Cerebellopontine Angle Masses

Alan L. Cowan, MD
Faculty Advisor: Arun Gadre, MD
The University of Texas Medical Branch
Department of Otolaryngology
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Cerebellopontine Angle

- Area of the lateral (quadrimenal) cistern containing CSF, arachnoid tissue, cranial nerves and their associated vessels.

- Borders
  - Medial – lateral surface of the brainstem
  - Lateral – petrous bone
  - Superior – middle cerebellar peduncle & cerebellum
  - Inferior – arachnoid tissue of lower cranial nerves
  - Posterior – cerebellar peduncle
Definitions

- **Intra-axial** – within the parenchyma of the brain or brainstem

- **Extra-axial** – outside of the brainstem parenchyma

- **CPA lesions** – lesions arising within the confines of the CPA.

- **Petrosal lesions** – lesions arising from the petrous portion of the temporal bone. These may extend into the CPA.
Differential

- Acoustic Neuroma
- Meningioma
- Epidermoid
- Rare CPA lesions
- Petrous Apex masses
- Vascular malformations
- Intra-axial masses
Acoustic Neuroma

- Comprises 60-92% of CPA lesions
- Majority of cases (95%) are sporadic
- Occur with equal frequency on the Superior and Inferior vestibular nerves

Pathophysiology

- Composed of Antoni A&B tissue
- Antoni A – compact tissue with spindle cells in palisades (most common)
- Antoni B – loose tissue with cyst formation.
AN symptoms

- **Cochlear**
  - Asymmetric SNHL
  - SSNHL
    - Up to 26% of AN may present with SSNHL
    - Only 1-2.5% of SSNHL is due to AN
  - Tinnitus
  - Decreased discrimination
  - Rollover

- **Vestibular**
  - Dysequilibrium (more common)
  - Vertigo (less common)

- **Facial**
  - Facial weakness (suspect other tumors - epidermoid)
  - Hitselberger’s sign – decreased sensation of EAC due to compression of CN VII sensory roots
AN symptoms

- Cerebellar
  - Wide gait
  - Falling to side of lesion

- Brainstem
  - Headache
  - Visual Loss

- Other Cranial nerves
  - V – facial numbness (large tumors, trigeminal schwannoma)
  - VI – lateral rectus palsy (rare)
  - IX – dysphagia (large tumors, jugular foramen syndrome)
  - X – hoarseness, aspiration (large tumors, jugular foramen syndrome)
  - XI – shoulder weakness (large tumors, jugular foramen syndrome)
AN - Radiology

- **CT**
  - Non-contrast: usually isodense to brain, calcification is rare
  - IV Contrast: Over 90% of non-treated tumors enhance homogeneously
  - Gas cisternogram: no longer done

- **MRI**
  - T1 – isointense to brain, hyperintense to CSF
  - T2 – hyperintense to brain, iso/hypo-intense to CSF
  - Gadolinium – Intense enhancement of tumor on T1
AN Features

- Centered on Porus Acousticus
- Acute angles to petrous bone
- Often involves the IAC
- Homogeneous enhancement
- No dural tail
- No calcifications
Meningioma

- Second most common CPA lesion 3-7 %
- Arise from cap cells near arachnoid villi which are more prominent near cranial nerve foramina and venous sinuses.
- 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.
Meningioma

- **Radiologic features**
  - Tumors generally hemispherical with obtuse angles to petrous bone
  - Dural tail often present (50-75%)
  - May herniate into middle fossa (50%)
  - May show calcification (25%)
  - Pial blood vessels with flow voids may be present at the margins.

- **Treatment**
  - Surgical removal is treatment of choice
  - XRT may be used to supplement if complete excision not possible
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
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
- Symptoms
  - Similar to acoustic neuroma and meningioma
  - Facial nerve paresis and facial twitching may occur
- Radiologic Features
  - May dumbell into middle fossa or contralateral cistern
  - Highly variable in shape with a cauliflower surface appearance
  - CT usually shows a mass hypodense to CSF
  - MRI – homogeneous lesion
    - T1 – isointense to CSF
    - T2 – isointense to CSF
  - Differentiation from arachnoid cyst may be difficult
    - Diffusion weighting will show moderate intensity for epidermoid, but low intensity for arachnoid cysts.
Arachnoid Cyst
Other Extra-axial Masses

- **Primary**
  - Arachnoid Cyst
  - Schwannomas (CN V-XII)
  - Hemangiomas
  - Lipoma
  - Dermoid/Teratoma

- **Secondary**
  - Paraganglioma
  - Chondroma
  - Chordoma

- **Extension of Petrous bone tumors**
Schwannomas

- **CN VII**
  - Symptoms may be identical to acoustic schwannoma
  - Differentiation from acoustic schwannoma may not be possible by radiography unless lesion extends distal to geniculate ganglion.

- **CN IX – XI**
  - Jugular Foramen syndrome
    - Dysphagia
    - Hoarseness
    - Shoulder weakness
  - Enlargement of Jugular Foramen

- **CN XII**
  - Hemiatrophy of tongue
  - Enlargement of hypoglossal canal
CN V Schwanoma
CN VII Schwanoma
CN X
Schwanoma
Vascular

- Vertebrobasilar dolichoectasia
  - Enlongation and dilation of the vertebrobasilar artery.
  - Symptoms - Facial spasm, trigeminal neuralgia

- AICA loop
  - May loop over, under, or between CN VII & CN VIII.
  - Symptoms - vertigo

- Giant Aneurysms

- Hemangioma

- Paragangliomas (may extend to CPA)
  - Glomus Jugulare
  - Glomus Tympanicum
Vertebrobasilar Dolichoectasia

[A set of medical images showing different views of the vertebral basilar system with annotations]
AICA loop
Giant Aneurysms
Glomus Jugulare
Petrosus Apex

- Cholesterol granulomas (most common)
- Epidermoid cyst
- Trigeminal schwannoma
- Carotid artery aneurysm
- Chondroma
- Chondrosarcoma
Intra-axial

- Astrocytoma
- Ependymoma
- Medulloblastoma
- Hemangioma / Hemangioblastoma
- Choroid plexus papilloma
- Metastasis
Imaging Techniques

- **XR**

- **CT**
  - Non-contrasted
  - Iodine based contrast - uptake by selected lesions
  - Gas CT cisternogram – no longer performed

- **MRI**
  - T1 – Fat density is bright
  - T2 – Water density is bright
  - FLAIR (Fluid Attenuated Inversion Recovery)
  - FSE (Fast Spin Echo)
  - CISS (Constructive Interference Steady State)
  - Gadolinium
Treatment
Treatment

- Observation

- Surgery
  - Translabrynthine
  - Retrosigmoid
  - Middle Fossa

- Radiotherapy
  - Conventional radiation therapy
  - Stereotactic radiosurgery
Observation

- **Indications**
  - Advanced age (over 65 or 75)
  - Poor health
  - Lack of symptoms
  - Non-progression of symptoms
  - Only hearing ear
  - Isolated IAC tumors in the elderly

- **Contraindications**
  - Young patient
  - Healthy patient
  - Symptomatic progression
  - Compression of brainstem structures
Trans-labyrinthine

- **Indications**
  - Extension into CPA > 0.5 - 1 cm
  - Non-serviceable hearing
  - Adequate contralateral hearing in large tumors

- **Contraindications**
  - Serviceable hearing
Middle Fossa

**Indications**
- Small tumor
- Intracanalicular 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)
Retrosigmoid

**Indications**
- Serviceable hearing
- Large tumors
- Compression of brainstem

**Contraindications**
- Functional hearing with extensive IAC involvement
- Intracanalicular tumors
Stereotactic Radiosurgery

- **Indications**
  - Small tumors
  - Functional hearing
  - Older patients (>75 Hirsch)
  - Medically unstable patients (Hirsch)
  - Previous resection (Hirsch)

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

- **Outcome**
  - Local control (non-progression): 94%
  - Hearing preservation: 47 – 77%

- **Complications**
  - Facial nerve injury: 5 - 17%
  - Trigeminal nerve injury: 2 - 11%
  - Hydrocephalus: 3%

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