# Rad/Path Case of the Month:

## 77yo Male with Forgetfulness, Paranoia, and Right Hand Weakness


Tracey Kim, MS4

Ailaura Donahoe, MS4

Lydia Du, PGY1

Tyson Tragon, MD

Matthew Hartman, MD

Allegheny General Hospital




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# Patient Presentation

- 77yo M presented to the ED with cough, headache and dizziness. He was found to have pneumonia and was also incidentally found to have a mass on CT head.
- He reports one year of forgetfulness and confusion, word-finding delays, and right hand weakness.
- Denies changes in vision; balance or coordination problems; bladder or bowel disfunction
- PMH: HTN, HLD, BPH, dyslexia, tobacco use; s/p facial surgery 12/2020
  extent of previous head radiation unknown
- MRI in 2013 and CT 2020 showed a smaller mass that has grown significantly since.
- No focal weakness or changes in sensation noted on physical exam; normal concentration and memory.

# What Imaging Should We Order?

# Select the applicable ACR Appropriateness Criteria

**Clinical Condition:** Headache

**Variant 3:** New or progressively worsening headache with one or more of the following 'red flags': subacute head trauma, related activity or event (sexual activity, exertion, position), neurological deficit, known or suspected cancer, immunosuppressed or immunocompromised state, currently pregnant, or 50 years of age or older. Initial imaging.

| Procedure | Appropriateness Category | Relative Radiation Level |
|---|---|---|
| CT head without IV contrast | Usually Appropriate | ☢☢☢ |
| MRI head without and with IV contrast | Usually Appropriate | O |
| MRI head without IV contrast | Usually Appropriate | O |
| CT head with IV contrast | Usually Not Appropriate | ☢☢☢ |
| CTA head with IV contrast | Usually Not Appropriate | ☢☢☢ |
| MRA head without IV contrast | Usually Not Appropriate | O |
| CT head without and with IV contrast | Usually Not Appropriate | ☢☢☢ |
| Arteriography cervicocerebral | Usually Not Appropriate | ☢☢☢ |
| MRA head without and with IV contrast | Usually Not Appropriate | O |

**Rating Scale:** 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate

*Relative Radiation Level

This imaging modality was ordered by the ER physician

This imaging modality was ordered by the surgeon

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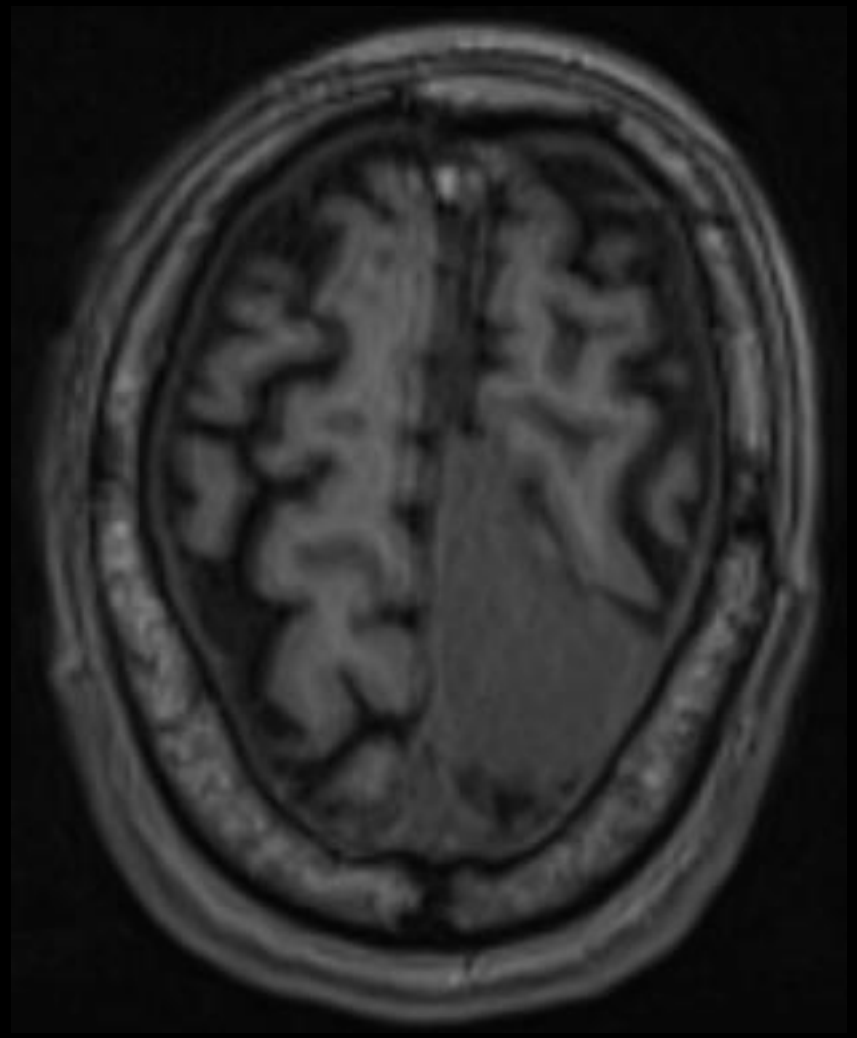
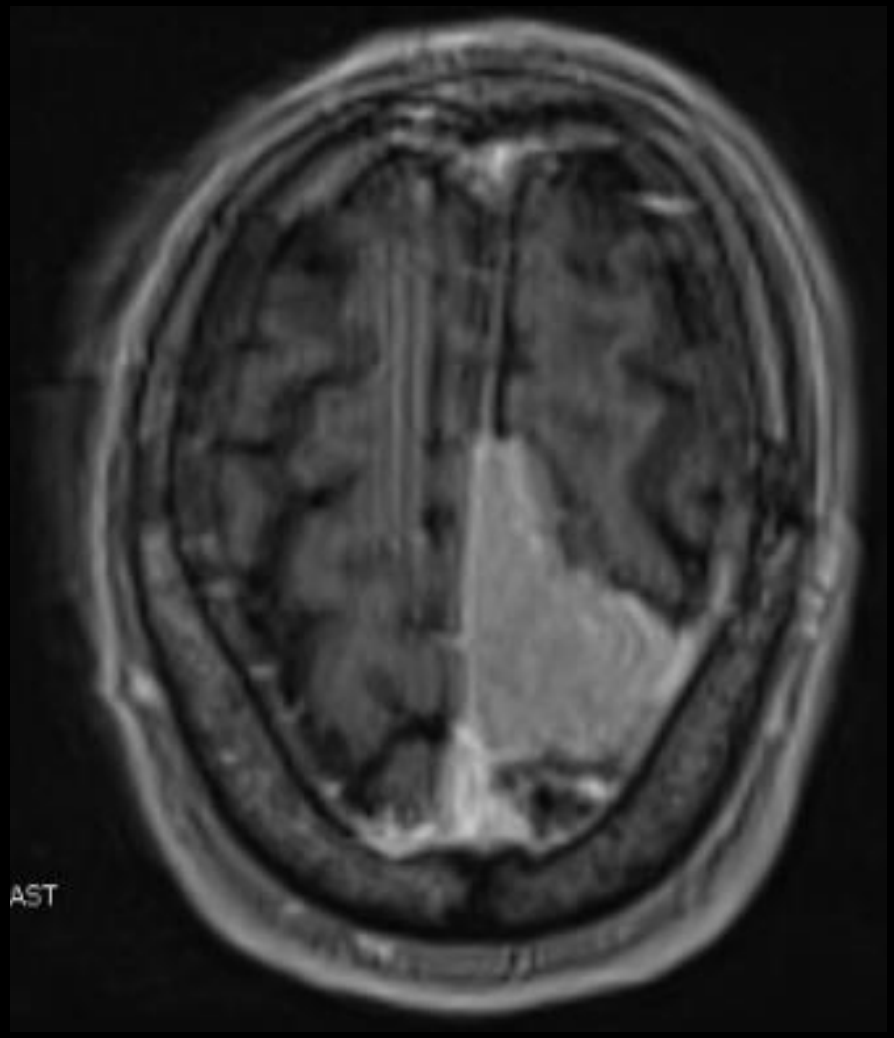
# MRI Brain with and without contrast

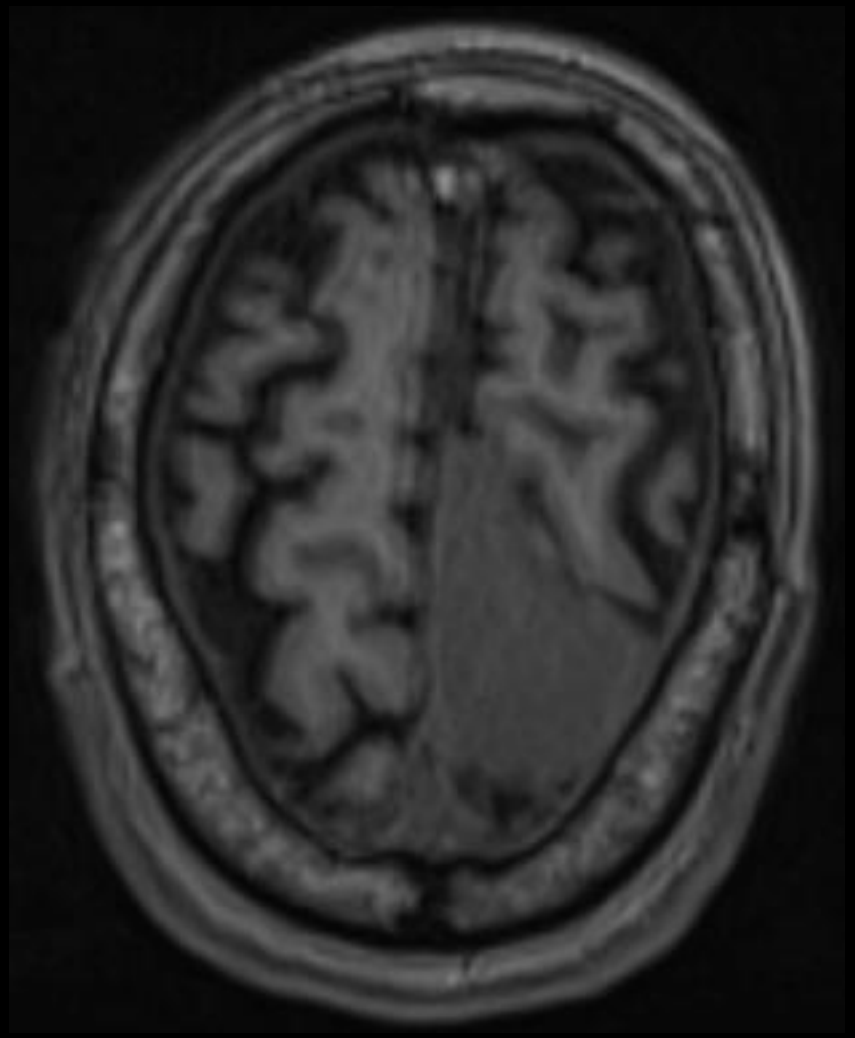


T1 pre-contrast




T1 post-contrast

# MRI Brain with and without contrast

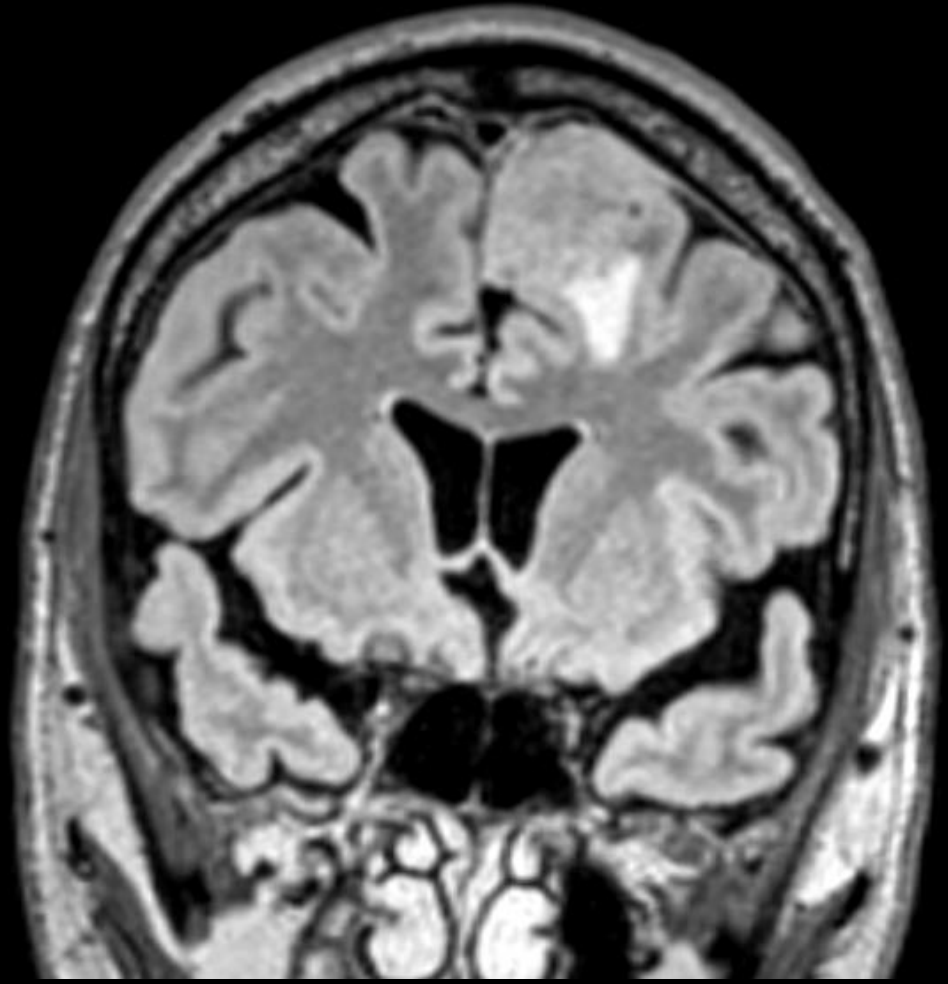


T1 pre-contrast

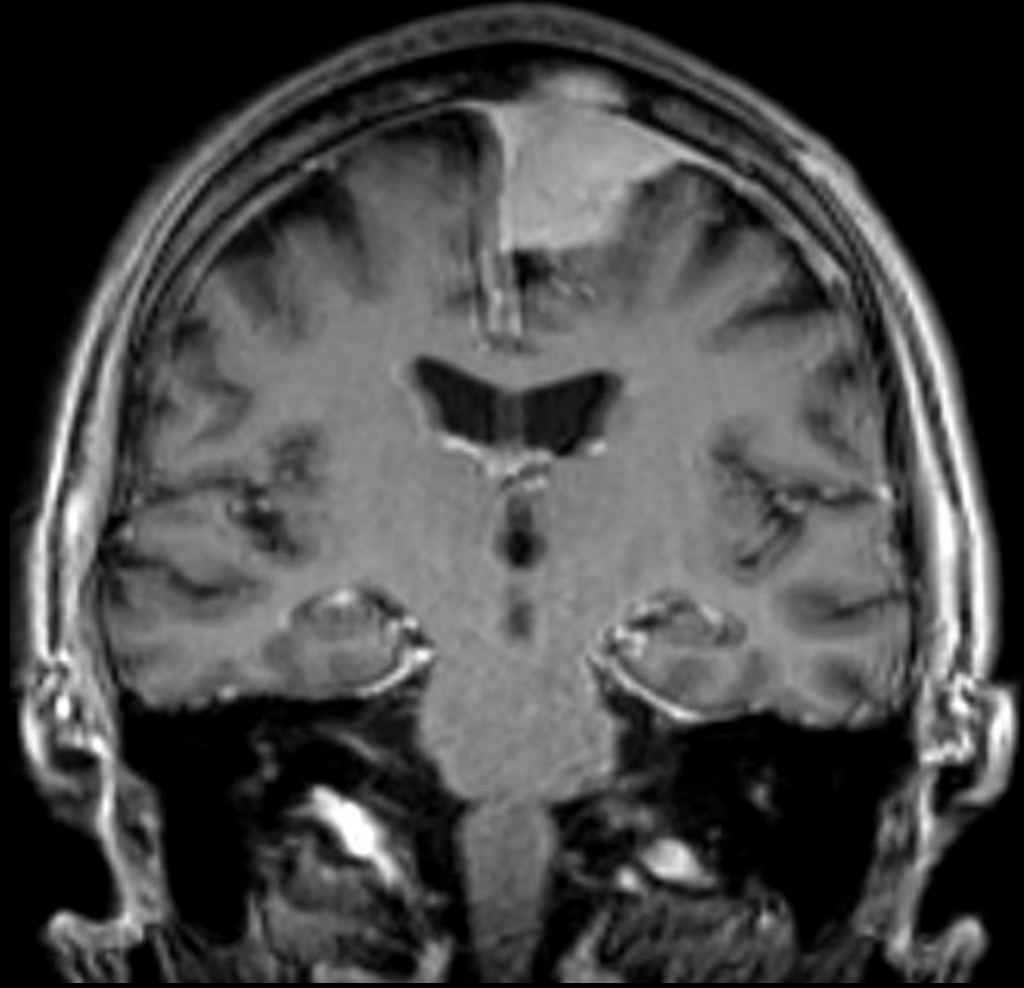

T1 post-contrast

Dural tail

Homogenously enhancing extra-axial mass with a **dural tail** along the left falx and left frontoparietal lobe

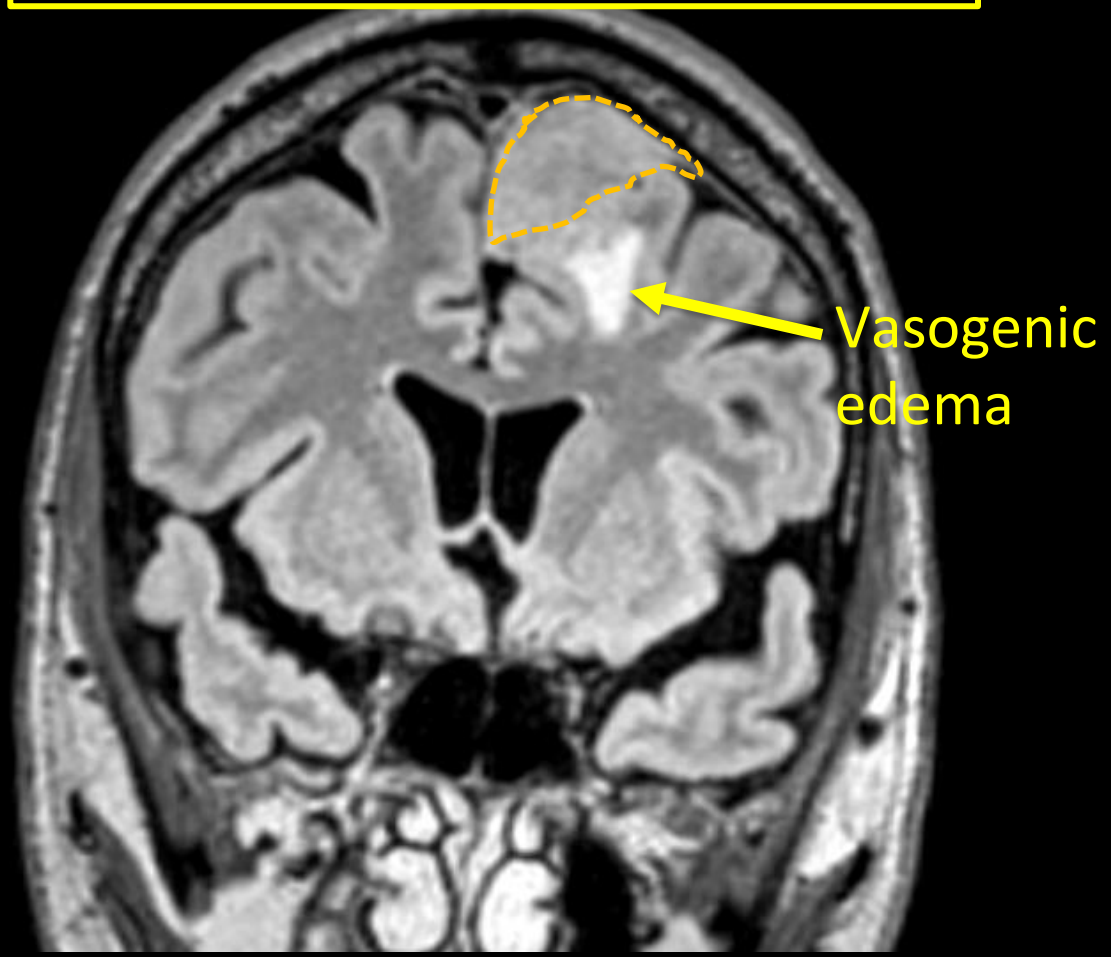


Coronal FLAIR



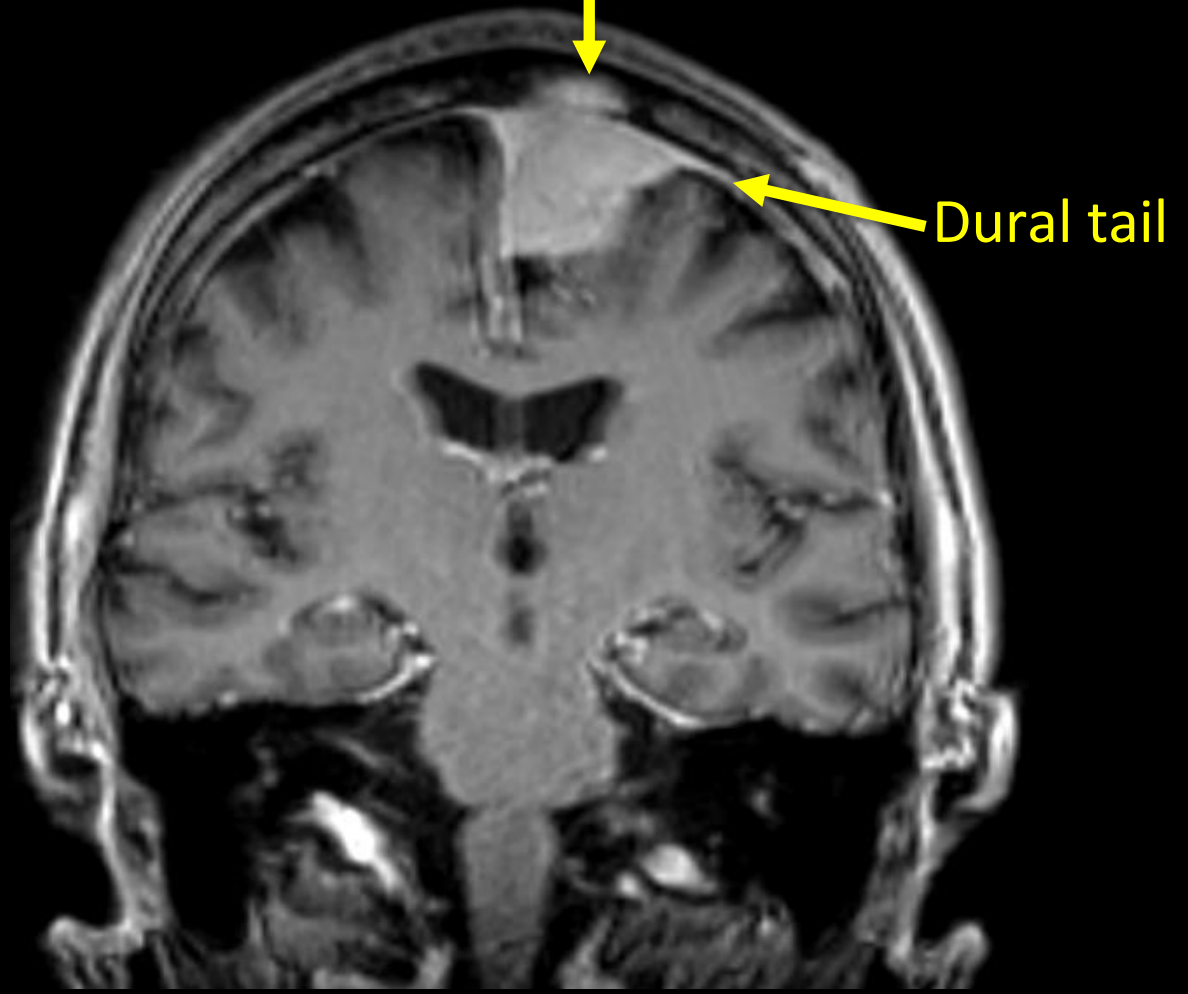
Coronal T1 post-contrast

The **mass** causes compression of the underlying brain parenchyma with **vasogenic edema.** There is an indistinct interface between the mass and the brain parenchyma.



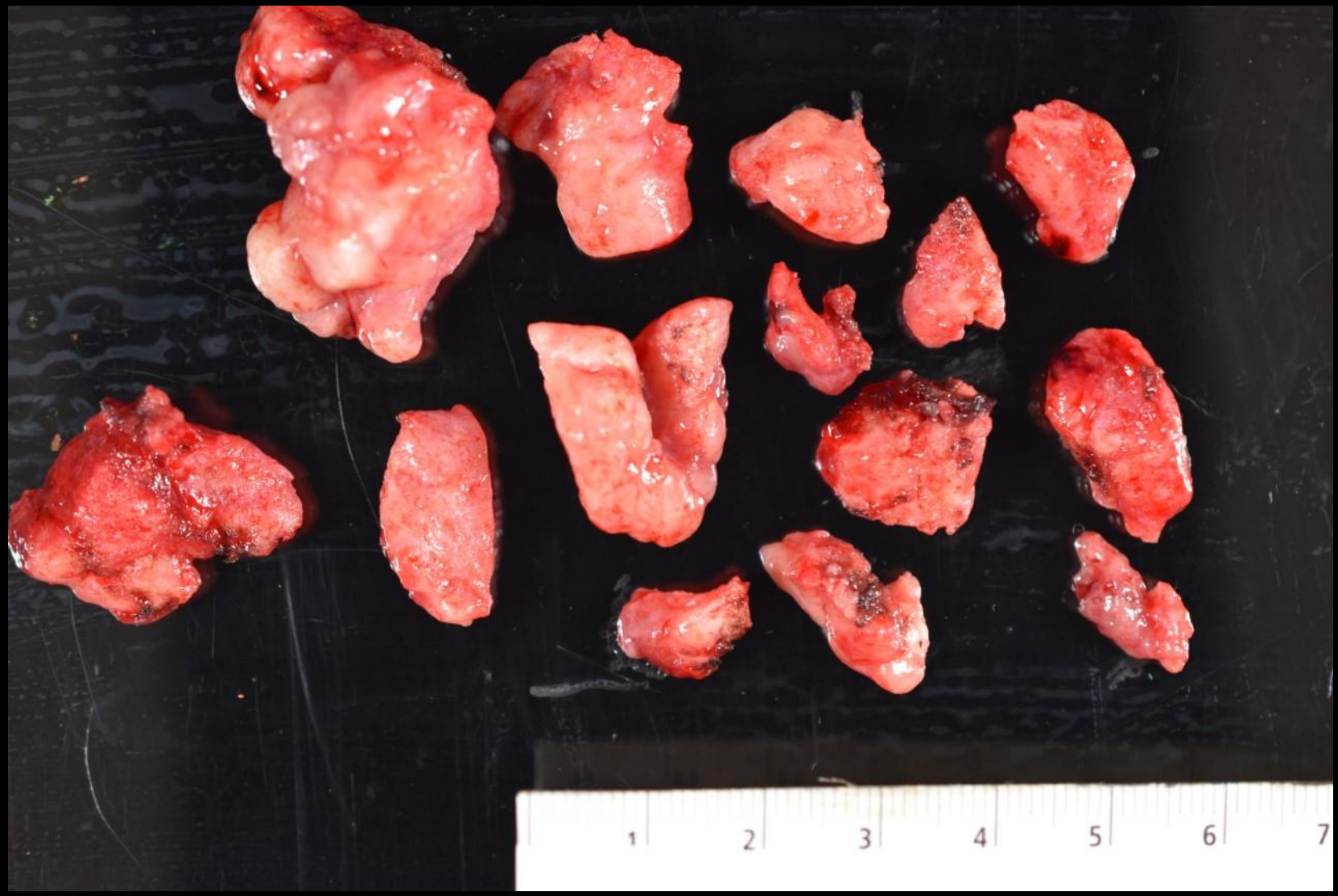

Coronal FLAIR

**Enhancement in the overlying calvarium** is concerning for bone invasion



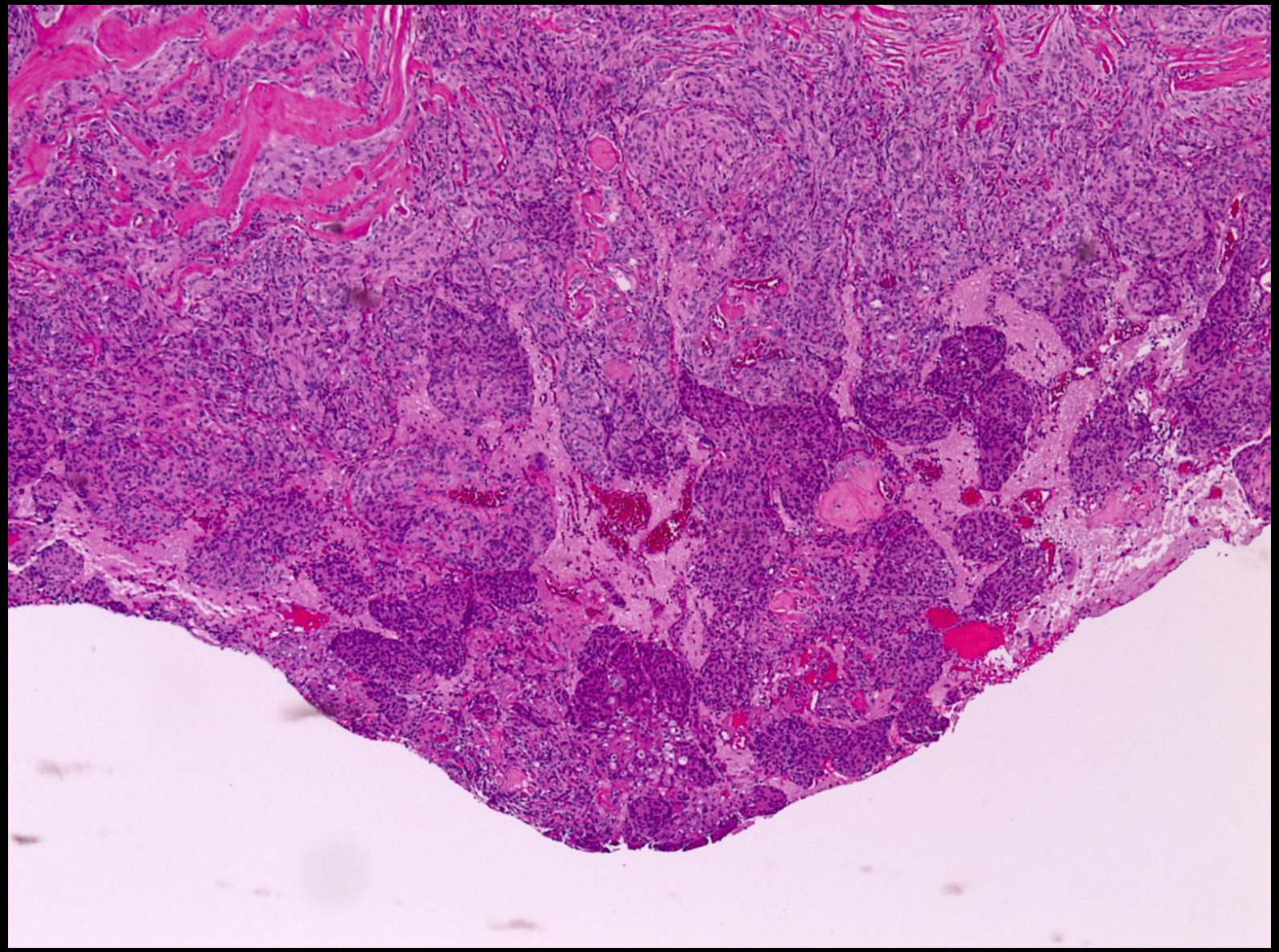

Coronal T1 post-contrast

# Gross Specimen

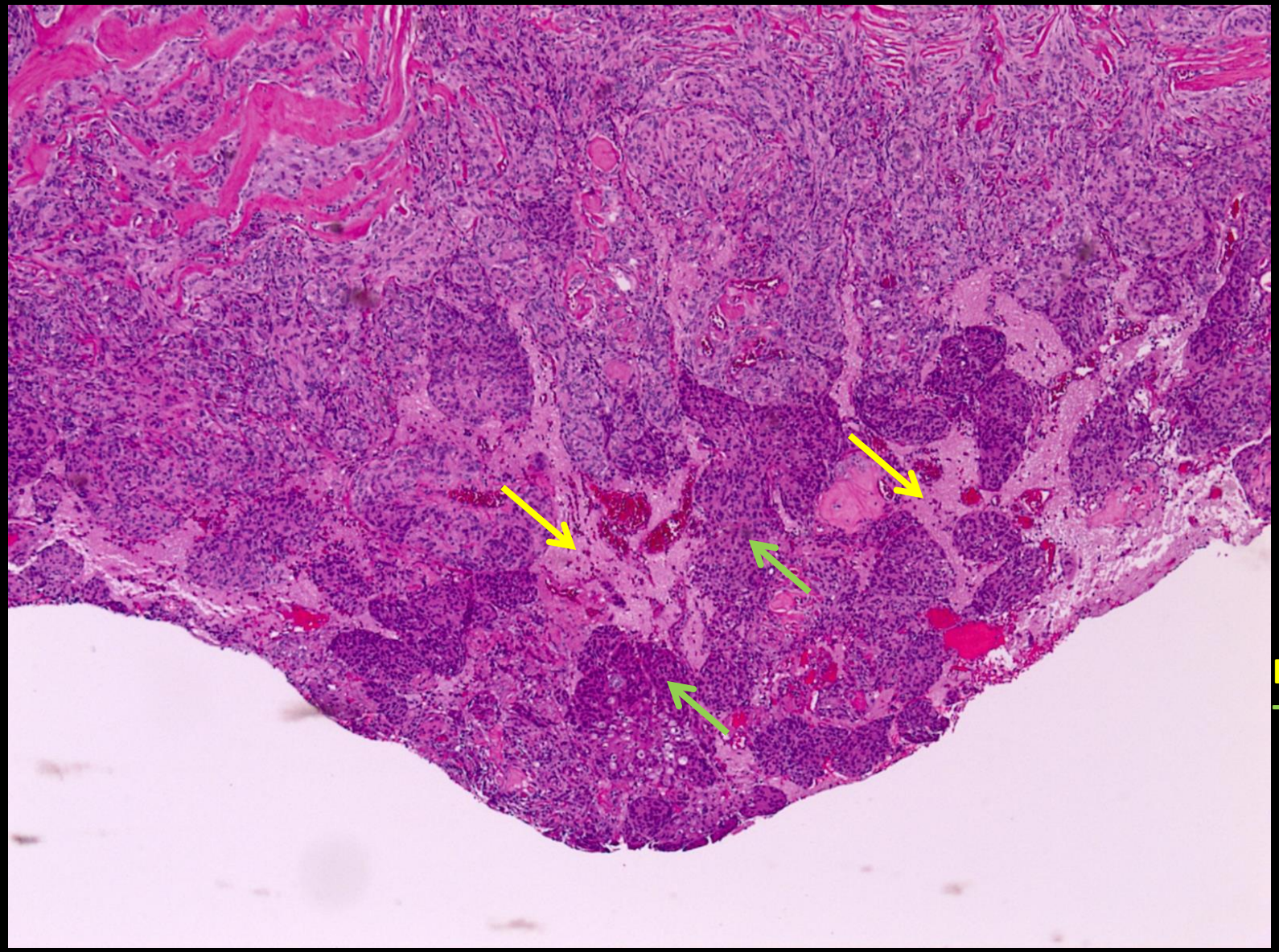



Multiple pieces of hemorrhagic, firm, tan-pink tissue

# Histology



# Histology



Brain tissue (yellow arrows)
Tumor cells (green arrows)

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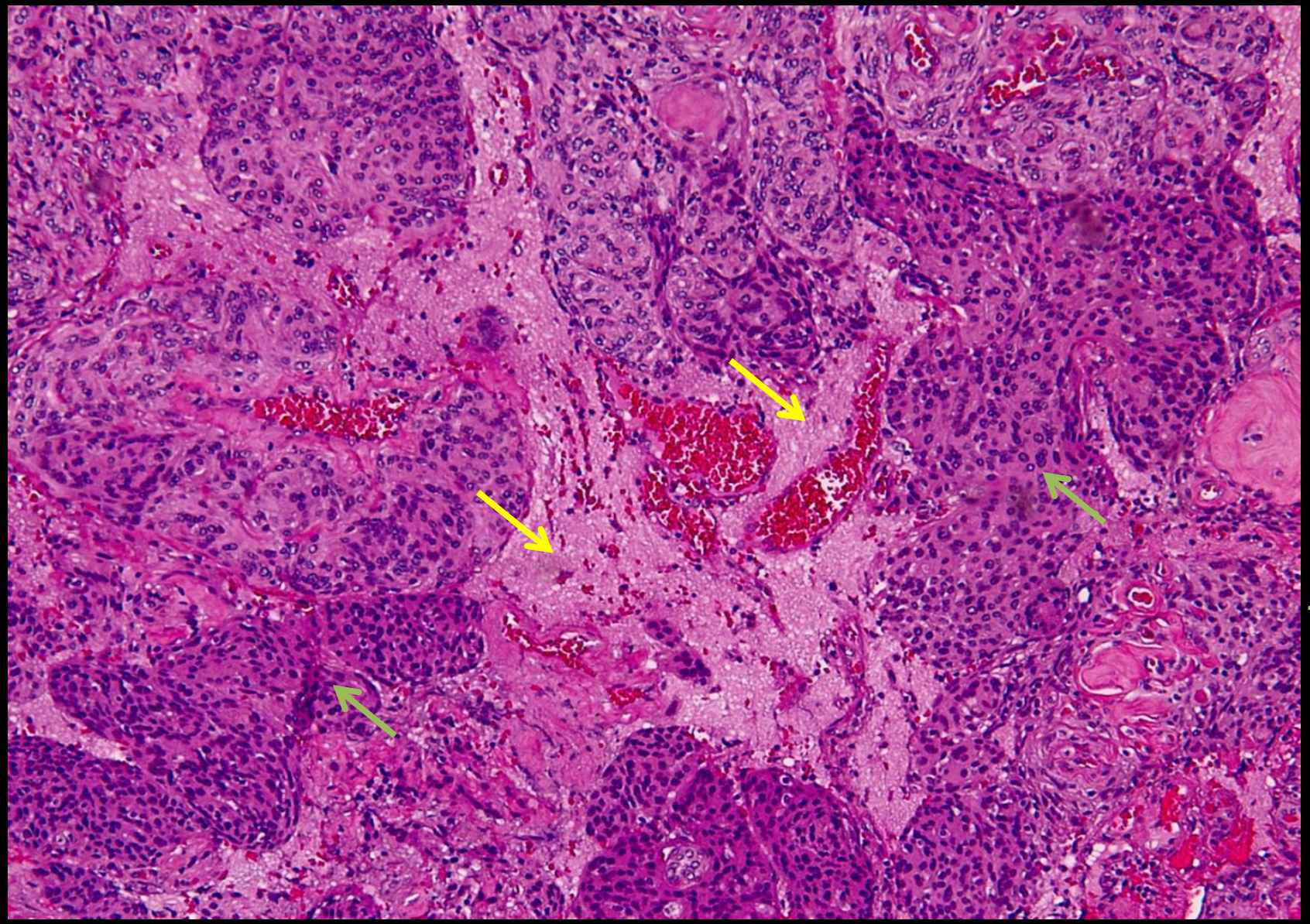
# Histology



Magnified View
Brain tissue (yellow arrows)
Tumor cells (green arrows)

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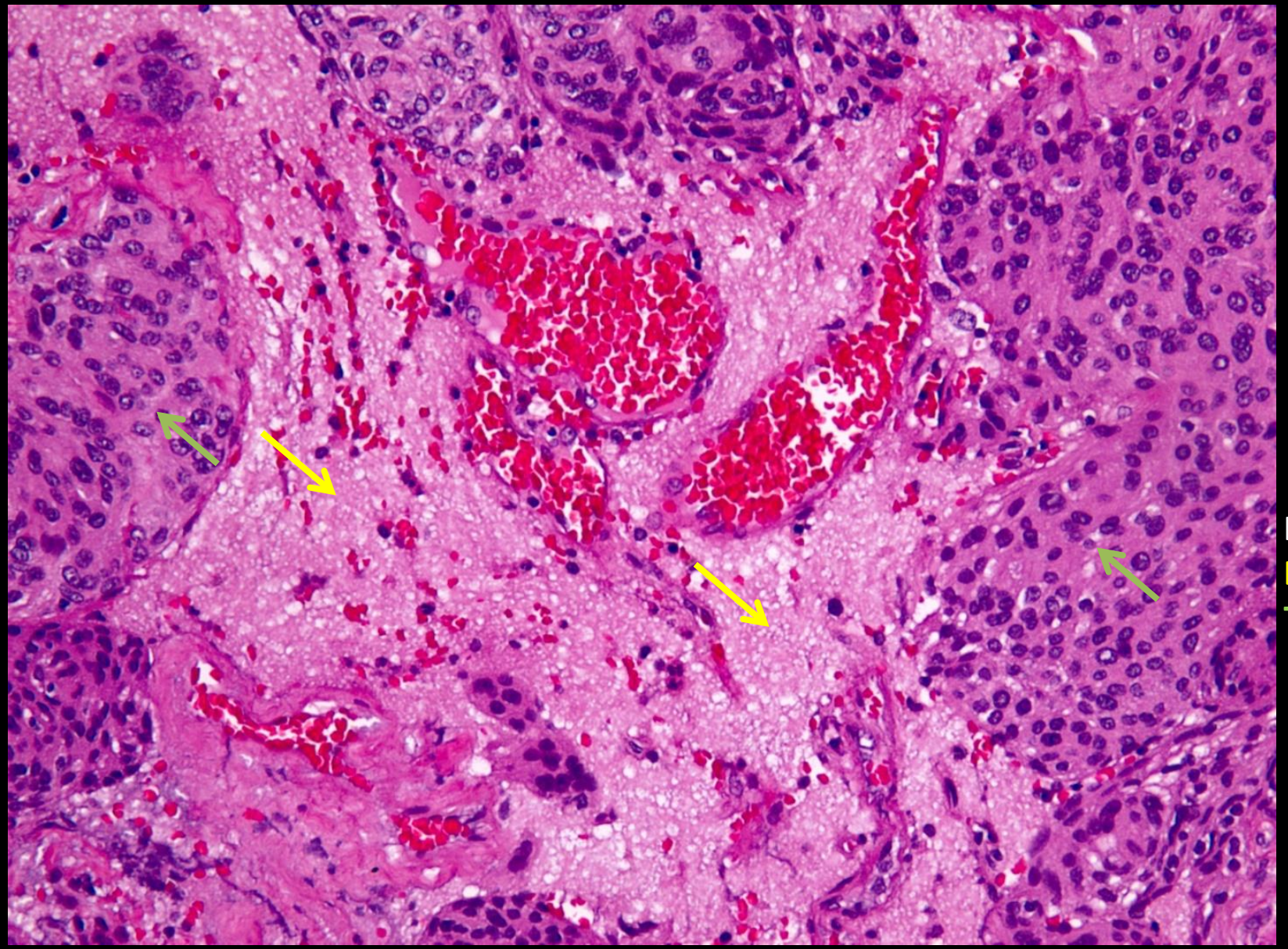
# Histology



High Power View
Brain tissue (yellow arrows)
Tumor cells (green arrows)

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# Differential Diagnosis

based on imaging

Dural Metastasis
Lymphoma
Meningioma
Solitary fibrous tumor (Hemangiopericytoma)
Gliosarcoma (adult)
Ewing Sarcoma (pediatric)

# Final Dx:

Atypical Meningioma, CNS WHO Grade II

# Case Discussion

- Patient underwent complete surgical resection.
- Pathology showed WHO Grade 2 meningioma with adjacent brain invasion

- He was neurologically intact post-op; no reported seizures.
  - on prophylactic Keppra 750mg BID for one month
  - Plans to begin radiation therapy

# Case Discussion

- Meningiomas are the most common primary CNS tumors and can be intracranial and spinal
  - Dural tail, sclerotic bone changes
- Epidemiology: more common in women; incidence increases with age >40
- Risk factors:
  - Exposure to ionizing radiation- associated with atypia/ malignant and multifocal
  - Genetic: chromosome 22- Half of those with NF2 have meningiomas- usually multiple, higher grade
- Diagnose histologically: WHO grading
  - Grade I (80-85%) is considered benign
  - Grade II (15-18%) is atypical
    - Atypical features include: brain invasion, mitotic counts of $\geq$ 4 per 10 hpf, or the presence of 3 of 5 high-grade histologic features:
      - prominent nucleoli
      - spontaneous necrosis
      - sheeting (loss of whorling or fascicular architecture)
      - small cells
      - high cellularity
  - Grade III (1-3%) is malignant: anaplastic, papillary, or rhabdoid
    - ≥20 mitoses per 10 hpfs and/or malignant characteristics resembling carcinoma, sarcoma, or melanoma

# Case Discussion

- Characteristic signs on imaging:
  - MRI: typically extra-axial, broad dural base; isointense or hypointense to gray matter on T1; hyperostosis can be observed in adjacent bone
    - CSF cleft sign: CSF rim around brain parenchyma between mass; this supports an extra-axial origin.
    - Grey matter buckling: white matter compression supporting extra-axial origin
    - "Atypical" features suggesting higher histologic grade on imaging:
      - Indistinct tumor-brain interface, CSF cleft sign is absent, peritumoral vasogenic edema, significantly lower ADC value on diffusion weighted imaging
  - CT: hyperdense mass (70-75%), calcification (20-25%), hyperostosis of adjacent bone

- Treatment: (level of resection based on Simpson grading)
  - No treatment is an option for Grade I without symptoms.
  - Gross total resection (Simpson grade I-III) can be curative and is the goal
  - Although strong evidence is not yet confirmed, adjuvant RT is increasingly given post resection in atypical and malignant meningiomas, which have a high chance of recurring within five years, especially post subtotal resections (Simpson grade IV)
- F/u with MRI surveillance for recurrence

# References


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