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What are a few differences in appearance between astrocytoma and ependymoma in the spinal cord?

Compared to astrocytoma, an ependymoma of the spinal cord has a classic apical cap of blood and is often cystic in appearance. Additionally, ependymomas are more likely central in the cord, are more likely to be associated with a syrinx and are more common in adults.

All high-grade parenchymal brain tumors enhance. What low grade tumors of the brain also enhance?

Ganglioglioma and pilocytic astrocytoma are notable that they are low-grade tumors that may enhance despite being low grade.

What is the classic imaging appearance of a pilocytic astrocytoma?

A cystic mass with an enhancing mural nodule.

What lesions are classic for crossing the midline of the brain?

Glioblastoma, lymphoma, multiple sclerosis, radiation necrosis and meningioma of the falx.

If you see bony reaction/thickening adjacent to a mass what is the significance of this?

Typically, bony reaction surrounding a mass denotes that the mass is extra-axial.

What are two masses that are not extra-axial that can nonetheless cause local bony reaction?

DNET and ganglioglioma are two notable exceptions to the aforementioned rule.

What are other signs besides bony reaction on imaging that denote a mass is in an extra-axial location?

CSF cleft around mass, displaced subarachnoid vessels, expanded subarachnoid space, broad based dural lesion with tail, able to identify gray matter between the mass on one side and white matter on the other side.

What are common cortically based tumors of the brain?

Mnemonic is DOG. D-dysembryoplastic neuroepithelial tumor. O-oligodendroglioma. G-ganglioglioma. Note that cortical tumors and cortical metastases may be occult on a non-contrast CT or MRI and may have very little surrounding edema.

What are some brain tumors that classically may be multifocal on imaging?

Metastases. Primary tumors include lymphoma, GBM, gliomatosis cerebri. Note that gliomatosis cerebri is often low grade and may therefore not enhance but may look as indistinct margins “blurring” between the gray and white matter on CT imaging. Note also that some tumors may seed in a multifocal manner and these include medulloblastoma, ependymoma, GBM and oligodendroglioma.

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What is SATCHMOE?

This is a mnemonic for sellar and parasellar mass lesions.

S is sarcoid. A is aneurysm/adenoma/rAthke's cleft cyst. T is teratoma. C is craniopharyngioma. H is hamartoma, hypophysitis, histiocytosis (LCH) and hypothalamic glioma. M is meningioma. O is optic nerve glioma. E is eosinophilic granuloma.

What are the top differential considerations for lesions that show restricted diffusion on DWI sequences for the following locations: supratentorial, CP angle, temporal horn, pediatric posterior fossa?

Supratentorial: lymphoma or abscess

CP angle: epidermoid cyst

Temporal horn: HSV encephalitis

Pediatric posterior fossa: medulloblastoma.

What are the most common primary brain tumors that calcify?

Oligodendroglioma is most classic for a calcified brain primary malignancy. However, astrocytomas can calcify and because they are more prevalent, you will see more calcified astrocytomas in real practice although most classic is still the oligodendroglioma in terms of calcified primary brain tumors.

What brain tumors are classically bright on T1-weighted images?

Melanoma, hemorrhagic metastases (melanoma, renal cell carcinoma, carcinoid, thyroid carcinoma, and choriocarcinoma), dermoid cyst, cholesterol in colloid cyst.

What are classic imaging features for Turcot syndrome?

Glioblastoma, medulloblastoma, and GI polyps.

What should you think of if you see an intensely enhancing homogenous solid mass with restricted diffusion in a periventricular location in a patient who is immunocompromised from AIDS or post-transplant state?

Primary CNS lymphoma vs toxoplasmosis. Remember CNS lymphoma is hot on a nuclear medicine thallium scan whereas CNS toxoplasmosis is not. Both can show uptake with FDG PET/CT.

An infratentorial cystic lesion with enhancing mural nodule is most classic for what entity in an adult and what entity in a child?

Adult: hemangioblastoma (think VHL, especially if multiple)

Child: pilocytic astrocytoma.

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Intraventricular tumors in adults classically include what entities?

Subependymoma, central neurocytoma, xanthogranuloma, colloid cyst and meningioma, others perhaps less classic than these entities.

If you see a non-enhancing intraventricular mass this should make you first think of what entity?

Subependymoma: circumscribed non-enhancing mass at foramen of monro and 4th ventricle. Lack of enhancement is notable for this entity.

What is the top intraventricular mass in the 20-40-year-old population?

Central neurocytoma: #1 intraventricular mass in 20-40-year-olds. These can have a swiss cheese (multiple cystic spaces) appearance and may have robust calcification, often arising from the intraventricular septum.

If you see a mass with restricted diffusion arising from the choroid plexus this should make you think of what entity?

Xanthogranuloma—a benign and typically incidental mass of the choroid plexus.

What intraventricular mass is most classic in the setting of death from acute hydrocephalus?

Colloid cyst which appears as a round, dense, mass at the foramen of monro that can cause acute obstruction of the foramen of monro causing acute hydrocephalus and, in extreme cases, death.

What is the most common location for an intraventricular meningioma?

Trigone of the lateral ventricle (80% of intraventricular meningiomas are located here)

Episode 2

Do pituitary adenomas enhance more rapidly or slower compared to normal brain?

Pituitary adenomas enhance more slowly compared to normal brain.

What are common differences between craniopharyngiomas in an adult vs craniopharyngiomas in a child?

Adult: Papillary type which does not calcify. Is a capsulated lesion so is easier to resect. More solid lesion.

Peds: Adamantinomatous type which does calcify. May not be capsulated and is harder to resect. “Machinery oil” appearance. More cystic lesion.

Similarities: Both are partially solid and cystic lesions low grade lesions in sellar/suprasellar region.

Meningiomas classically show uptake on what nuclear medicine studies?

Meningiomas typically have uptake with Tc-MDP (bone scan agent) and octreotide and Ga68-Dotatate.

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What are common differences between a CNS dermoid cyst and epidermoid cyst?

Epidermoid: can be congenital or acquired after LP/trauma. Usually located off of midline. Follow CSF intensity.

Dermoid: Typically located at midline with internal lipoid material, fat density on CT, bright on T1 weighted images, NF2 association.

If you see what looks like a meningioma but there is associated bony invasion of the skull, what additional entity should be considered?

Hemangiopericytoma: a soft tissue sarcoma that can mimic an aggressive meningioma. These typically do not calcify or cause hyperostosis but these do often invade the calvarium. If you see invasion of the calvarium, imaging cannot differentiate between a meningioma or a hemangiopericytoma.

In what age group to atypical teratoma/rhabdoid (AT/RT) tumors most commonly present?

Pediatrics, < 6 years of age and often < 2 years of age. AT/RT tumors are high grade often large tumors with internal necrosis and heterogeneous enhancement which may be in a supra- or infra-tentorial location but are most common in the cerebellum. Cannot tell difference on imaging between a medulloblastoma and AT/RT so this is a pathologic diagnosis.

Are desmoplastic infantile gliomas more commonly supratentorial or infratentorial?

Desmoplastic infantile gliomas (DIGs) are classically supratentorial-only lesions. These are large, cystic tumors in a superficial cortical location. Commonly present with rapidly increasing head circumference before first birthday.

What is the most common location of both a choroid plexus papilloma/carcinoma in pediatric patients and in adults?

Pediatrics: Supratentorial location in lateral ventricle.

Adults: Infratentorial location in 4th ventricle

What is the most common brain metastasis in pediatric patients?

Neuroblastoma. Three common sites of metastatic disease with neuroblastoma are the bones, the dura/brain, and the posterolateral orbit.

If you see a cyst with mural nodule in the temporal lobe of a teenager with epilepsy which tumors should you think of first?

First is probably a ganglioglioma which may present with a cystic and solid mass with calcifications essentially anywhere in any age range but classic is with a temporal lobe mass in setting of temporal lobe epilepsy. Differential includes other cortical based tumors; remember DOG for cortical-based tumors (DNET, Oligodendroglioma, Ganglioglioma). Note ganglioglioma is different from a desmoplastic infantile glioma and classic history for the latter is rapid head enlargement in a pediatric patient < 1 year of age). Note also that you can't tell a DNET from a ganglioglioma on imaging.

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What is the most common location for a pleomorphic xanthroastrocytoma (PXA)?

PXA's ae always supratentorial, usually located in the temporal lobe, presenting with a cyst with mural nodule. This may have a dural tail and is also common in setting of seizures.

True or false: A PNET (primitive neuroectodermal tumor) appears similarly on histology as a medulloblastoma?

True. These entities can look very similar on histology. However, a PNET is a supratentorial lesion and have been nicknamed a "supratentorial medulloblastoma". Bad prognosis with PNET due to propensity for distant metastases.

What is the classic imaging appearance of a medulloblastoma?

Medulloblastomas commonly present as a midline mass centered at the roof of the 4th ventricle with associated hydrocephalus.

What tumor is classically associated with gelastic seizures and precocious puberty, with a mass of the tuber cinereum?

Hypothalamic hamartoma. This is a hamartoma of the tuber cinereum. Typically, do not enhance. This is separate in location from the pituitary stalk.

Note—a gelastic seizure is a seizure with sudden onset of laughing or other sudden release of energy.

What is more common in the spine—medulloblastoma or ependymoma?

What episode states: Medulloblastoma is much more common than ependymoma. Medulloblastomas of the spine tend to restrict on DWI and have zuckerguss (sugar icing) appearance with leptomeningeal spread/coating of disease. Ependymomas are more likely to calcify than medulloblastomas.

Correction:

The question "***What is more common in the spine—medulloblastoma or ependymoma?***" contains an incorrect answer "*Medulloblastoma is much more common than ependymoma."*

Approximately 350 cases of medulloblastoma are diagnosed annually compared to approximately 1300 cases of ependymoma per year. About 10% of ependymomas are found in the spinal cord compared to up to 33% of medulloblastomas involving the leptomeninges of the spinal cord. Therefore, involvement of the spinal cord is likely more common in ependymoma.

Can you name at least one syndrome with a medulloblastoma association?

Perhaps top two are basal cell nevus syndrome (AKA Gorlin syndrome) which presents with medulloblastoma and dural calcifications, basal cell skin cancers, odontogenic cysts, common in post-radiation state. Also, Turcot syndrome (discussed in episode 1) are classic for GI polyposis and brain tumor to include medulloblastoma and/or glioblastoma.

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With a vertical gaze palsy (aka dorsal Parinaud syndrome) what tumor is most classic?

A pineal tumor.

What is the most common pineal tumor?

A germinoma is the most common pineal tumor (only classically seen in boys). In general, girls are much more likely to have suprasellar germinomas and boys are most likely to have pineal germinomas. Germinomas can cause precocious puberty via HCG secretion.

Can you name some other pineal region tumors? What are some differences between these?

Besides pineal germinoma, there is also pineocytoma (uncommon in childhood, non-invasive, children "hide out of cyt (sight)"), pineoblastoma (common in childhood, "kids frequently have a blast", highly invasive).

What is the so-called "trilateral retinoblastoma"?

This is when you have bilateral retinoblastomas and a concurrent pineoblastoma as these tumors are associated with one another. Both are small round blue cell tumors.

What is the significance of pineal calcifications in differentiating between a germinoma versus pineocytoma/pineoblastoma?

If pineal calcifications appear "exploded" it is a pineoBLASToma/cytoma. If pineal calcifications appear engulfed it is more likely a pineal germinoma.