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

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
Differential Diagnosis for Our Patient’s Clinical Presentation and Laboratory Findings:

- 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.
Final Diagnosis:
CNS Toxoplasma Infection

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).
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
    - TI-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

Gandhi (2019)
References

- “Neurotoxoplasmosis”, Sharma, R., Jha, P. Radiopaedia.org