AMSER Case of the Month
August 2019

34 year old female presents with a new onset left facial droop and left-sided upper and lower extremity weakness.

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Patient Presentation

- HPI: 34 year old female presents with new onset left, upper and lower, extremity weakness and a left facial droop.
- PMH: Peritoneal TB (2016), PCP Pneumonia (2018) and AIDS
- PSH: None
- Physical exam identified 3/5 strength in the patient's left, upper and lower extremities compared to the right. She also exhibited left, forehead-sparing, facial weakness.
- Pertinent Labs:
  - WBC: 3,000
  - CD4 count: 28
  - Viral Load: 226,000
  - Toxoplasma IgM Ab: Negative
  - Cryptococcal Antigen: Negative

What Imaging Should We Order?

Select the applicable ACR Appropriateness Criteria

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.	O
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.	O
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.	O
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.	O
CTA head and neck with IV contrast	8	CTA can be obtained after NCCT.	☢☢☢
CT head perfusion with IV contrast	6		☢☢☢

These imaging modalities were ordered by the outside hospital ED.

These imaging modalities were ordered by the inpatient medicine team after transfer.

CT findings (unlabeled)

Axial CT without Contrast

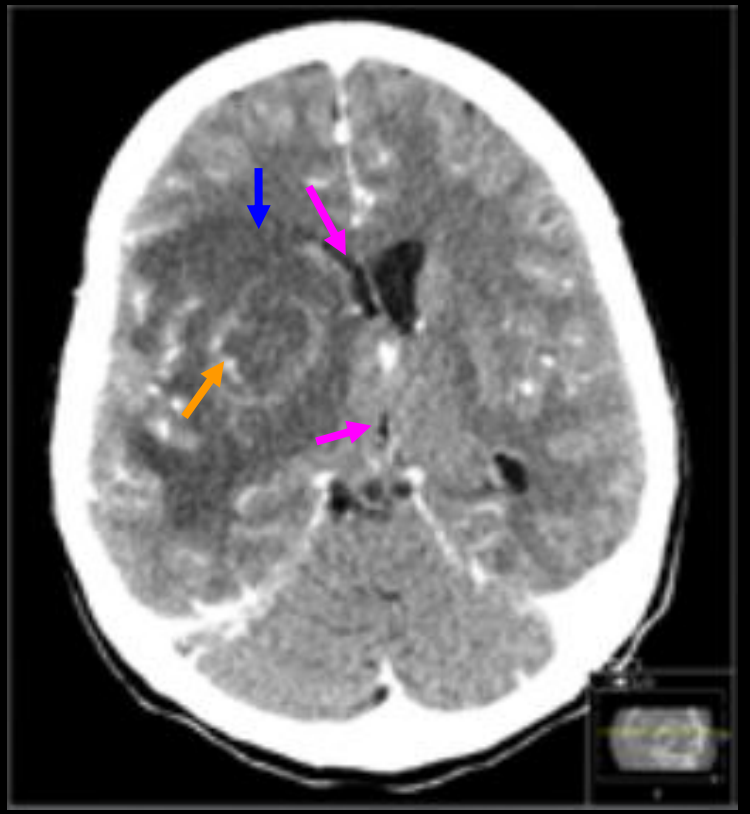
Axial CT with Contrast

CT findings (labeled)

Axial CT without Contrast

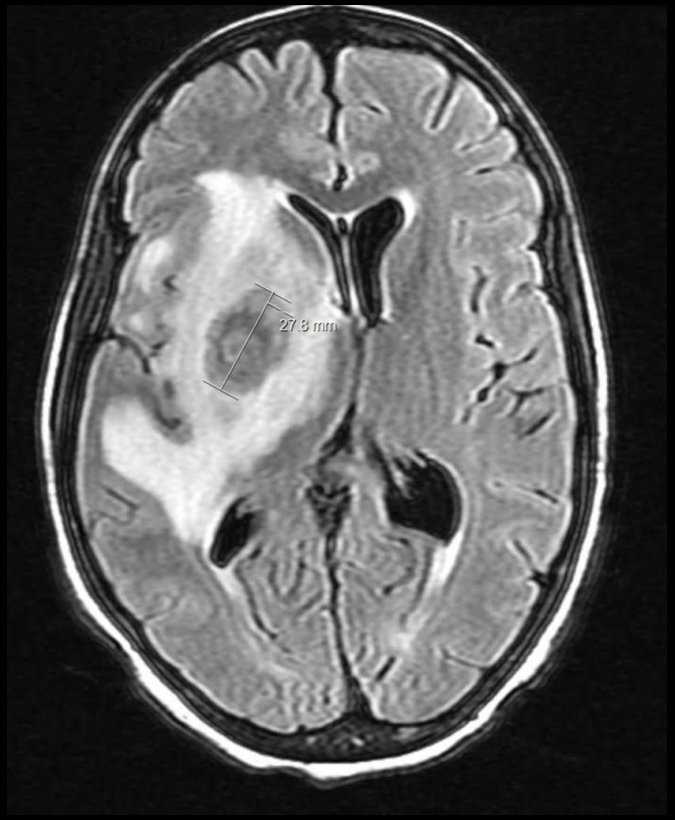
- Peripheral rim enhancement surrounding central non-enhancement
- Frontal and temporal vasogenic edema
- Effacement of the right lateral and third ventricles

Axial CT with Contrast

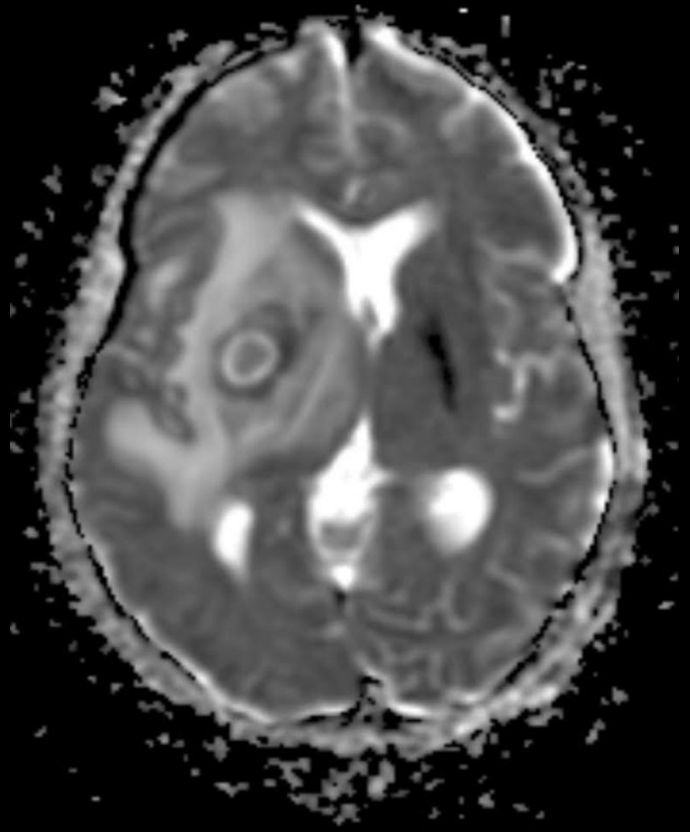


MRI findings (unlabeled)

Axial T2 Flair

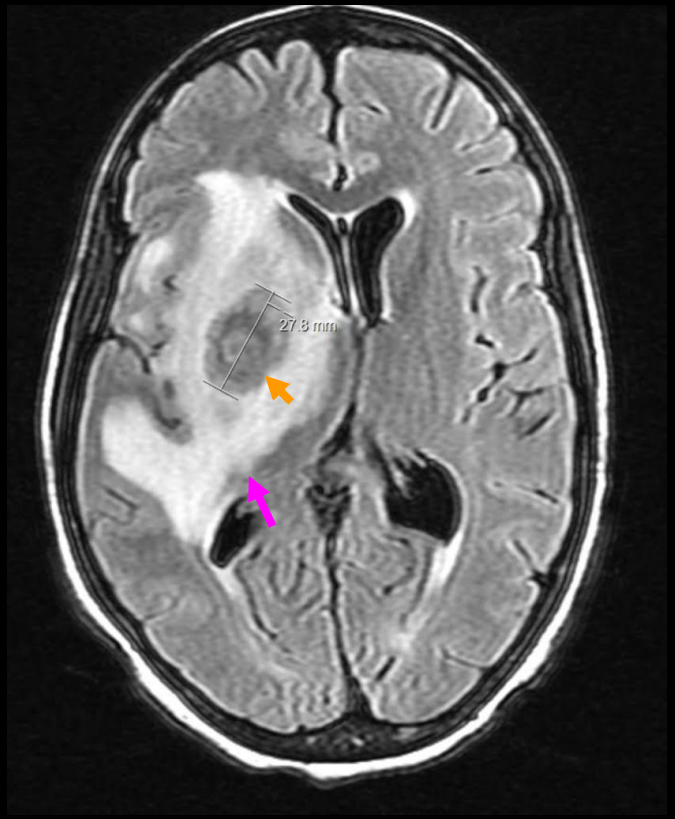


Axial ADC



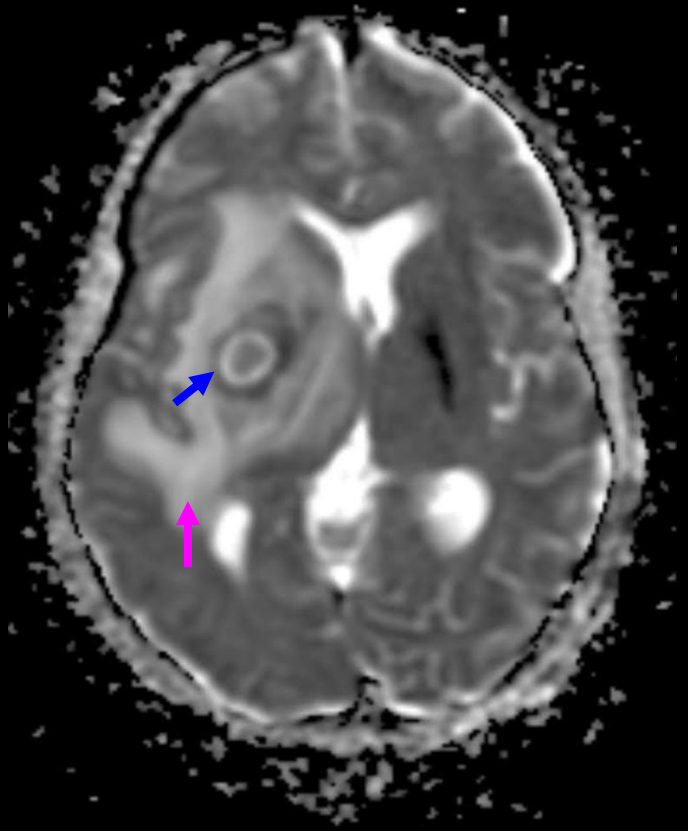
MRI findings (labeled)

Axial T2 Flair



- Solitary 3 cm hypointense lesion centered in the right basal ganglia
- Regions of restricted diffusion within the lesion
- Peri-lesional edema

Axial ADC



Differential Diagnosis for Single Ring Enhancing CNS Lesion*

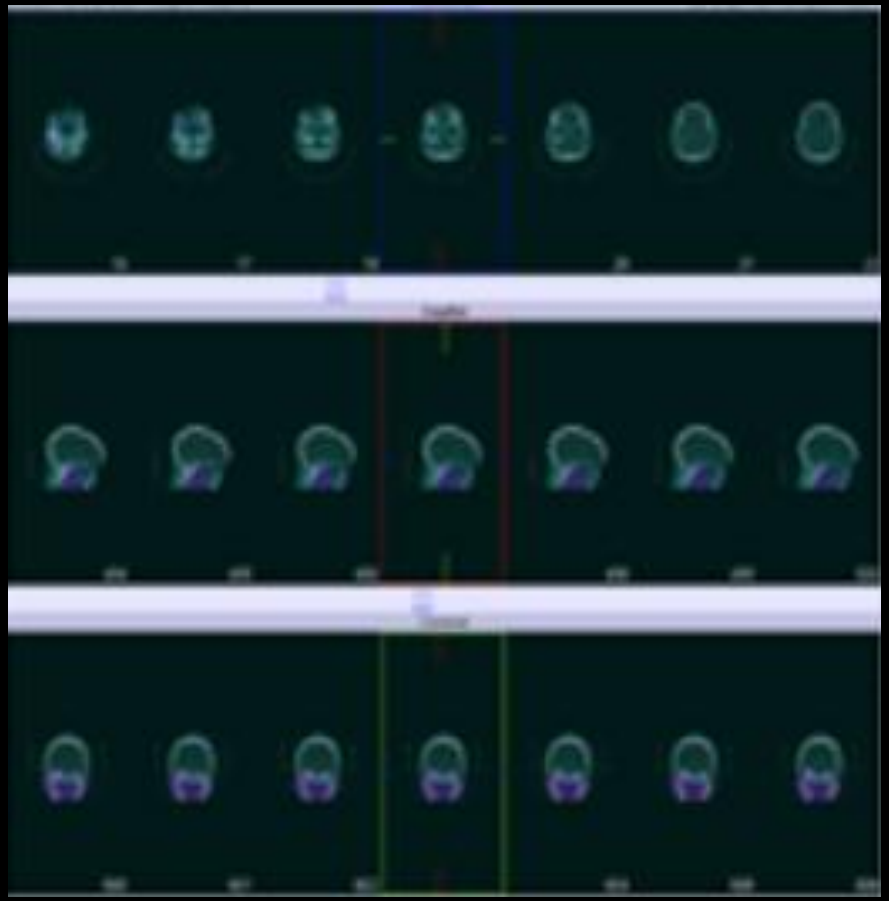
- M: Metastasis
- A: Abscess
- G: Glioblastoma
- I: Infarct (Subacute Phase)
- C: Contusion or Cerebritis
- A: AVM or other vascular malformation
- L: Lymphoma
- D: Demyelinating Disease (MS or TDL)
- R: Radiation Necrosis or Resolving Hematoma

<u>Differential Diagnosis for Our Patient's Clinical Presentation and Laboratory Findings:</u>

- Abscess
  - Most likely Toxoplasma
- CNS Lymphoma

Thallium-201 SPECT nuclear imaging was used to distinguish these two diagnoses.

*Note: A helpful mnemonic for a patient with a single ring enhancing CNS lesions is M.A.G.I.C.A.L. D.R.



Thallium-201 SPECT Nuclear Imaging

Lack of uptake in the rim enhanced region argues against CNS Lymphoma. CNS Lymphoma would show focal uptake of the tracer.*

*Note: There is normal physiologic uptake in the salivary glands (purple).

Final Diagnosis: CNS Toxoplasma Infection

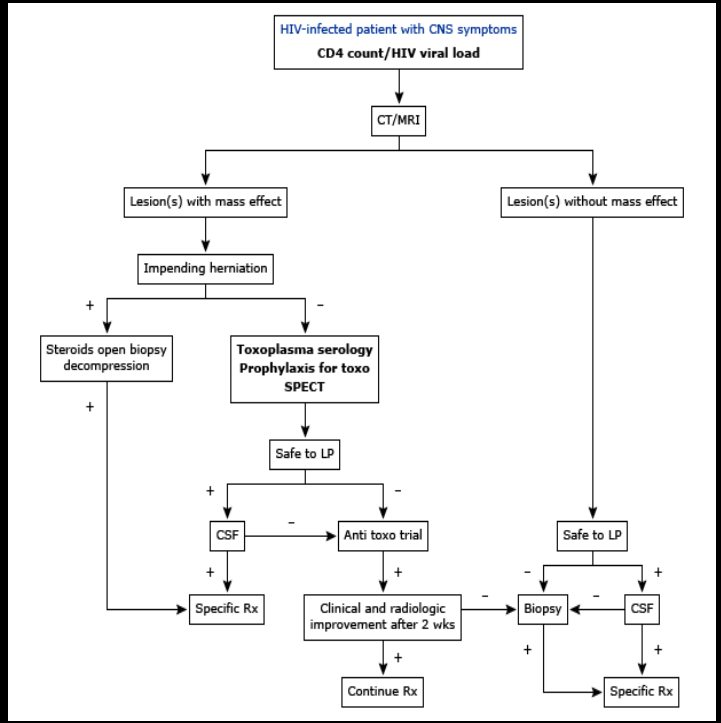
CNS Toxoplasma

- CNS Toxoplasma
  - Caused by protozoan parasite Toxoplasma gondii.
  - Acquired by the ingestion of infectious oocytes from undercooked meat or contact with feline feces.
  - Life threatening disease in newborns and immunocompromised patients.
- Risk Factors
  - CD4 count <100 and not on Bactrim prophylaxis.
  - Vertical transmission to fetus from newly infected mother
- Clinical and Laboratory Findings
  - Fever and acute, vague, neurological symptoms: altered mental status, seizures and weakness
  - Toxoplasma IgG positive (IgM is often absent and quantitative IgG Ab is not helpful)
  - Elevated LDH
  - CSF positive for Toxoplasma, mild pleocytosis and elevated protein

CNS Toxoplasma

- Imaging:
  - Gold Standard is MRI
    - T1: Multiple iso-intense or hypo-intense lesions
    - T2: Multiple iso-intensities, hyperintensities or concentric alternating hypo/hyper/iso-intensities
    - T1 C+ (Gd): Lesion ring enhancement also known as the eccentric target sign
    - DWI and ADC: Lesion restricted diffusion
  - Toxoplasma displays the following characteristics when compared to CNS Lymphoma:
    - MR Spectroscopy: decreased choline, prominent lipid/lactate
    - MR perfusion: decreased rCBV
    - Tl-201 SPECT/CT: negative (no tracer uptake)
    - 18F-FDG PET/CT: negative (not hypermetabolic)
- Treatment
  - Sulfadiazine, Pyrimethamine and Leucovorin for 6 weeks
  - Antiretroviral therapy and Bactrim prophylaxis until CD4 count > 200
  - Clinical improvement often precedes neuroimaging resolution

Management Flow Chart



Gandhi (2019)

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