

# AMSER Case of the Month

## July 2024

Patient with *Aggregatibacter* infective endocarditis with emboli to the brain presents for follow-up imaging.

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# Initial Patient Presentation

**HPI:** 64-year-old woman with no significant PMH presents with 3 months of gradual right, then left vision loss.

**Physical Exam:** Bilateral panuveitis, no other focal deficits

Inpatient work-up reveals Aggregatibacter infectious endocarditis c/b multiple ring enhancing lesions due to septic emboli to the brain

Discharged on 8-week course of Metronidazole and Ceftriaxone

# Patient Presentation at 8-week Follow Up

**HPI:** Following up to assess symptom/imaging progression

- Vision symptoms stable and feels better overall. Patient reports worsening ataxia; secondary fall 4 weeks post discharge. Now requires wheelchair.
- Denies headaches, fevers, chills, tingling or numbness, and incontinence
- Medications:
  - IV Ceftriaxone 2g BID
  - PO Metronidazole 500mg TID

What Imaging Should We Order?

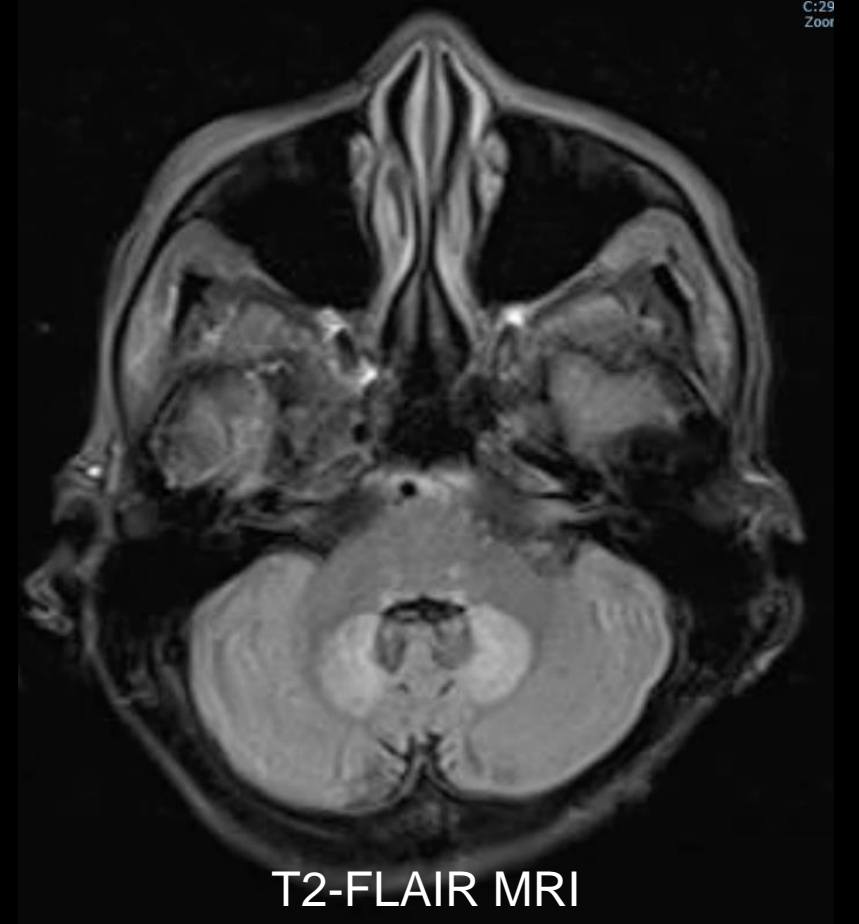
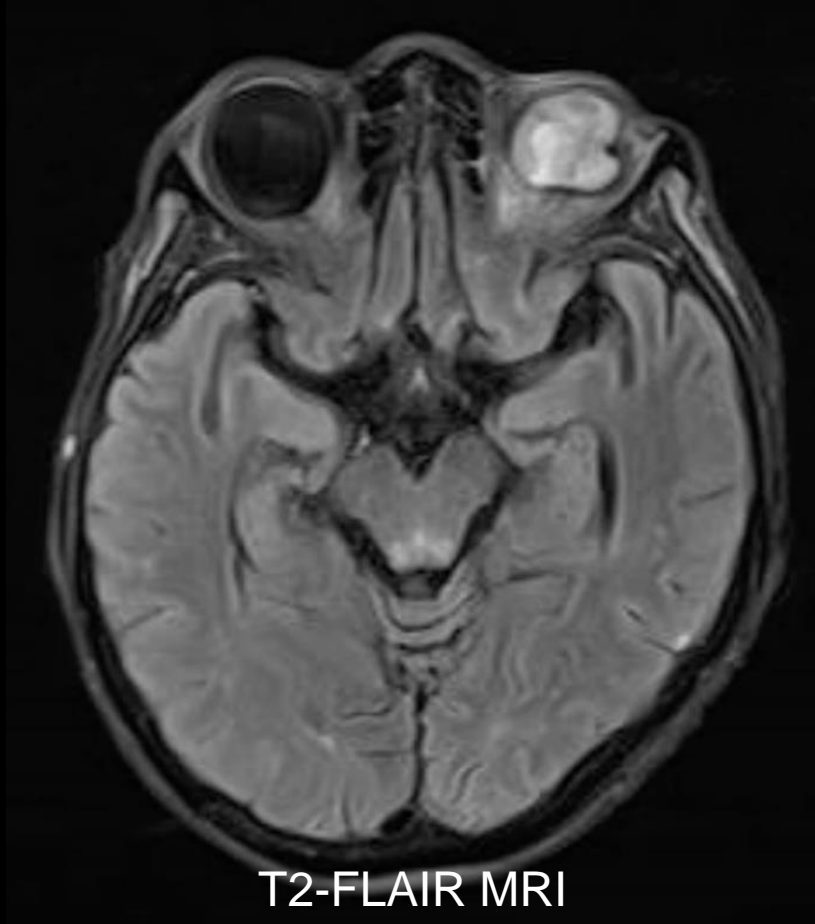
# Select the applicable ACR Appropriateness Criteria

**Clinical Condition:** Focal Neurologic Deficit

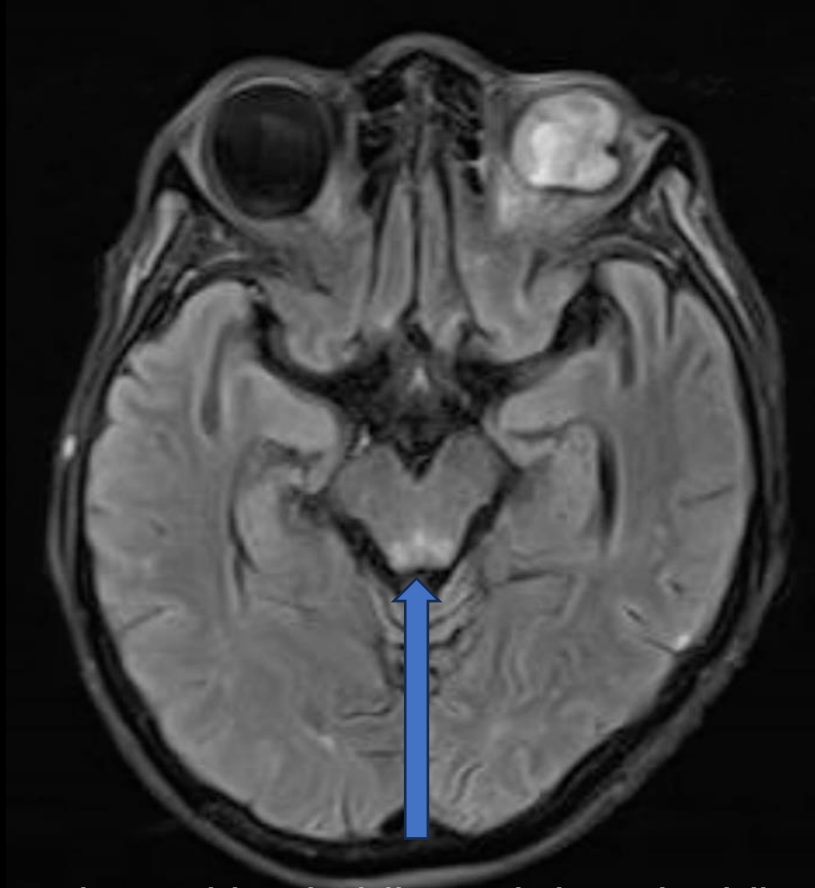
**Variant 4:** Single or multiple focal neurologic deficits, subacute onset, progressive or fluctuating.

Radiologic Procedure	Rating	Comments	RRL*
MRI head without and with contrast	8	See statement regarding contrast in text under "Anticipated Exceptions."	0
MRI head without contrast	8		0
CT head without contrast	7	Acute screening.	☼☼☼
MRA head and neck without and with contrast	6	See statement regarding contrast in text under "Anticipated Exceptions."	0
MRA head and neck without contrast	6		0
CT head without and with contrast	6	If MRI is unavailable or contraindicated. Consider CT perfusion.	☼☼☼
CTA head and neck with contrast	6	For suspected vascular abnormality.	☼☼☼
CT head perfusion with contrast	5		☼☼☼
MRI head perfusion with contrast	5	See statement regarding contrast in text under "Anticipated Exceptions."	0
CT head with contrast	4		☼☼☼
MR spectroscopy head without contrast	4	For selected cases.	0
MRI functional (fMRI) head without 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		☼☼☼☼
<b>Rating Scale:</b> 1,2,3 Usually not appropriate; 4,5,6 May be appropriate; 7,8,9 Usually appropriate			<b>*Relative Radiation Level</b>

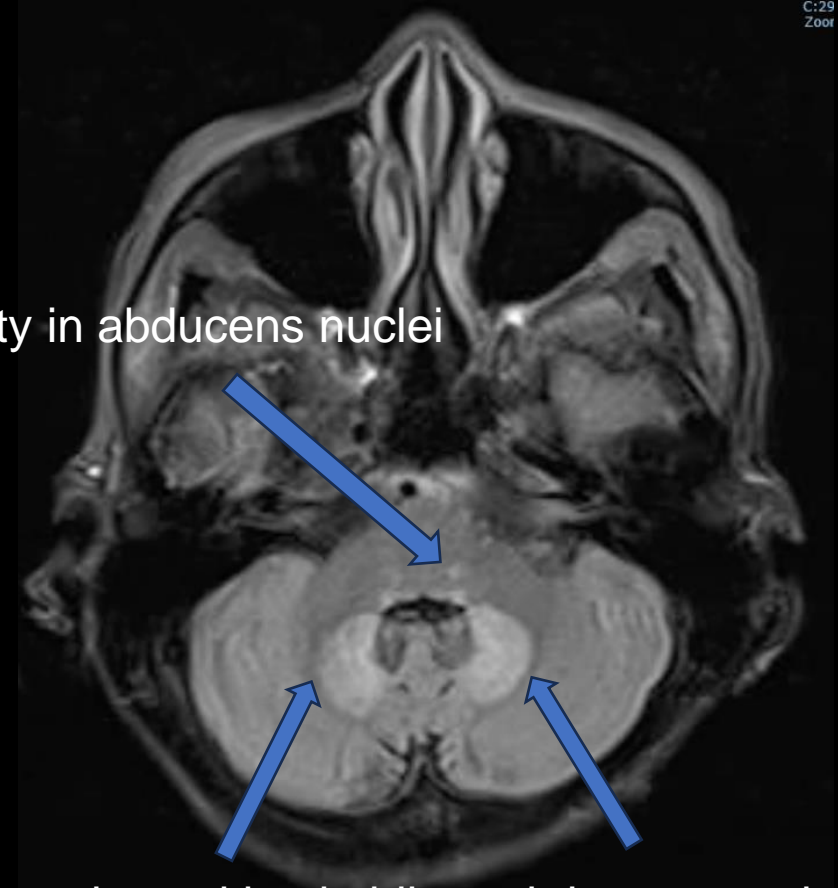
# Findings (unlabeled)



# Findings (labeled)



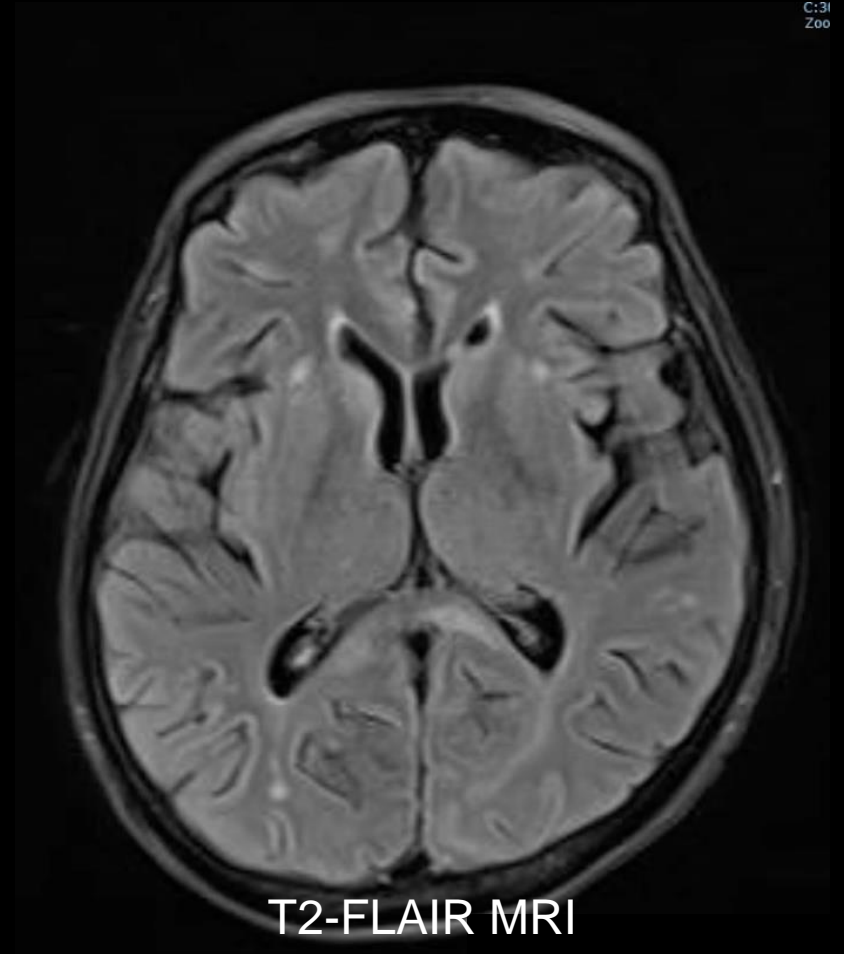
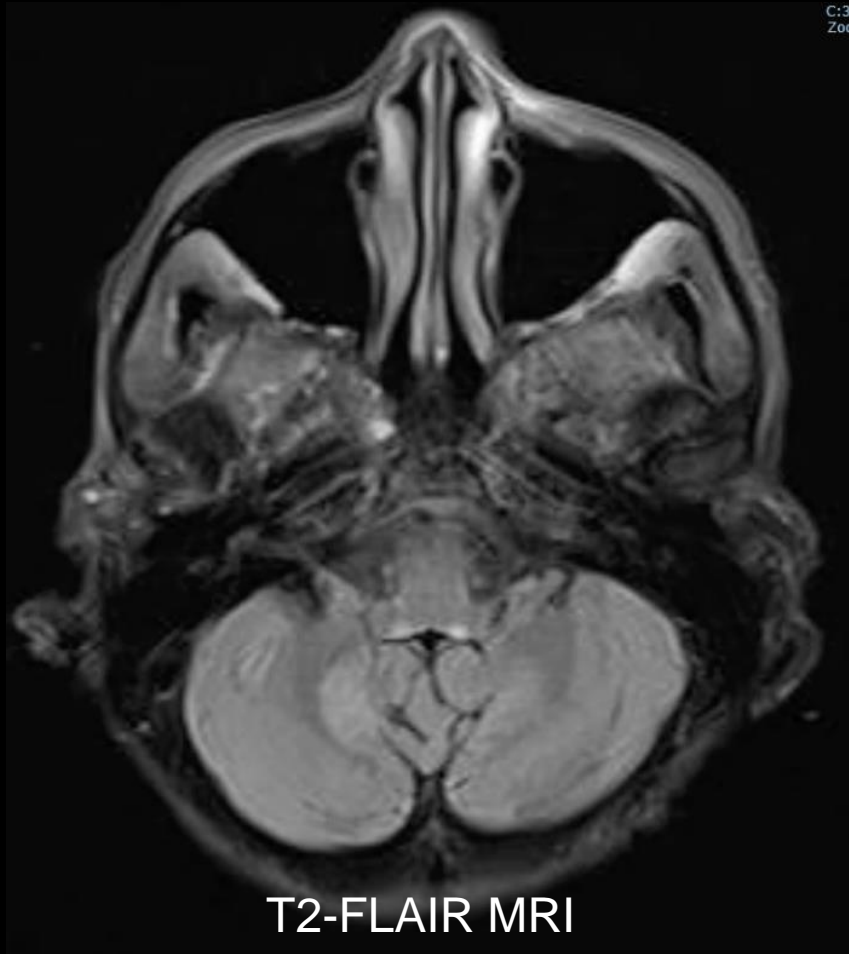
Hyperintensities in bilateral dorsal midbrain



Hyperintensity in abducens nuclei

Hyperintensities in bilateral dentate nuclei

# Findings (unlabeled)

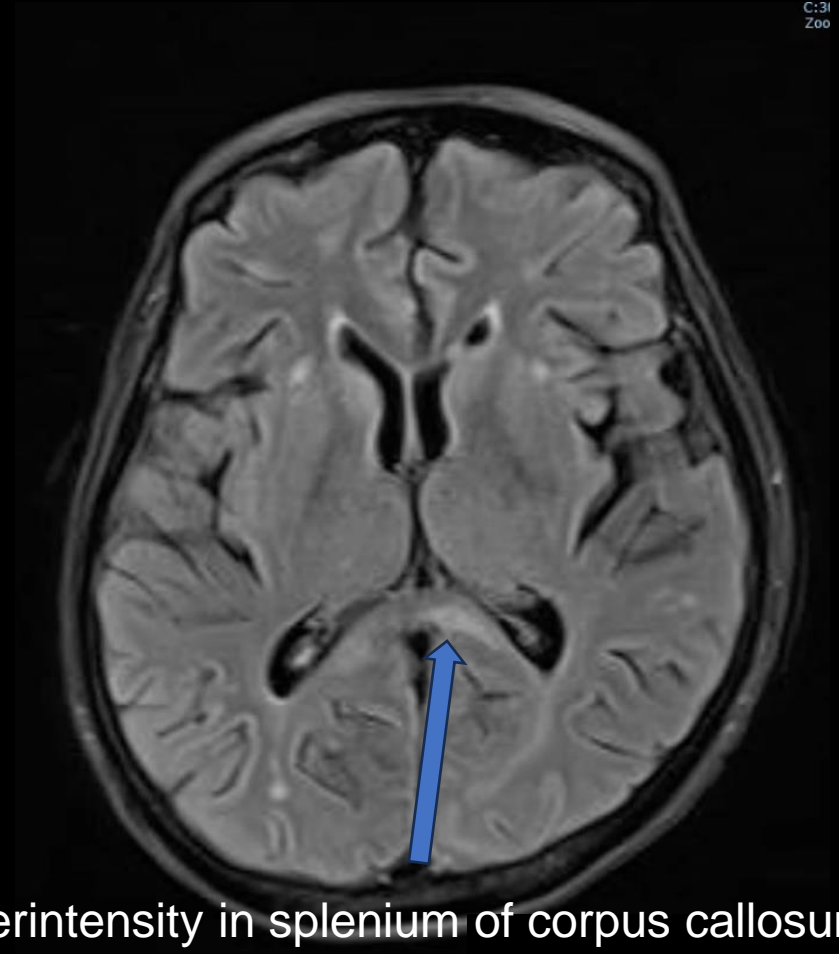




# Findings (labeled)



Hyperintensities in bilateral dorsal medulla  
(vestibular nuclei)



Hyperintensity in splenium of corpus callosum

Final Dx:

Metronidazole-Induced Neurotoxicity (MIN)

# Case Discussion: Metronidazole-Induced Neurotoxicity

- Metronidazole is a commonly used antibiotic effective against protozoa and anaerobic bacteria.
- Generally well-tolerated in short courses, but risk of neurotoxicity suggested to increase with higher doses and longer duration of therapy.
- The current pathophysiology behind MIN is unclear, but proposed mechanisms include generation of free-radicals and causing vascular spasms that lead to localized ischemia.

# Case Discussion: Metronidazole-Induced Neurotoxicity

- **Diagnosis:**
  - Diagnosis of exclusion
  - Should suspect in patients on long durations of high-dose metronidazole who present with neurologic dysfunction
    - Most common symptoms: cerebellar dysfunction (dysarthria, ataxia, dysmetria), altered mental status, and seizures
  - MRI T2W/FLAIR hyperintensities in specific regions can aid MIN diagnosis
    - In decreasing order of frequency, cerebellar dentate nucleus, midbrain (including periaqueductal region), dorsal pons, medulla, inferior colliculus, subcortical white matter, basal ganglia, thalamus, and cerebellar peduncles

# Case Discussion: Metronidazole-Induced Neurotoxicity

- **Treatment:** Discontinue metronidazole
- **Prognosis:**
  - Majority of cases either improve (29%) or have complete resolution of symptoms (65%)
  - 3% of patients experience permanent cognitive impairment
  - Patients with cerebellar dysfunction less likely to have complete resolution than those with mental status changes or seizures

# References:

- Buckens S, Sharma R, Carroll D, et al. Metronidazole central nervous system toxicity. Reference article, Radiopaedia.org (Accessed on 19 May 2024) <https://doi.org/10.53347/rID-39532>
- Kuriyama A, Jackson JL, Doi A, Kamiya T. Metronidazole-induced central nervous system toxicity: a systematic review. *Clin Neuropharmacol*. 2011;34(6):241-247. doi:10.1097/WNF.0b013e3182334b35
- Patel L, Batchala P, Almardawi R, Morales R, Raghavan P. Acute metronidazole-induced neurotoxicity: an update on MRI findings. *Clin Radiol*. 2020;75(3):202-208. doi:10.1016/j.crad.2019.11.002
- Roy U, Panwar A, Pandit A, Das SK, Joshi B. Clinical and Neuroradiological Spectrum of Metronidazole Induced Encephalopathy: Our Experience and the Review of Literature. *J Clin Diagn Res*. 2016;10(6):OE01-OE9. doi:10.7860/JCDR/2016/19032.8054