Brain Imaging

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IV lesions
Intraventricular lesions

- Ependymoma
- Choroid plexus papilloma

Other lesions

- Meningioma
- Astrocytoma
- Dermoid
- Medulloblastoma
- Deposits
- Subependymoma
- Cysticercosis
- Arachnoid, epidermoid
How to diagnose an intraventricular lesion?! 

- Lesion totally confined within the ventricle
- Lesion known to occur in the ventricle

Other signs:
- The ipsilateral ventricle is dilated
- Absence of brain edema
- The lesion takes the configuration of the ventricle
Intraventricular

Extra ventricular
Colloid cyst
Ependymoma

9% of all Gliomas of grade II or III

10% of pediatric intracranial neoplasms

Most common site 4th ventricle

Extra ventricular lesions arise from ectopic rests within brain tissue

Children: adults 5:1 age incidence 10-15 years [most of the lesions occur before the age of 10 years][ other beak at 4th -5th decades ]

The prognosis is best with filum terminale lesions > spinal cord > supratentorial > posterior fossa.
CT isodense lobulated mass filling the 4th ventricle with homogenous or heterogeneous enhancement
- Hydrocephalus is common
- **Calcification** 40 - 50%, common than any other posterior fossa lesion
- **Cystic changes** are seen in 15% of cases
- High incidence of CSF seeding
Typical appearance is of a partially calcified posterior fossa mass extending through the 4th ventricle foramina.
Extension through the foramina is best appreciated in the sagittal MR images

From Osborn AG: Diagnostic neuroradiology, St. Louis, 1994, Mosby
Ependymoma with CSF seeding
## MR Appearance

<table>
<thead>
<tr>
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<th>Description</th>
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<tbody>
<tr>
<td>T1</td>
<td>Iso - hypo intense lesion</td>
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<tr>
<td>T2</td>
<td>Hyper intense lesion</td>
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<tr>
<td>DD</td>
<td>Medulloblastoma,</td>
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<td></td>
<td>Other lesions arising</td>
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<tr>
<td></td>
<td>inside the ventricle</td>
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![MR images](image-url)
Medulloblastoma, operated with CSF seeding

- Meningeal carcinomatosis
  - Metastatic: breast, ...
  - CSF seeding: medulloblastoma, ...
  - Leukemia, lymphoma
EPENDYMOMA
Subependymoma

- Variant of Ependymoma  **WHO grade I, benign course**
- Sharply demarcated, lobulated, Intraventricular mass
- Benign may, be asymptomatic, no CSF seedling
- 4th ventricle is the commonest site
- Solid, homogenous lesion
- Males around 60 years
- > 60% no enhancement

Cyst formation, calcification and hemorrhage may be seen
Subependymoma

Isodense lesion on CT
Isointense lesion on T1, hyper intense on T2 WIS
Choroid plexus papilloma

3% of all intracranial tumors in children
85% occur in patients younger than 5 years

Lobulated mass in the trigone of the lateral ventricle [child]
4th ventricle [adult] Multiple sites in 4% of cases

Hydrocephalus is common > 90%

Overproduction of CSF [4-5 times]
Obstruction of flow
- hemorrhage
- mechanical
Choroid plexus papilloma

- 25% Calcification and hemorrhage
- Hyper dense in the pre-contrast study
- Strong heterogeneous enhancement
- May spread by CSF?! Benign
- Similar to a branch of mulberries

Resected papilloma gives 100% 5 year survival rate, while in carcinoma it is only 40%
**Choroid plexus papilloma**

- Iso-hypointense signal in T1 WIs
- Hyper intense signal in T2 WIs
- **Heterogenous** enhancement

Low signals within the enhanced tumor are due to Calcification 25%

Blood vessels
Sturge-Weber syndrome

- Choroid plexus hemangioma
- Xantho-granuloma
  - Containing fat
  - Very high signal in DWIs
Choroid plexus carcinoma

30% of choroid plexus tumors are carcinomas

10-20% of papillomas turn malignant

Highly vascular high grade WHO III

CSF seeding > 60%

Difficult to differentiate benign from malignant

Brain tissue invasion
Intraventricular meningioma

Arise from meningeal rests within the stroma of choroid plexus
Commonly in the trigone of the lateral ventricle
Imaging similar to other meningiomas
Usually asymptomatic until large

Multiple meningiomas are associated with NF2
Intraventricular meningioma

- **80%** Trigone of lateral ventricle
- **15%** 3rd ventricle
- **05%** 4th ventricle
Choroid plexus papilloma / Meningioma
Choroid plexus papilloma / Meningioma

**Choroid plexus papilloma**
- Young children
- Nodular surface
- Diffuse hydrocephalus
- Heterogenous enhancement

**Intra ventricular meningioma**
- Middle aged patients
- Smooth margin
- Focal hydrocephalus
- Homogenous enhancement
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Subependymal Giant Cell Astrocytoma

- Very rare 0.3%
- Develops from the nodules
- Usually in the frontal horn near the foramen of Monro Hydrocephalus
- Low grade lesion [no recurrence after excision]

**CT**
Isodense or slightly hyper dense + Calcification
Homogenous enhancement
Tuberous sclerosis with giant cell astrocytoma
Dermoid cyst

- Rare than epidermoid cyst
- **Midline plane** [posterior fossa, suprarenal area] Intraventricular
- **CT:** fat density ± calcification, no enhancement
- **MRI:** high signal in T1 [fat]
- Rupture intraventricular or subarachnoid → fat / fluid level
intraventricular
Dermoid cyst
Subependymal deposits
Subependymal deposits
WHO Classification

Neuroepithelial tumors
- Astrocytomas
- Oligodendroglialoma
- Ependymoma
- Choroid plexus papilloma
- Pineal tumors

Low grade types
- Pilocytic astrocytoma
- Subependymal giant cell astrocytoma
- Pleomorphic xantho-astrocytoma [PXA]

High grade types
- Diffuse astrocytoma
- Anaplastic astrocytoma
- Glioblastoma multiform
Intracranial cysts

- Arachnoid cyst
- Epidermoid cyst
- Dermoid cyst

- Astrocytoma [cystic types]
- Hydatid cyst
- Porencephalic cyst

- Colloid cyst

Extra-axial

Intra-axial
Nerve sheath tumors
- Schwannoma
- Neurofibroma

Meningeal tumors
- Meningioma
- Hemangiopericytoma

Lymphoma

Germ cell tumors
Posterior fossa

Cerebello-pontine angle
- Meningioma
- Acoustic neuroma
- Epidermoid cyst

Cerebellum
- Astrocytoma
- Hemangioblastoma

Brainstem
- Glioma
- Deposits

4th Ventricle
- Epndymoma
- Medulloblastoma
- PNET
سبحانك اللهم و بحمدك × نشهد أن لا إله إلا انت × نستغفرك و نتوب اليك

Thank you

Mamdouh Mahfouz MD
THANK YOU

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Choroid plexus papilloma. A. This choroid plexus mass has a lot of peripheral high signal on T2WI (A) and FLAIR (B), signifying the paucity of the parenchyma. C. Note the hydrocephalus and central necrosis of the tumor, as well as an extracerebral cyst (C). D. A mulberry-like shape to the mass centered on the trigone, is typical of choroid plexus papillomas and carcinomas.

Classically, epidermoids do not enhance, but rarely the wall may show mild enhancement. The key atypical appearance on CT is that of displacement of the lateral ventricles. MR has been very helpful in distinguishing between epidermoids and arachnoid cysts, a distinction that sometimes blurred on CT. On MR these lesions appear...
Cysticercosis

- Two types
  - Cysticercus cellulosae [cyst with scolex inside]
  - Cysticercus racemose [grape like cysts, no scolex]
- Intraventricular Cysticercosis 7-20%
  - 4th ventricle is the most common
  - Single or multiple
  - Free or Subependymal