Cerebellopontine Angle Lesions: An Illustrative Review

Poster No.: C-0289
Congress: ECR 2012
Type: Educational Exhibit
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Keywords: MR-Diffusion/Perfusion, MR, CT, Education, Ear / Nose / Throat, eLearning, Pathology
DOI: 10.1594/ecr2012/C-0289

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Learning objectives

1. To review pathology of the cerebellopontine angle.
2. To demonstrate CT, MRI and nuclear imaging characteristics of specific pathology.

Background

Cerebellopontine angle lesions may present with hearing loss and debilitating vertigo. As the most common site of pathology in the posterior cranial fossa, radiologists should be aware of the numerous pathologies occurring at this site. Evaluation of this complex anatomical location can prove challenging for junior radiologists. Hence, a pictorial review demonstrating different pathology at the CPA will aid the understanding of radiologists in training.

Imaging findings OR Procedure details

We present select cases collected from MDM meetings at the University Hospital Coventry and Warwickshire from the previous 2 years.

CT and MRI images appropriately selected to highlight features of differing pathology in the CPA region.

Acoustic neuromas (85%), meningiomas (13%) and epidermoids (6%) account for the vast majority of such lesions\(^1,2\). We also present CT and MRI images of Peripheral PNET tumour, epidermoid cyst, glomus jugulare, jugular fossa schwannoma and subarachnoid cyst.

Salient features and key identifying characteristics are displayed in simple succinct, illustrative format with appropriate annotation.

Vestibular schwannoma (Fig 1)

A neural sheath tumour. Vestibular schwannoma is the commonest schwannoma at the CPA. It can also develop in other nerves (CN V, VII)\(^2\). Usually they occur as isolated lesions, unless associated with Neurofibromatosis type 2. MR characteristics show a
strong, homogenously enhancing, often 'dumb-bell' shaped mass on T1 sequences. CT is often used to assess adjacent bone destruction. The main differential is meningionma\(^3\).

**Meningioma (Fig 2)**

These benign yet locally agressive tumours arise from cap cells gathered in tips around arachnoid villi\(^2\). They displace but do not invade neural tissue. CT characteristics show calcification (20%), and a hyperdense (75%) or isodense (25%) mass on non-contrast CT\(^3\). Typical findings include strong contrast enhancement (90%) and a dural tail\(^3\).

**Arachnoid cyst (Fig 3)**

These are pouches of uncertain origin filled with CSF. The lesions have smooth walled edges. On CT and MR sequences, the contents of the cyst match CSF almost exactly. They can be confused for Epidermoid cysts, however crucially DW imaging shows a hypointense lesion\(^1\).

**Epidermoid cyst (Fig 4)**

Epidermoid cysts arise from inclusion of normal epithelial cells in neural tube closure. They are the product of desquamation of squamous epithelium lining the mass. Hence, they are also called primary cholesteatomas.

The main differential is Arachnoid cyst. For Epidermopid cyst, MRI characteristics are typically slightly higher intensity than CSF on both T1 and T2 weighting. On DWI, epidermoid cysts have high signal intensity than Arahnoid cysts (as shown in fig. 4). On CT, in contrast to arachnoid cyst, Epidermoid cyst typically produces no reaction at the adjacent bone interface.

**Peripheral Primitive Neuroectodermal Tumour (PPNET) (Fig 5)**

This highly aggressive tumour is usually found in bone or soft tissue (Ewing's Sarcoma), but can rarely arise in the CPA angle. It's rare occurrence makes it difficult to distinguish from more common tumours.

MRI shows similar characteristics as tumours seen in bone and soft tissue. Contrast enhancing soft tissue mass with an aggressive nature and spread along the glial surfaces. T2 images shows heterogenous hyperintense masses, which may or may not show haemorrhage or cystic change within\(^6\).

**Glomus Jugulare (Fig 6)**

A tumour arising from the paraganglion precursor cells. They commonly originate at the jugular bulb. CT findings show destruction of local bone. MRI shows high signal on T2
weighted images. There is avid contrast enhancement due to the vascular nature of the tumour. Vascular flow voids can also be seen within the tumour body\textsuperscript{4}.

**Jugular Fossa Schwannoma (Fig 7)**

This cranial nerve sheath tumour is less commonly found at the jugular foramen. It shows typical characteristics of schwannomas elsewhere. On MRI, well demarcated borders and dense contrast enhancement is seen\textsuperscript{5}. This particular tumour is located within the jugular fossa and extends into surrounding regions (in this case the CPA as it is a path of low resistance). Extension is often seen to follow the nerve itself\textsuperscript{1}. It often causes localised Bone erosion and flaring\textsuperscript{3}.

**Images for this section:**

![Images](image_url)

**Fig. 1:** Vestibular Schwannoma (Accoustic Neuroma) seen in the right Cerebellopontine angle, extending into right Internal acoustic meatus causing expansion of the canal.
**Fig. 2:** Meningioma. non-contrast CT, bone algorithm and contrast enhanced CT showing a typical densely calcified, strong homogeneously enhancing mass arising from left posterior cranium, involving the left cerebellopontine angle.

**Fig. 3:** Arachnoid cyst. T2 weighted images showing a large right sided Arachnoid cyst causing displacement of CN7 and 8 at the CP angle.
**Fig. 4:** Epidermoid cyst. T2 weighted IAM sequence, T1 weighted and DW coronal reconstruction. The cyst displaces the left CP angle. DW imaging shows restricted diffusion of the lesion confirming the diagnosis.

**Fig. 5:** Peripheral primitive neuroectodermal tumour (PPNET). T2 IAM sequence, T1 coronal and axial following contrast administration also demonstrating enhancement of brainstem surface and left tentorium cerebelli.
**Fig. 6:** Glomus Jugulare. T2 weighted MRI show pathognomonic description of dumbbell shaped lesion with flow voids. CT image c) shows permeative destructive change in adjacent petrous bone.

**Fig. 7:** Jugular Fossa Schwannoma. Solid mass extending from jugular foramen, extending into the cerebellopontine angle.
Conclusion

Diagnosing pathology at the cerebellopontine angle can be problematic. Hence, presenting it in a concise, informative illustrative way will better trainee understanding and confidence.

CP angle lesions display specific characteristics on CT and MRI imaging which helps narrow the differential diagnosis of pathology at this site.

Personal Information

References


