

RADY 401 Case Presentation

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Acknowledgement: Sallie Wilson, MD for help with IMPAX

Ed. John Lilly, MD



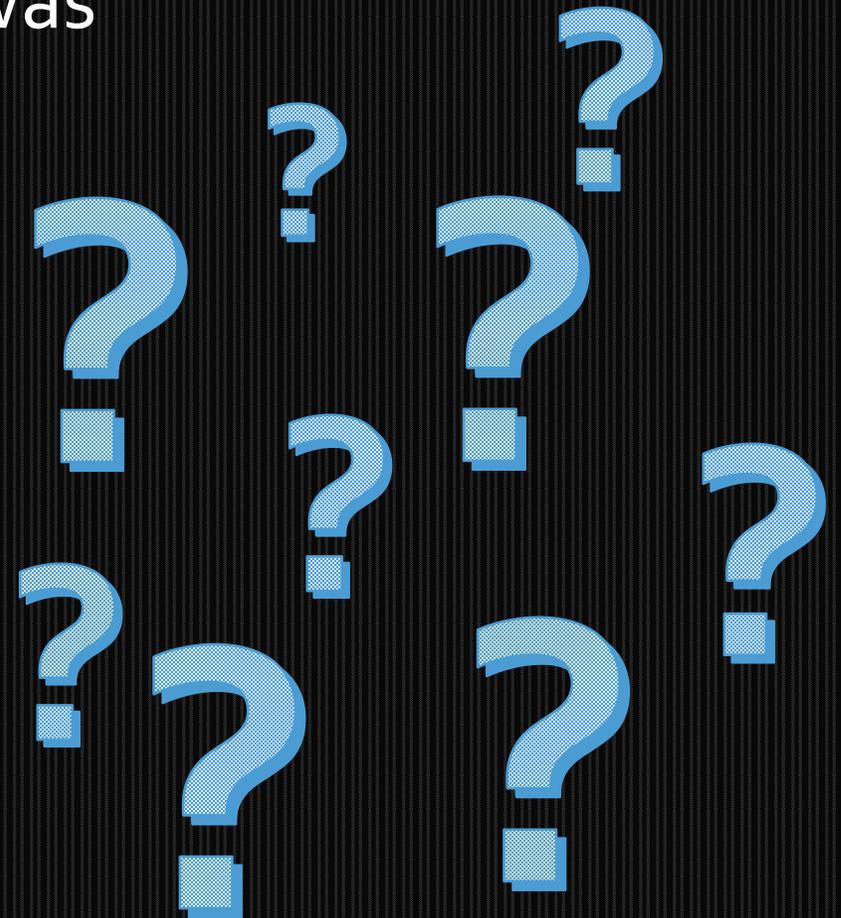
SCHOOL OF MEDICINE
Radiology

Focused patient history and workup

- Patient A is a 92 y.o. male who presented at the geriatric clinic on 06/08 with worsening left-sided deficits, facial droop, inattention, sleepiness, and worsened stooped gait.
 - PMHX notable for: Right parietal ischemic stroke with hemorrhagic conversion 12/2017; A-fib, Eliquis 2.5 mg BID; s/p pacemaker
 - Physical Exam
 - Neuro: "Alert, but somewhat inattentive. Notable facial droop, cranial nerves otherwise intact. Seems to be neglecting the left side, able to ambulate, favors the right leg, has some trouble cooperating with instructions for strength testing, though in general seems to have full strength on individual muscle testing. Unable to fully supinate his left palm in trying to test for pronator drift."

Focused patient history and workup

- Head CT was ordered and patient was taken to the ED...
 - Differential for current symptoms¹
 - Lyme disease
 - Otitis media
 - Ramsay Hunt
 - Sarcoidosis/Guillain-Barre
 - Tumor
 - Multiple sclerosis
 - Stroke/CVA



List of imaging studies

First (Read @ 3:35pm on 6/8):

- CT Head without contrast was ordered.

Second (Read @ 10:42pm on 6/8):

- MRI Brain without and with contrast

Variant 3: New focal neurologic defect, fixed or worsening. Less than 6 hours. Suspected stroke.

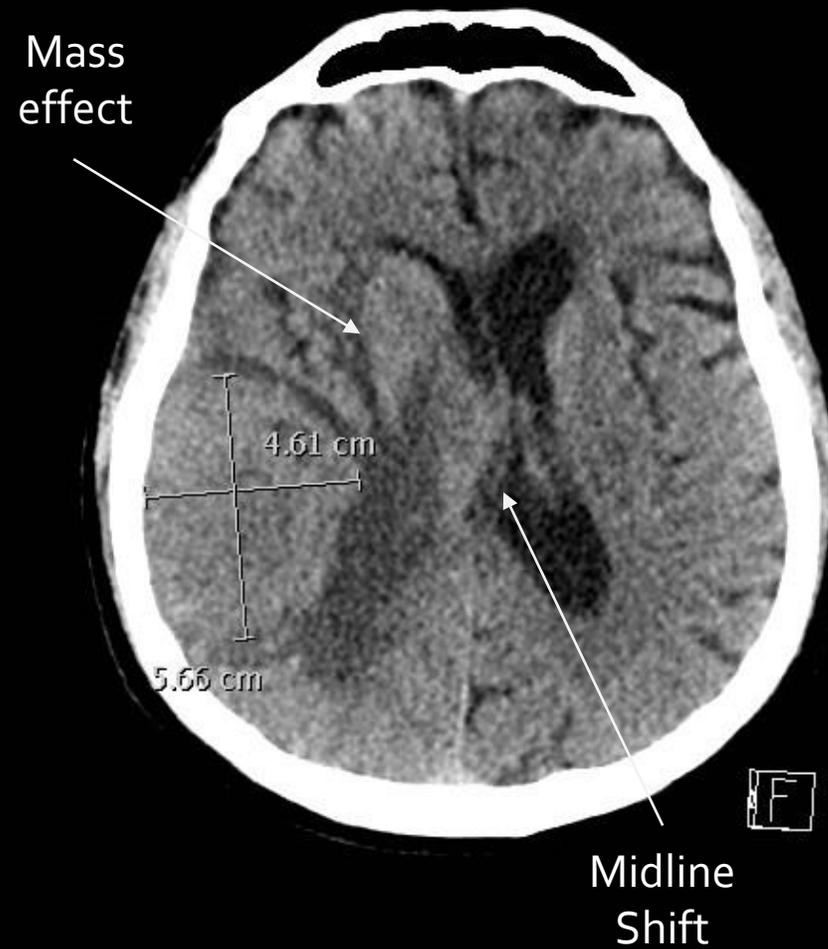
Radiologic Procedure	Rating	Comments	RRL*
✓ CT head without IV contrast	9	Parenchymal brain imaging and CT or MR vascular imaging of the head and neck should be considered. Noncontrast head CT is often obtained first to assess for hemorrhage or large infarct. MRI is more sensitive than CT for acute infarct.	☼☼☼
MRI head without IV contrast	8	Parenchymal brain imaging and CT or MR vascular imaging of the head and neck should be considered. Can be useful if there is a contraindication to contrast. Noncontrast head CT is often obtained first to assess for hemorrhage or large infarct. MRI is more sensitive than CT for acute infarct.	○
✓ MRI head without and with IV contrast	8	Noncontrast head CT is often obtained first to assess for hemorrhage or large infarct. MRI head with contrast can be helpful to determine the age of infarct and to evaluate for other causes of symptoms such as tumor or infection.	○
MRA head and neck without IV contrast	8	Can be obtained in conjunction with MRI head. Preferred MR vascular imaging of the head and neck includes noncontrast head MRA and contrast-enhanced neck MRA. Can be useful in patients with renal failure or contrast allergies.	○
MRA head and neck without and with IV contrast	8	Can be obtained in conjunction with MRI head. Preferred MR vascular imaging of the head and neck includes noncontrast head MRA and contrast-enhanced neck MRA.	○
CTA head and neck with IV contrast	8	CTA can be obtained after NCCT.	☼☼☼
CT head perfusion with IV contrast	6		☼☼☼
MRI head perfusion with IV contrast	5		○
Arteriography cervicocerebral	5		☼☼☼
CT head with IV contrast	3		☼☼☼
CT head without and with IV contrast	3		☼☼☼
US duplex Doppler carotid	2		○

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

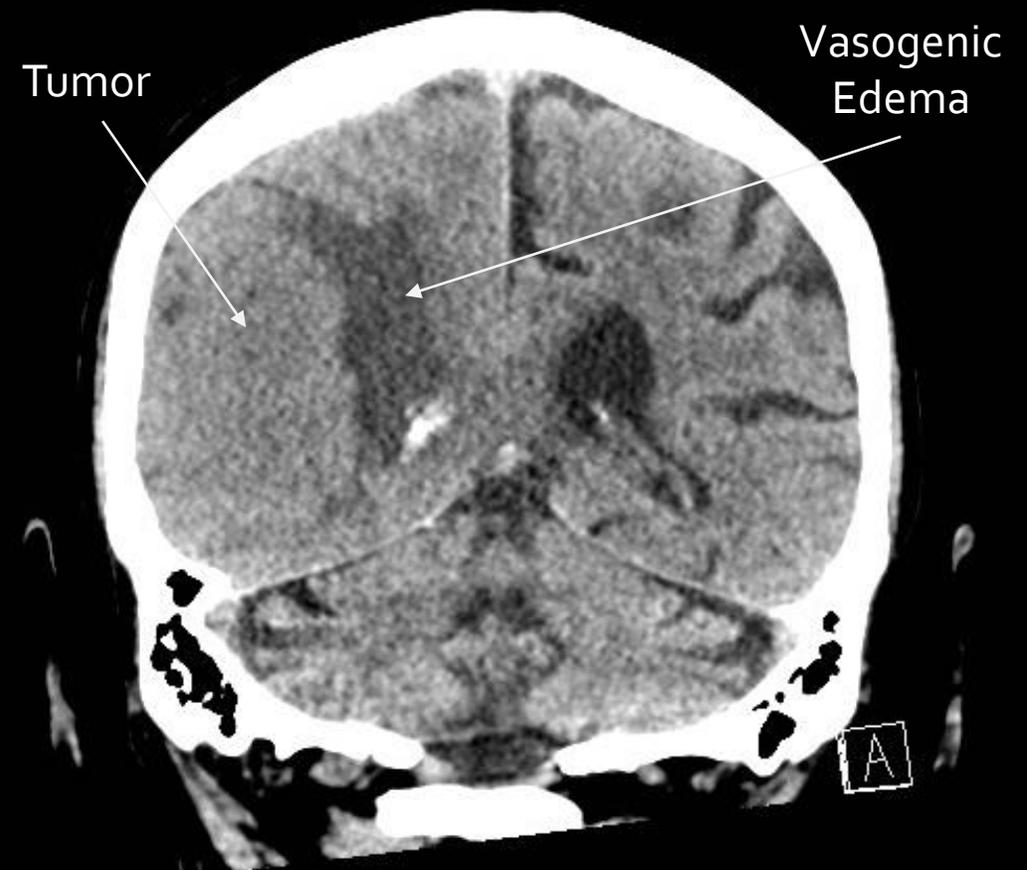
***Relative Radiation Level**

CT Head Without Contrast

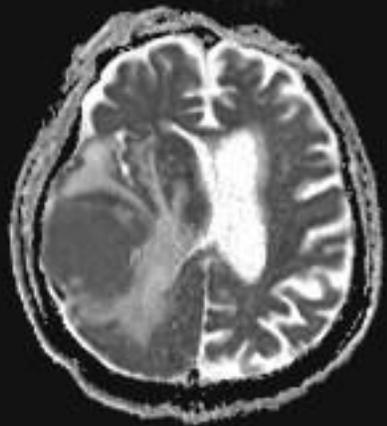
Axial View



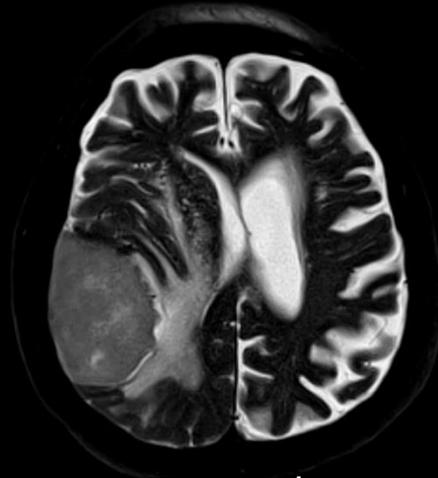
Coronal View



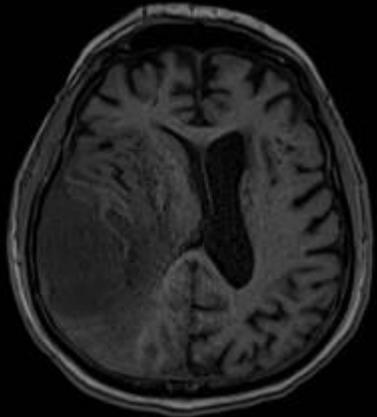
MRI Brain Without and With Contrast



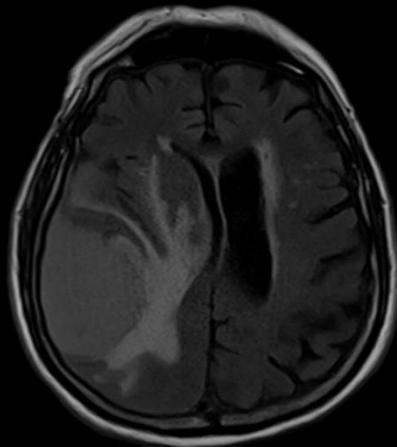
Diffusion-weighted (ADC)



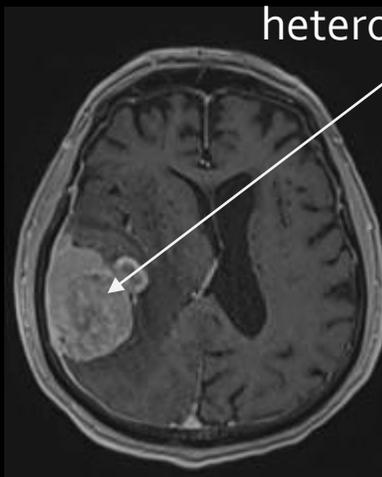
T2 Axial



T1 Without Contrast



FLAIR



T1 With Contrast

Mildly
heterogeneous

Coronal T1 With Contrast

4.8 x 5.1 x 6 cm
mass



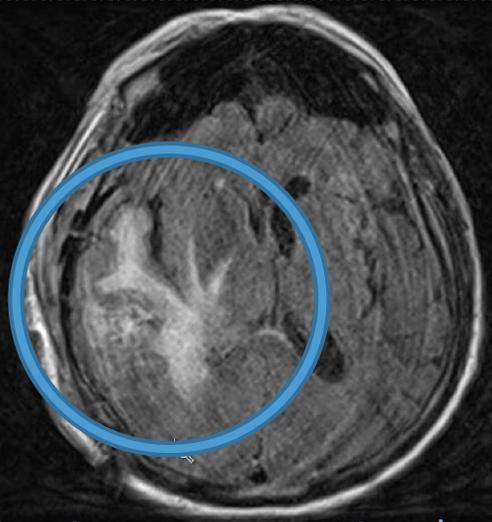
5.96 cm

Patient treatment or outcome

- **Dx: Right temporoparietal meningioma**
 - **Meningiomas** are intracranial tumors arising from the level of the meninges. They are typically **benign** and **slow-growing** with low potential to spread. Common symptoms include headache, weakness, paralysis, visual field reduction, and speech problems².
 - Typically, these tumors have **well-defined borders** and are definitively diagnosed via biopsy³.
- **Tx: Right temporoparietal craniotomy for resection of meningioma**
 - The goal of the craniotomy is to provide full access to the meningioma and complete removal³. The patient will then undergo long-term observation, which involves **repeat MRIs**. May potentially require radiation therapy dependent on surgical outcomes.

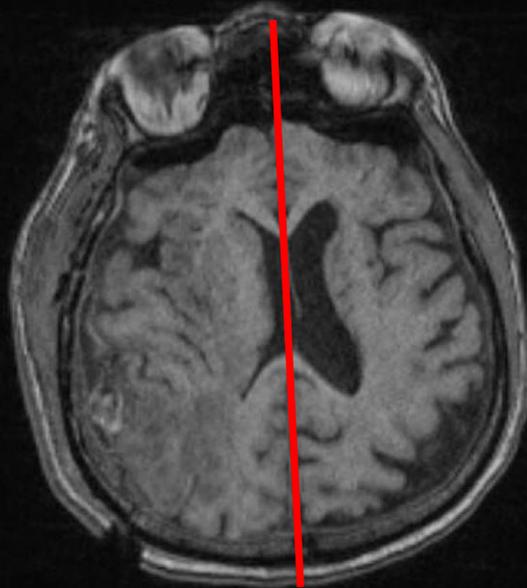
MRI Brain Without and With Contrast (Post-Op)

T2 Axial



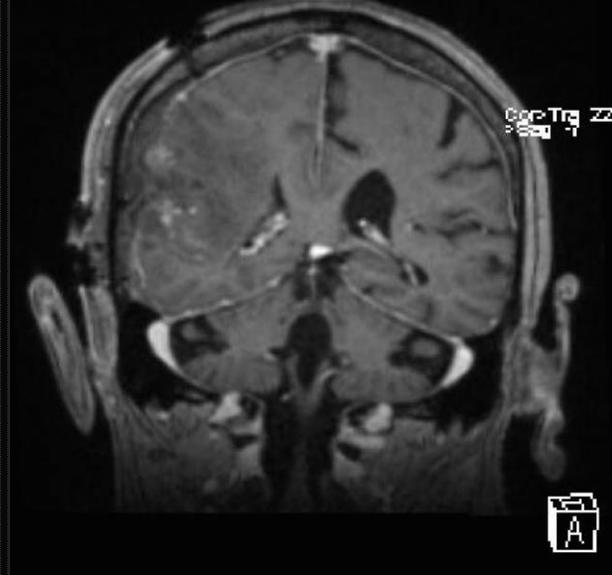
Persistent vasogenic edema

T1 Axial



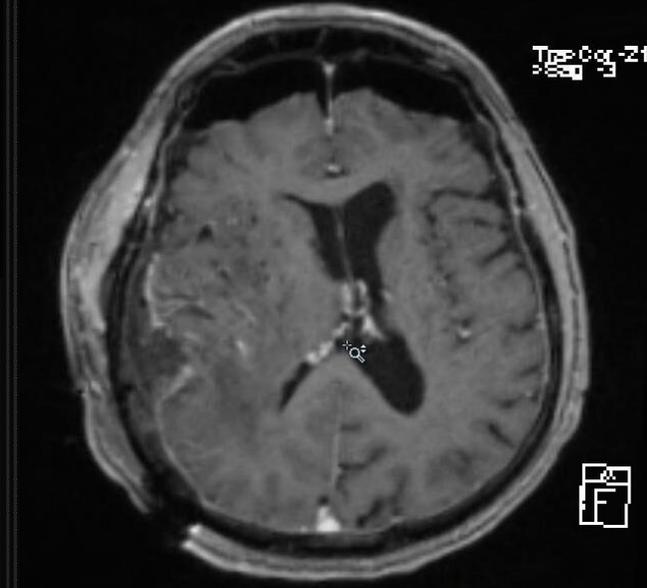
Decreased midline shift

T1 Coronal



No obvious tumor residual visualized

T1 Axial Post



T1 Axial Post

CT? MRI? All of the above?

Clinical Condition: Focal Neurologic Deficit

Variant 4: Single or multiple focal neurologic deficits, subacute onset, progressive or fluctuating.

Radiologic Procedure	Rating	Comments	RRL*
MRI head without and with IV contrast	8		0
MRI head without IV contrast	8		0
CT head without IV contrast	7	Acute screening.	☼☼☼☼
MRA head and neck without and with IV contrast	6		0
MRA head and neck without IV contrast	6		0
CT head without and with IV contrast	6	If MRI is unavailable or contraindicated. Consider CT perfusion.	☼☼☼☼
CTA head and neck with IV contrast	6	For suspected vascular abnormality.	☼☼☼☼
CT head perfusion with IV contrast	5		☼☼☼☼
MRI head perfusion with IV contrast	5		0
CT head with IV contrast	4		☼☼☼☼
MR spectroscopy head without IV contrast	4	For selected cases.	0
MRI functional (fMRI) head without IV contrast	3		0
Tc-99m HMPAO SPECT head	3	For problem solving in HIV/AIDS.	☼☼☼☼☼
Thallium-201 SPECT head	3	For problem solving in HIV/AIDS.	☼☼☼☼☼
Arteriography cervicocerebral	3	For problem solving.	☼☼☼☼
FDG-PET/CT head	2		☼☼☼☼☼

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

*Relative Radiation Level

- MRI technology is the **gold** standard for intracranial disorders, including tumors. But CTs can still be useful to detect most meningiomas⁴.
 - Consider pros and cons of CT vs. MRI.
 - Availability/urgency
 - Cost
 - Radiation exposure
 - Bone/tissue involvement
- MRI pulse sequences = radiofrequency pulses and gradients that result in images with a particular appearance.
 - Can be utilized to aid in diagnoses and understand etiologies
 - Common sequences include:
 - T₁, T₂, FLAIR, DIR, DWI (ADC, DTI), etc.

MRI Pulse Sequences and Tumors

- Standard brain MRI protocol can include T₁, T₂, Diffusion-weighted imaging (DWI), and fluid-attenuated inversion recovery (FLAIR) complemented by T₁-W₁ post gadolinium⁵
- Diffusion-weighted imaging (DWI) maps molecular motion of water (Brownian motion), can be helpful for early stroke detection and tumors (i.e. grading of meningiomas)⁶
- Many other modalities present that can assist neuroradiology in understanding the etiology of brain pathology.

CT and MRI for Diagnosing Meningiomas

■ CT⁷

- Specificity: 95.0%
- Sensitivity: 74.0%
- PPV: 95.0%
- NPV: 75.0%

■ MRI⁸

- Specificity: 86.1%
- Sensitivity: 96.9%
- PPV: 78.1%
- NPV: 98.2%



<https://www.amberusa.com>

Costs \$\$ - Insured vs. Uninsured

Self-Pay⁹:

- CT w/o Contrast = **\$2,207**
- MRI w/ and w/o Contrast = **\$6,490**

Private Insurance (BCBSNC)¹⁰:

- CT w/o Contrast = **\$219 – \$1,170**
- MRI w/ and w/o Contrast = **\$932 – \$3,159**



Wrap-Up!

- Both CT and MRI have roles in the diagnosis of brain tumors
- CT usually completed in the acute setting, followed by MRI to confirm.
- CT Chest/Abdomen/Pelvis can help rule in/out mets
- Post op MRIs completed to detect surgical excision success
- Costs can be high, utilize ACS Appropriateness to determine risks
- Pt was discharged on June 16th, 2018 (8 days from first CT scan)

References

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