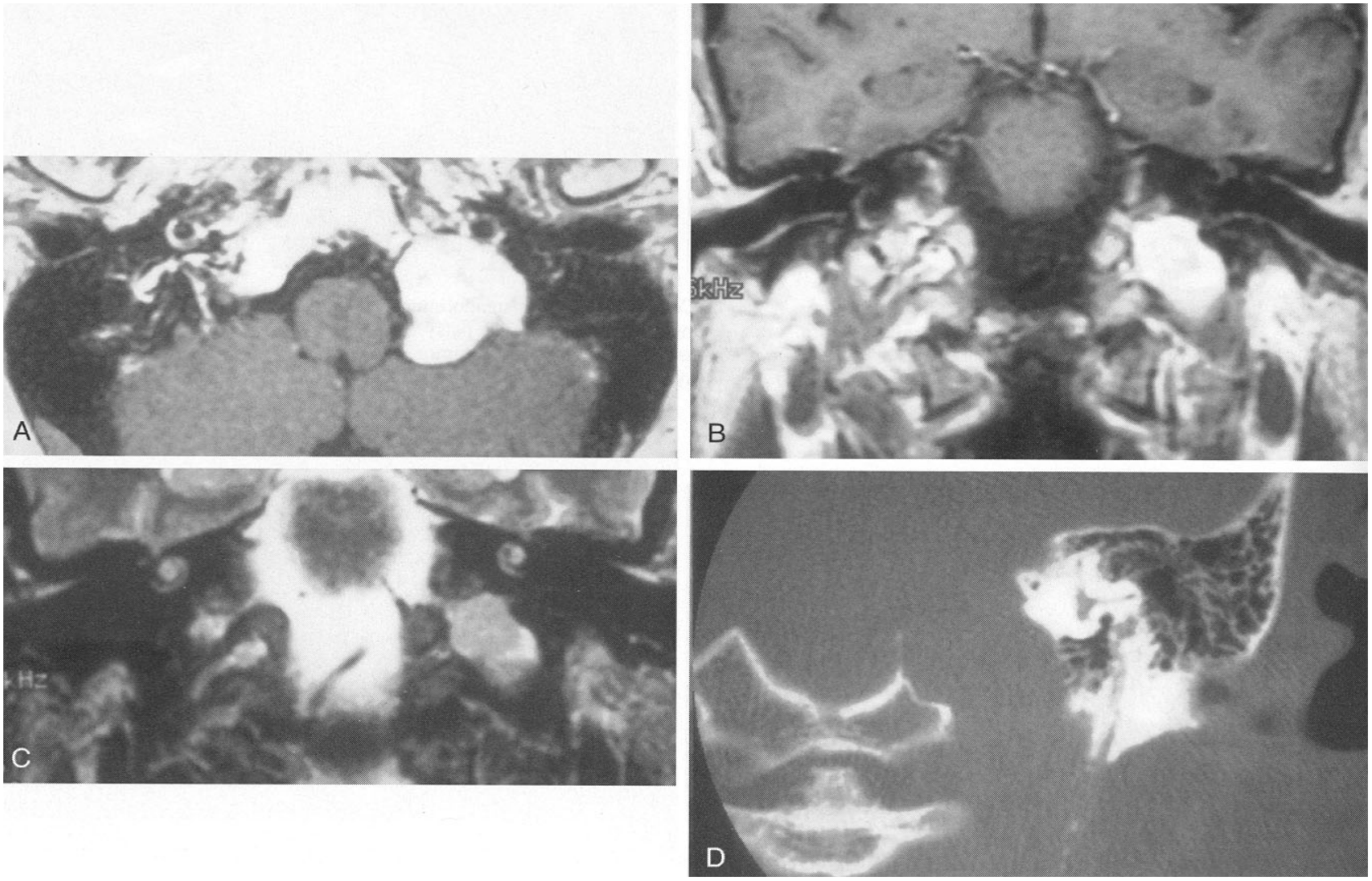
(a) Axial T1-weighted MR image shows an arachnoid cyst with signal intensity similar to that of CSF stretching the left seventh and eighth cranial nerve complex (arrow).
(b) Axial T2-weighted MR image shows the cyst displacing the vascular structures of the CPA (rowheads).

CN V Schwanoma

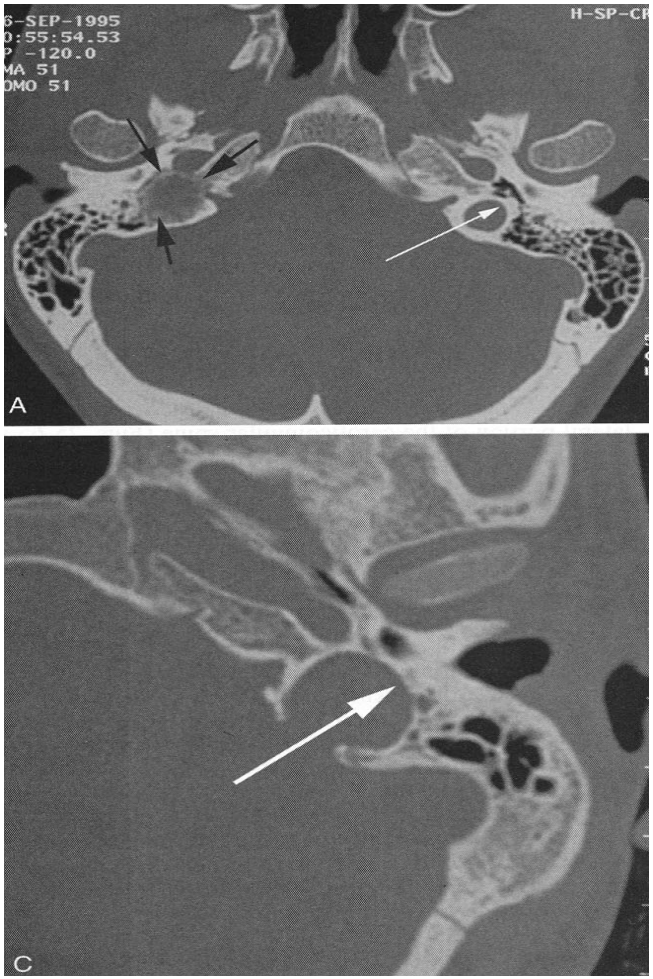
CN VII Schwanoma

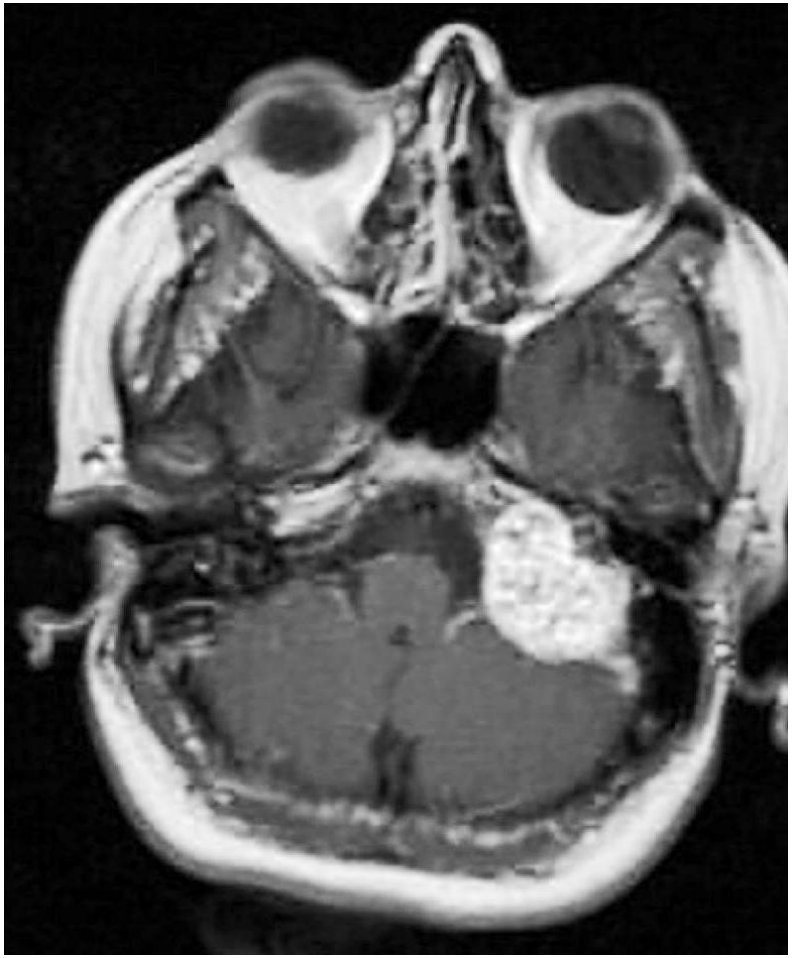


CN X Schwanoma



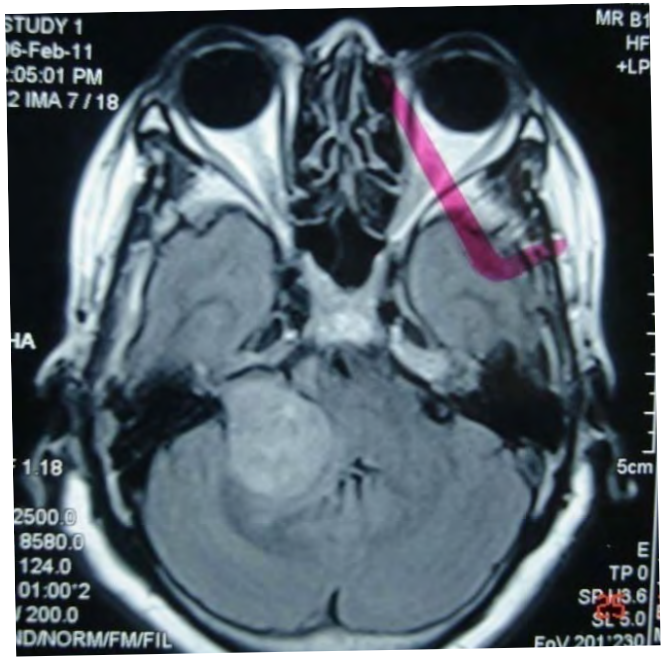
Glomus Jugulare





COMPLICATIONS

- Hearing loss
- Facial paresis
- Lower cranial nerve paresis
- Pseudomeningocele/CSF leak
- Infection
- Operative site hematoma
- Infarct
- Air embolism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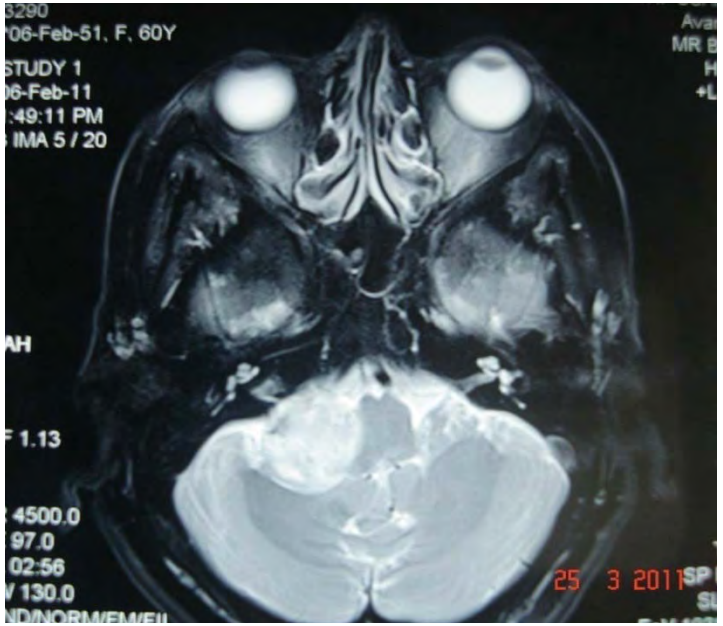
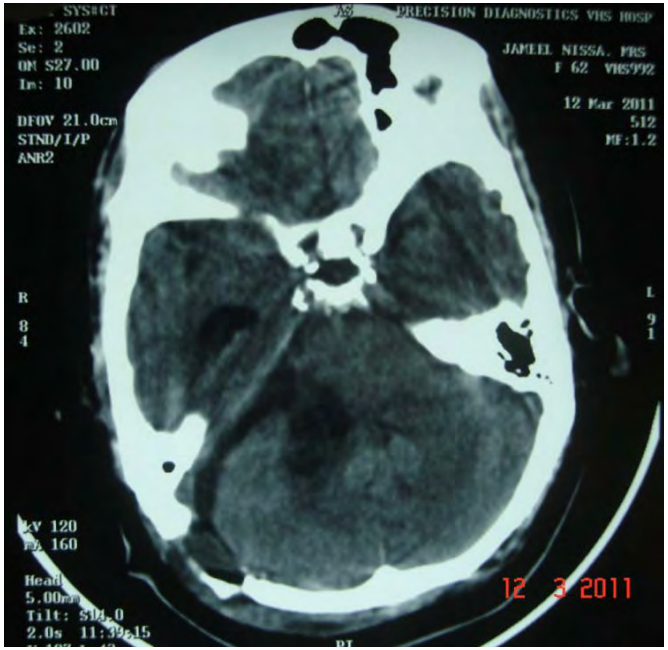
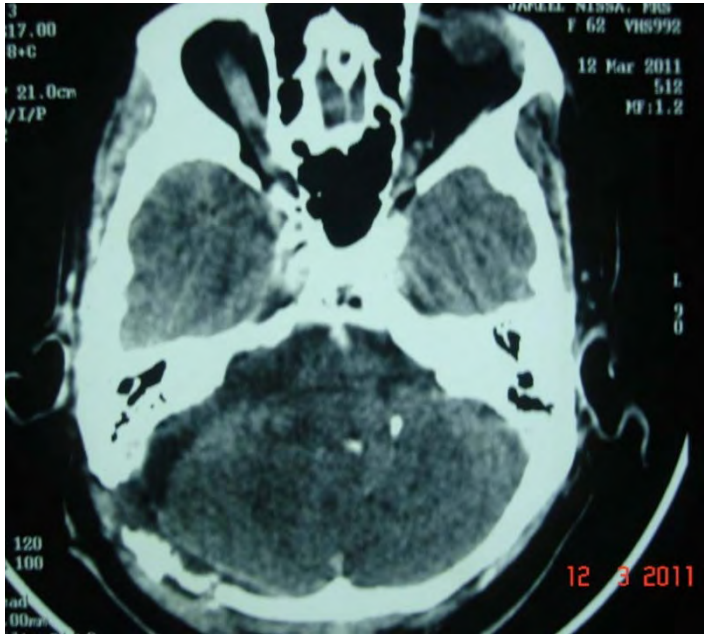
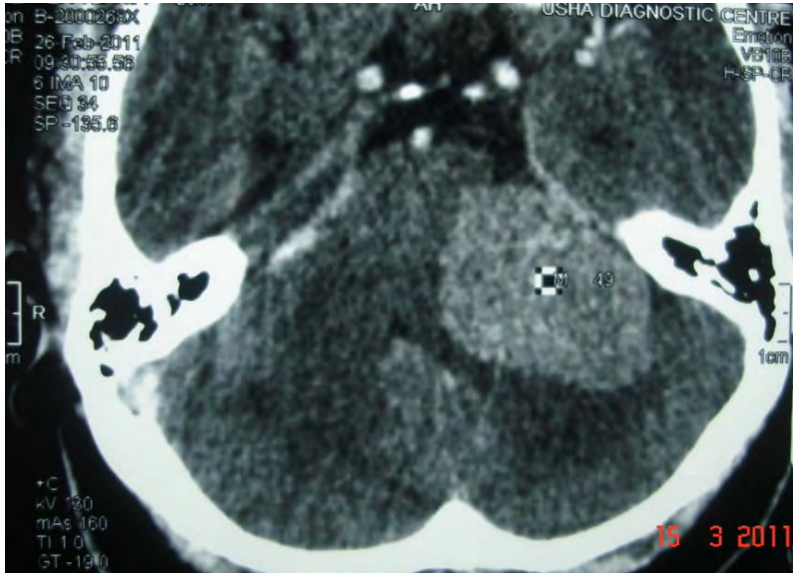
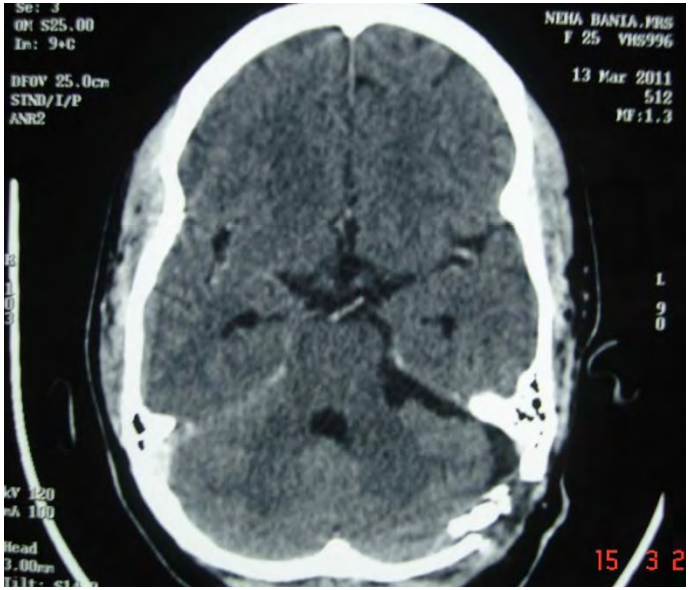
SP H3.6
SL 5.0


3290
06-Feb-51, F, 60Y
STUDY 1
06-Feb-11
:49:11 PM
IMA 5 / 20
AH
1.13
4500.0
97.0
02:56
130.0
25 3 2011


SYS#GT
Ex: 2602
Se: 2
OM S27.00
In: 10
DFOV 21.0cm
STND/I/P
ANR2
PRECISION DIAGNOSTICS VHS HOSP
JAMEEL NISSA, PRS
F 62 VHS992
12 Mar 2011
512
MF:1.2
R
L
8
4
9
1
kV 120
mA 160
Head
5.00mm
Tilt: S00.0
2.0s 11:39:15
12 3 2011


17.00
8+C
21.0cm
I/P
JAMEEL NISSA, PRS
F 62 VHS992
12 Mar 2011
512
MF:1.2
L
9
0
120
100
12 3 2011


USHA DIAGNOSTIC CENTRE
26 Feb 2011
IMA 10
SER 34
SP -135.8
R
1cm
+C
kV 130
mAs 160
TI 10
GT -190
15 3 2011


ON S25.00
In: 9+C
DFOV 25.0cm
STND/I/P
ANR2
NEHA BANIA,MRS
F 25 VHS996
13 Mar 2011
512
MF:1.3
L
15 3 2

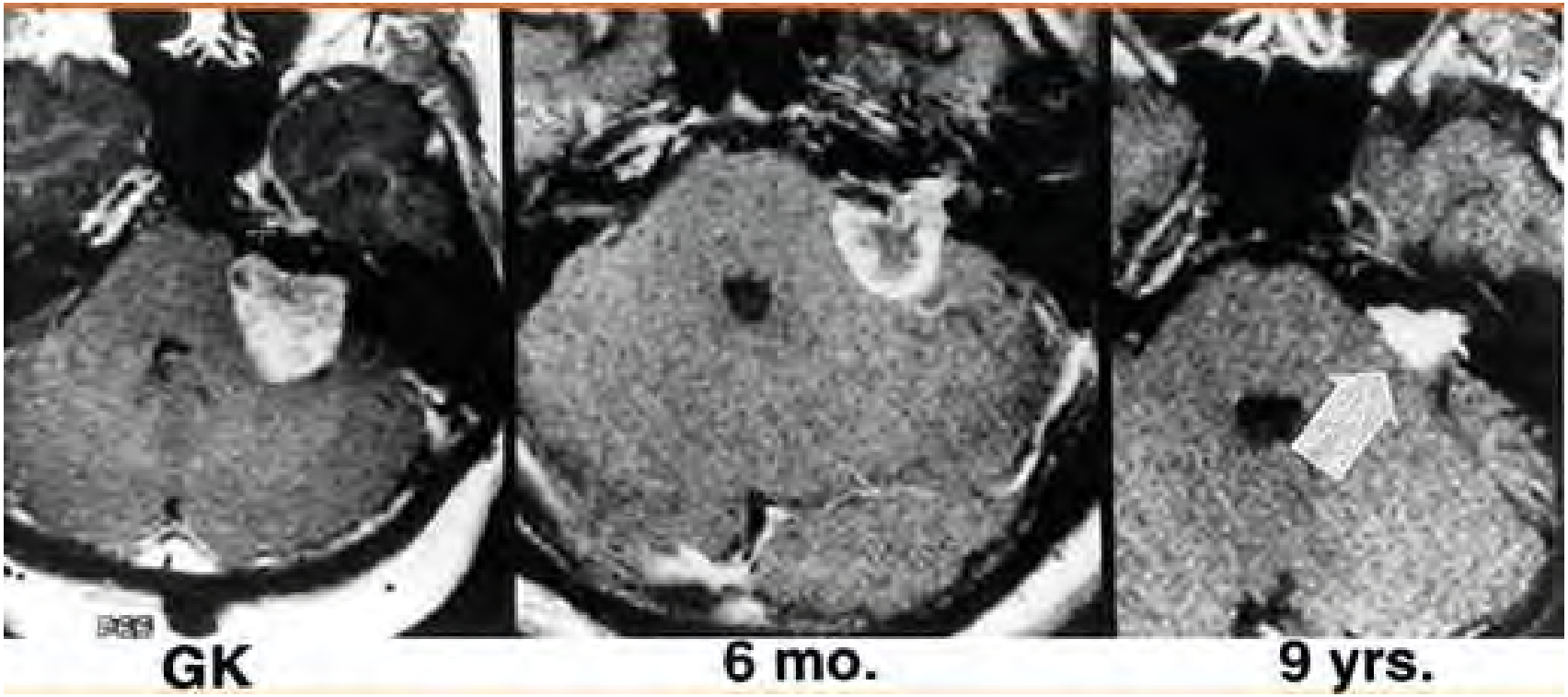

4.00
25.0cm
I/P
15 3

Stereotactic Radiosurgery

- Indications
  - Small tumors
  - Functional hearing
  - Older patients (>75)
  - Medically unstable patients
  - Small residual lesion

- Contraindications
  - Tumors > 3 cm
  - Prior radiotherapy
  - Tumor compressing brainstem

SRS



Thank You