AMSER Case of the Month October 2025

22-year-old-woman with altered mental status

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Patient Presentation

- A 22-year-old female with pmhx of schizophrenia and Bipolar disease (BPD) presents to the VCU ED for worsening altered mental status (AMS) and forensic psych evaluation.

- Pt initially found down in hotel room one day prior after suspected sexual assault and transported to OSH. Had significant AMS at the outside hospital but initial CTH normal. Subsequent transfer to VCU ED for reasons above.

Patient Presentation

- Pertinent past medical/surgical history: BPD1 and Schizophrenia
- Vitals:
  - BP – 137/99
  - HR – 94
  - RR – 14
  - Temp – 98.1
- Physical Exam:
  - Head: Atraumatic and normocephalic
  - Neurological: AAOx1 to name, lethargic, somnolent, moving extremities spontaneously
  - No other relevant exam findings

Pertinent Labs

- ABG: normal
- CBC
  - WBC: 21
  - HgB and Plt wnl
- CMP + Liver Panel
  - AST: 485
  - Alt: 367
  - CK: 4734
  - BMP + electrolytes wnl
- Urine Drug Screen (UDS) : positive for cocaine, marijuana, and opioids
- UA: Normal

Patient Presentation Cont.

- Patient was given time to metabolize drugs found on UDS and renal insult was medically managed.

- Continued to have moderate/severe AMS despite time allowed for metabolization and appropriate initial clinical management

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria

Home Altered Mental Status, Coma, Delirium, and Psychosis

Variants

1. **Adult. Altered mental status despite clinical management of known medical illness or toxic-metabolic cause. Initial imaging.**

Documents

Documents

Narrative

Evidence Table

Lit Search

Appendix

Scenario	Scenario ID	Procedure	Adult RRL	Peds RRL	Appropriateness Category
Altered mental status, medical illness clinically managed, initial imaging	3149734	CT head without IV contrast	1-10 mSv ☢☢☢	0.3-3 mSv [ped] ☢☢☢	Usually appropriate
		MRI head without and with IV contrast	0 mSv O	0 mSv [ped] O	May be appropriate
		MRI head without IV contrast	0 mSv O	0 mSv [ped] O	May be appropriate
		MRI head with IV contrast	0 mSv O	0 mSv [ped] O	Usually not appropriate
		CT head with IV contrast	1-10 mSv ☢☢☢	0.3-3 mSv [ped] ☢☢☢	Usually not appropriate
		CT head without and with IV contrast	1-10 mSv ☢☢☢	3-10 mSv [ped] ☢☢☢☢	Usually not appropriate

Repeat CTH w/o contrast was ordered by the ER physician to evaluate for possible hidden intracranial pathology in setting of persistent AMS

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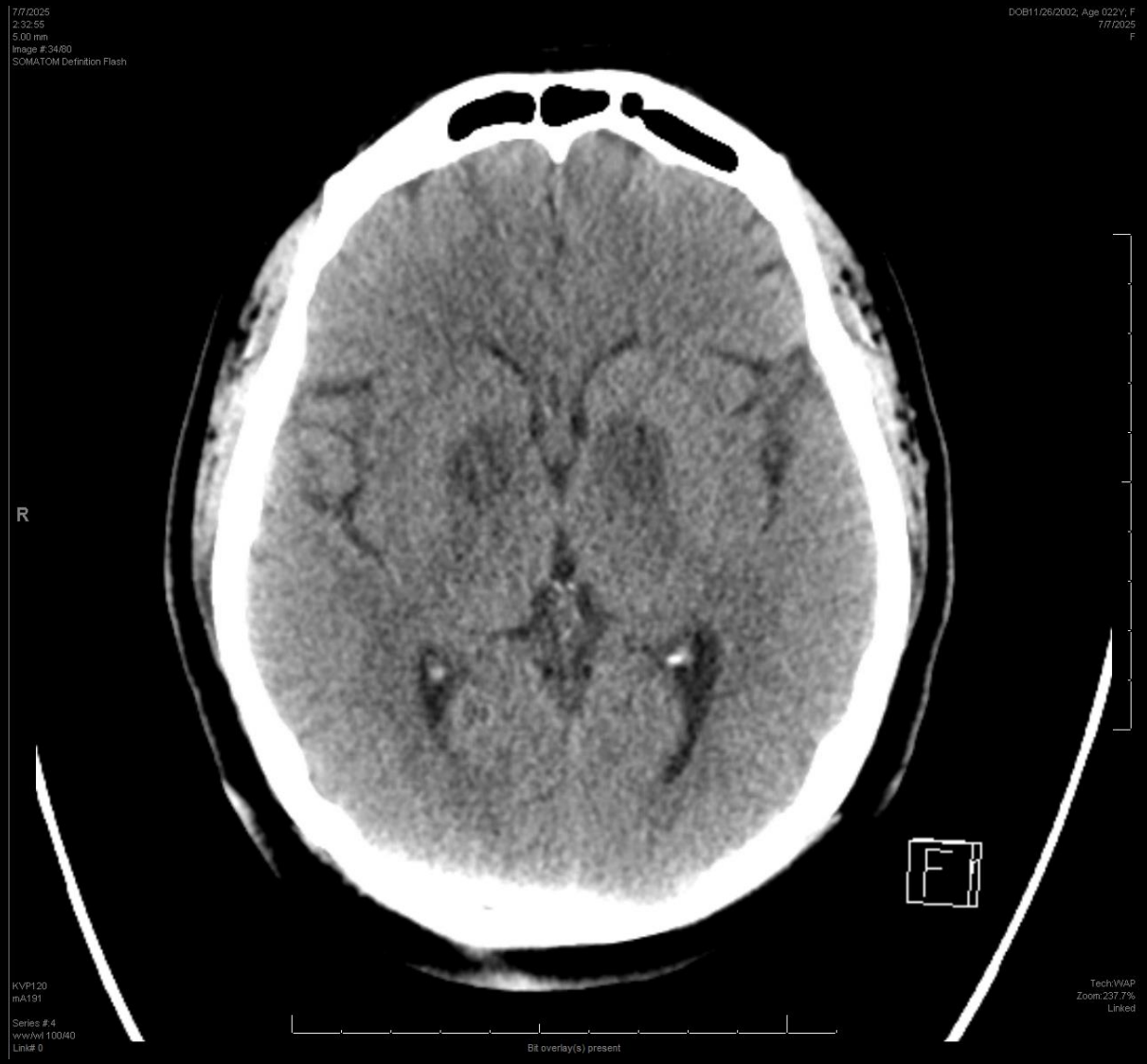
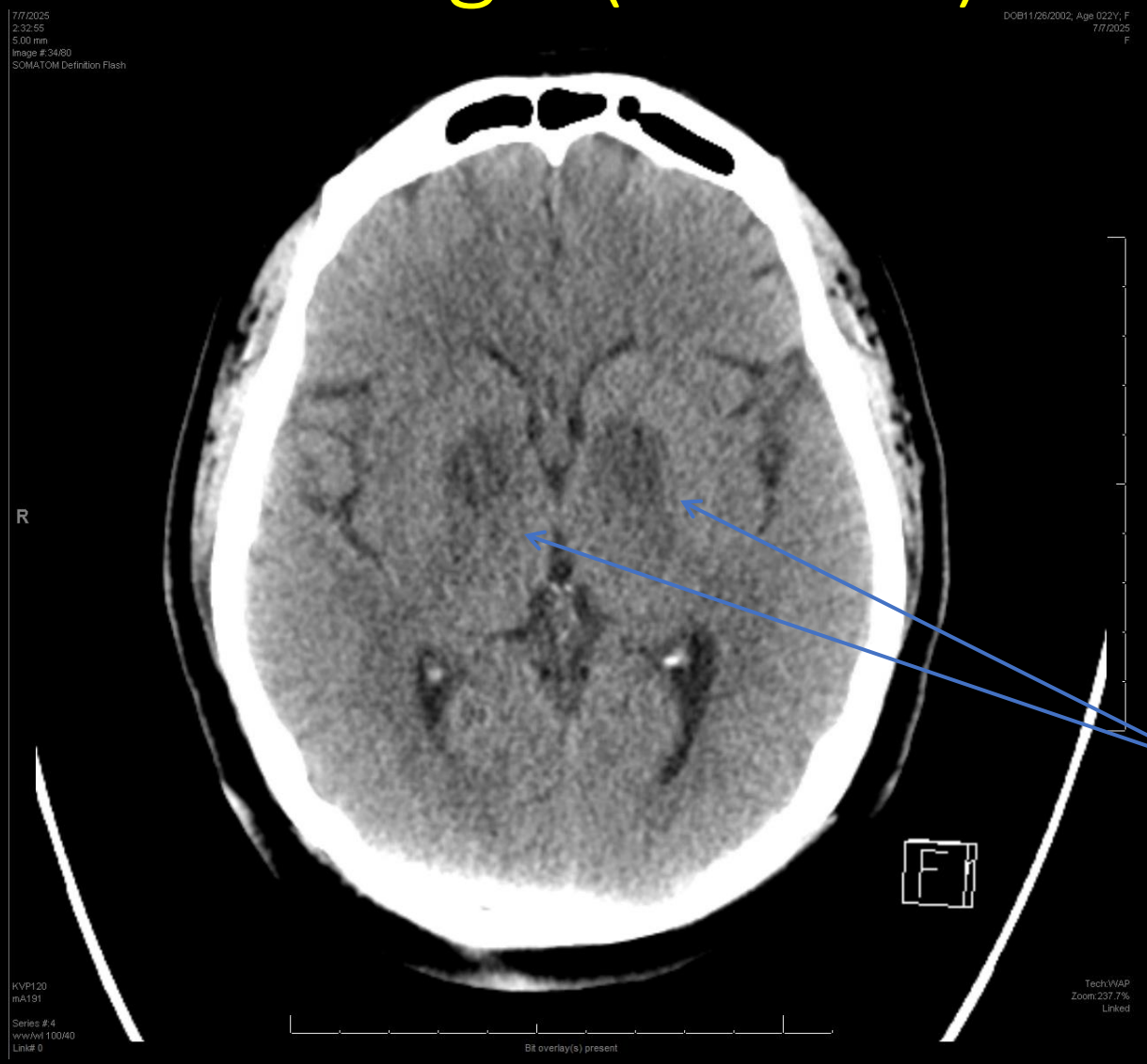
Findings (unlabeled)



Findings: (labeled)



Bilateral symmetric hypodensities in basal ganglia extending into the adjacent internal capsule concerning for acute infarct.

Select the applicable ACR Appropriateness Criteria for Follow up Imaging

Variant 3: **Adult. Recent ischemic infarct; less than 24 hours. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
MRA head without IV contrast	Usually Appropriate	O
MRA neck without and with IV contrast	Usually Appropriate	O
MRI head without IV contrast	Usually Appropriate	O
CT head without IV contrast	Usually Appropriate	☢☢☢
CTA head with IV contrast	Usually Appropriate	☢☢☢
CTA neck with IV contrast	Usually Appropriate	☢☢☢
US duplex Doppler carotid artery	May Be Appropriate	O
MRA neck without IV contrast	May Be Appropriate	O
MRI head perfusion with IV contrast	May Be Appropriate	O
CT head perfusion with IV contrast	May Be Appropriate	☢☢☢
US duplex Doppler transcranial	Usually Not Appropriate	O
Arteriography cervicocerebral	Usually Not Appropriate	☢☢☢
MRA head without and with IV contrast	Usually Not Appropriate	O
MRI head without and with IV contrast	Usually Not Appropriate	O
MRV head without and with IV contrast	Usually Not Appropriate	O
MRV head without IV contrast	Usually Not Appropriate	O
CT head with IV contrast	Usually Not Appropriate	☢☢☢
CT head without and with IV contrast	Usually Not Appropriate	☢☢☢
CTV head with IV contrast	Usually Not Appropriate	☢☢☢

- Neurology consulted due to CT findings
- After discussion with radiology, recommended MRI without IV contrast to assess for progression and further characterization of lesion given concern for infarct.

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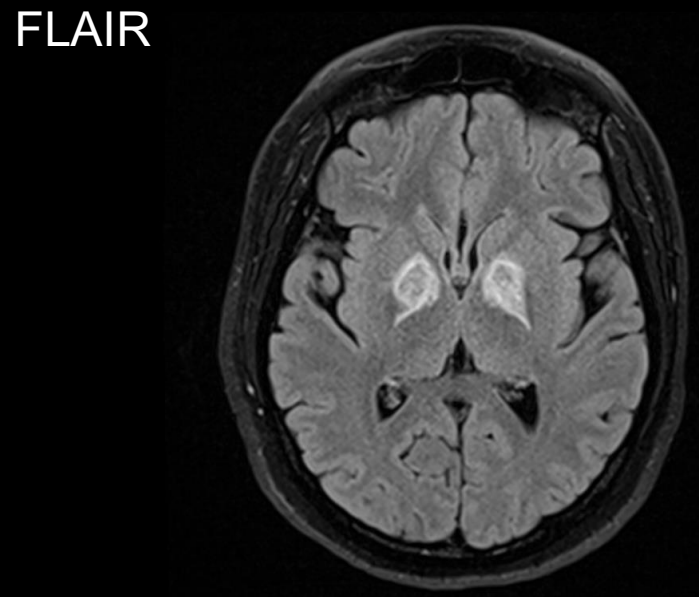
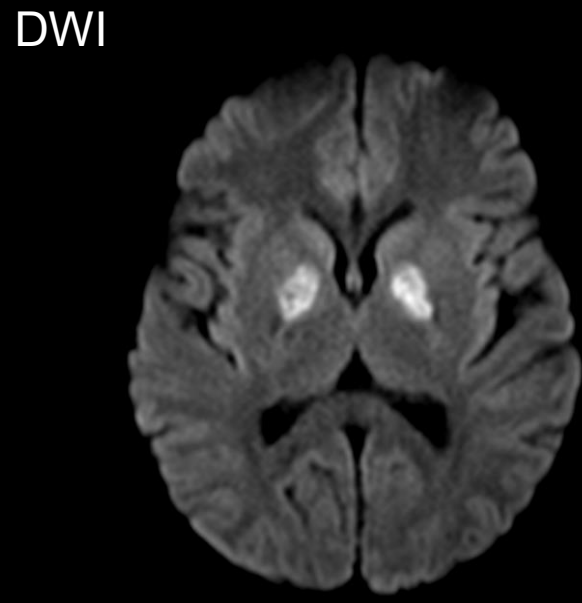
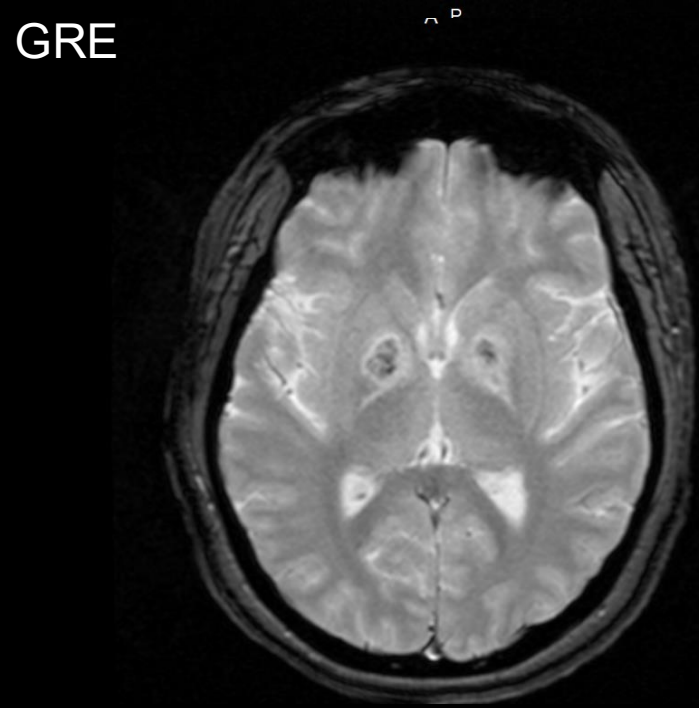
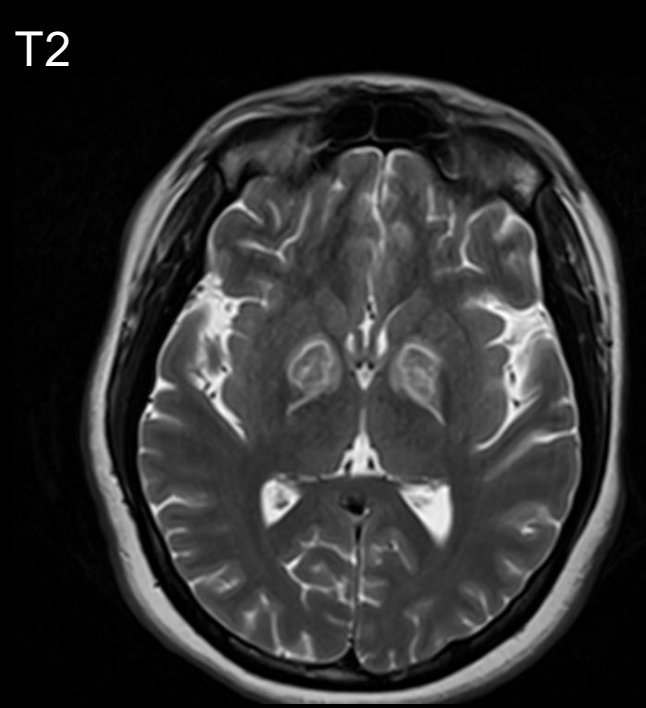
Findings (unlabeled)



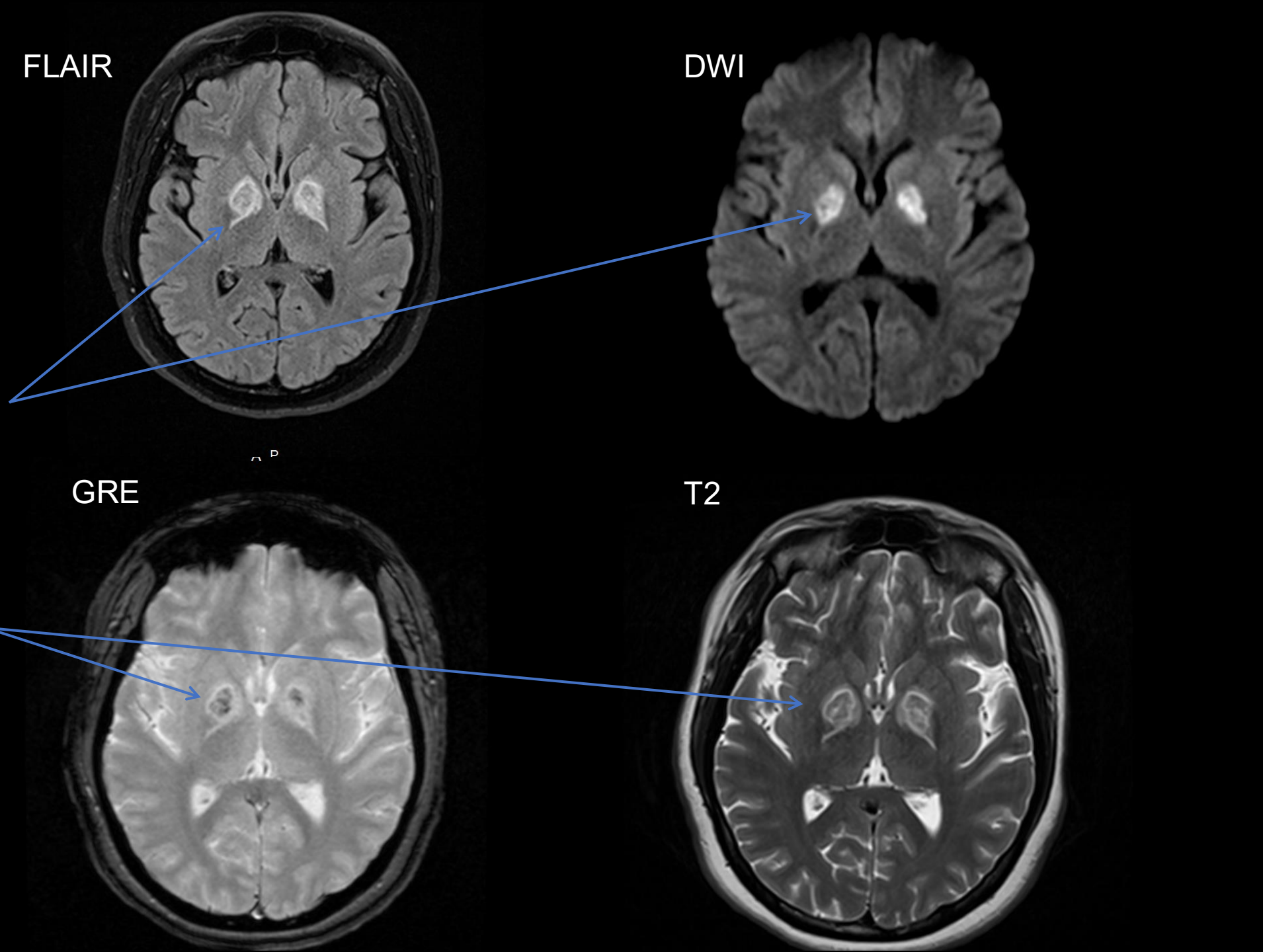






Findings: (labeled)

- Bilateral, symmetric foci of abnormally restricted diffusion and FLAIR changes involving the globus pallidi.
- There is also associated petechial hemorrhage and small amounts of vasogenic edema



Differential Diagnosis

- Metabolic encephalopathy
- Toxic encephalopathy
- Ischemic Stroke

Although these diagnoses can have somewhat similar clinical presentations, clinical hints (positive UDS and persistent AMS in an otherwise healthy young woman) and radiological clues (isolated symmetric bilateral globus pallidus insults on MRI with no other findings) can narrow down our differential to…

Final Dx:

Toxic Insult to the Globus Pallidus

Case Discussion: Pathophysiology

- The Basal ganglia (BG) is the part of the brain primarily responsible for movement initiation as well as cognitive and reward pathways[4]
  - Easily prone to infarct due since supplied by small perforating arteries
  - Lesions can lead to parkinsonian symptoms with movement abnormalities as well as broad cognitive abnormalities
- The Globus Pallidus (GP), specifically, is a region of the BG that modulates voluntary movement and proprioception[1]
  - Unlike the rest of the BG, the GP is surprisingly resistant to hypoxic insult[1]
  - Although the underlying mechanism is poorly understood, the GP is known to be symmetrically susceptible to insults from toxins/metabolites such as…[2]
    - Carbon monoxide
    - Opioid use
    - Cocaine use
    - Alcohol use

Case Discussion: Workup

- Initial symptoms of GP insult very nonspecific but include[1]:
  - AMS
  - Varied movement symptoms
  - Somnolence
- Patient in this case was known to be a user of cocaine and opioids per admission UDS making us more suspicious for GP toxic insult.
  - Age and lack of risk factors make the diagnosis of ischemic stroke less likely
  - Important to use clinical presentation, labs, history to prioritize the differential considerations
- Neuroimaging per ACR criteria is often necessary for definitive diagnosis, as was done in this case[3].
  - CTH without contrast for initial evaluation and rule out
  - MRI Brain without contrast for further characterization of lesion if found

Case Discussion: Management

- Management of GP insult is largely 2 main parts[4]:
  - Medical management of current risk factors
    - Cessation/avoidance of offending drug use
  - Progressive neurorehabilitation of deficits
    - Continued outpatient physical rehabilitation
  - Medication in refractory cases
    - Muscle relaxants – decrease spastic movements
  - Extreme cases (more used in Parkinson's vs acute GP insult)[5]
    - DBS – stimulation of surviving neurons to decrease motor symptoms
    - Pallidotomy – very invasive surgical ablation (no longer in fashion)

Case Discussion: Follow up

- Where is our patient now?
- Continued to improve throughout the hospital course
  - Quick recovery of mental status on Day 2-3 of insult with progressive improving through discharge
  - However, persistent movement dysfunction
    - Gait instability and urinary incontinence through discharge
    - Long term physical therapy follow-up

References:

1. Alquist CR, McGoey R, Bastian F, Newman W 3rd. Bilateral globus pallidus lesions. J La State Med Soc. 2012 May-Jun;164(3):145-6.
2. Azeem, M. U., Cheraghi, S. N., Nagy, M., Vu, V., Maliakal, V., Henninger, N., & Daniello, K. (2019). Cocaine use associated with bilateral globus pallidus changes; similar to carbon monoxide intoxication. (P5.6-025). *Neurology*, *92*(15_supplement). https://doi.org/10.1212/wnl.92.15_supplement.p5.6-025
3. Finelli P. Diagnostic Approach to Restricted-Diffusion Patterns on MR Imaging. Neurol Clin Pract. 2012;2(4):287-93.Czosnyka M, Pickard JD, Steiner LA. Principles of intracranial pressure monitoring and treatment. Handb Clin Neurol. 2017;140:67-89
4. Jiang, Y., Qi, Z., Zhu, H., Shen, K., Liu, R., Fang, C., Lou, W., Jiang, Y., Yuan, W., Cao, X., Chen, L., & Zhuang, Q. (2024). Role of the globus pallidus in motor and non-motor symptoms of parkinson's disease. *Neural Regeneration Research*, *20*(6), 1628–1643. https://doi.org/10.4103/nrr.nrr-d-23-01660
5. Sharma, V. D., Patel, M., & Miocinovic, S. (2020). Surgical treatment of parkinson's disease: Devices and lesion approaches. *Neurotherapeutics*, *17*(4), 1525–1538. https://doi.org/10.1007/s13311-020-00939-x