

Rare Complication in a Patient with Pneumococcal Meningoencephalitis

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Background

- Bacterial meningitis is associated with a high mortality and neurological sequelae
- Cerebral vasculitis is one of the rare but fatal complications
- Cerebral vasculitis is challenging to diagnose

Patient Information

44 year old female, previously healthy with no medical history or surgical history

Case Presentation

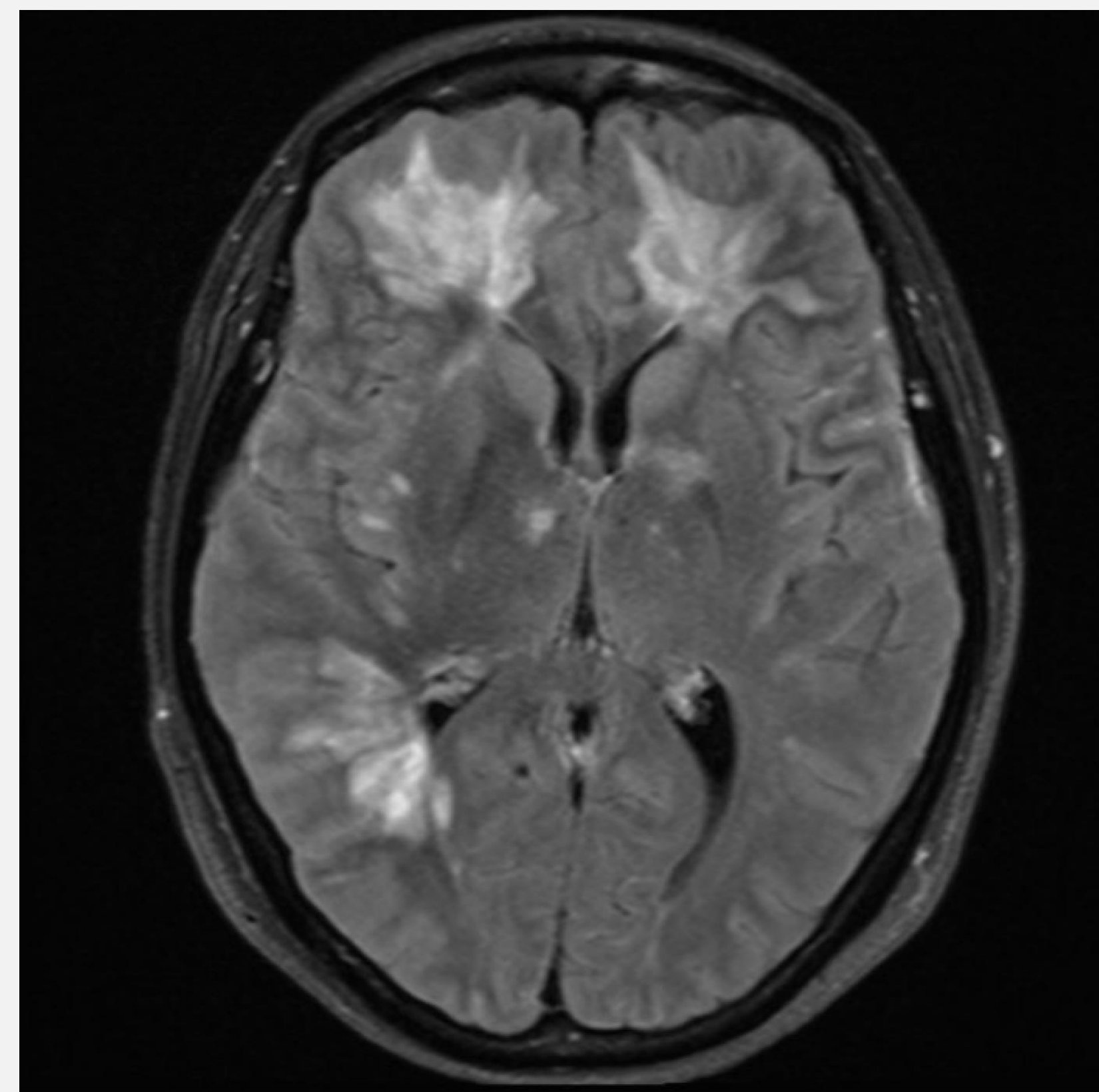
- Recent visit to ED with 2 day history of left buttock pain radiating down left leg diagnosed as sciatica and discharged home with hydromorphone, naproxen, and rabeprazole
- After returning home, her discomfort worsened and she had difficulty walking. 1 day history of tinnitus. 2 days after returning home, her LOC had remarkably diminished. EMS was called and found that her GCS 7, T 38.6C
- Physical exam:
 - Severe rigidity of the neck muscles, positive Kernig sign bilaterally
- Investigations:
 - CSF culture: Streptococcus pneumoniae, sensitive to ceftriaxone
 - CSF analysis: nucleated cells 8.8, glucose < 0.6, high protein 5.26 glucose is less than 0.6 (low), erythrocytes to 17.8 (H)
 - CSF viral (July 8, 2024): HSV, VZV, enterovirus negative
 - Blood cultures: Streptococcus pneumoniae
 - Urine culture (July 8, 2024): No growth
 - Respiratory virus panel (July 8, 2024): Negative
- Imaging:
 - CT Head: Mild diffuse cerebral edema and potential very early developing hydrocephalus at the temporal horns of the lateral ventricle

Hospital Course

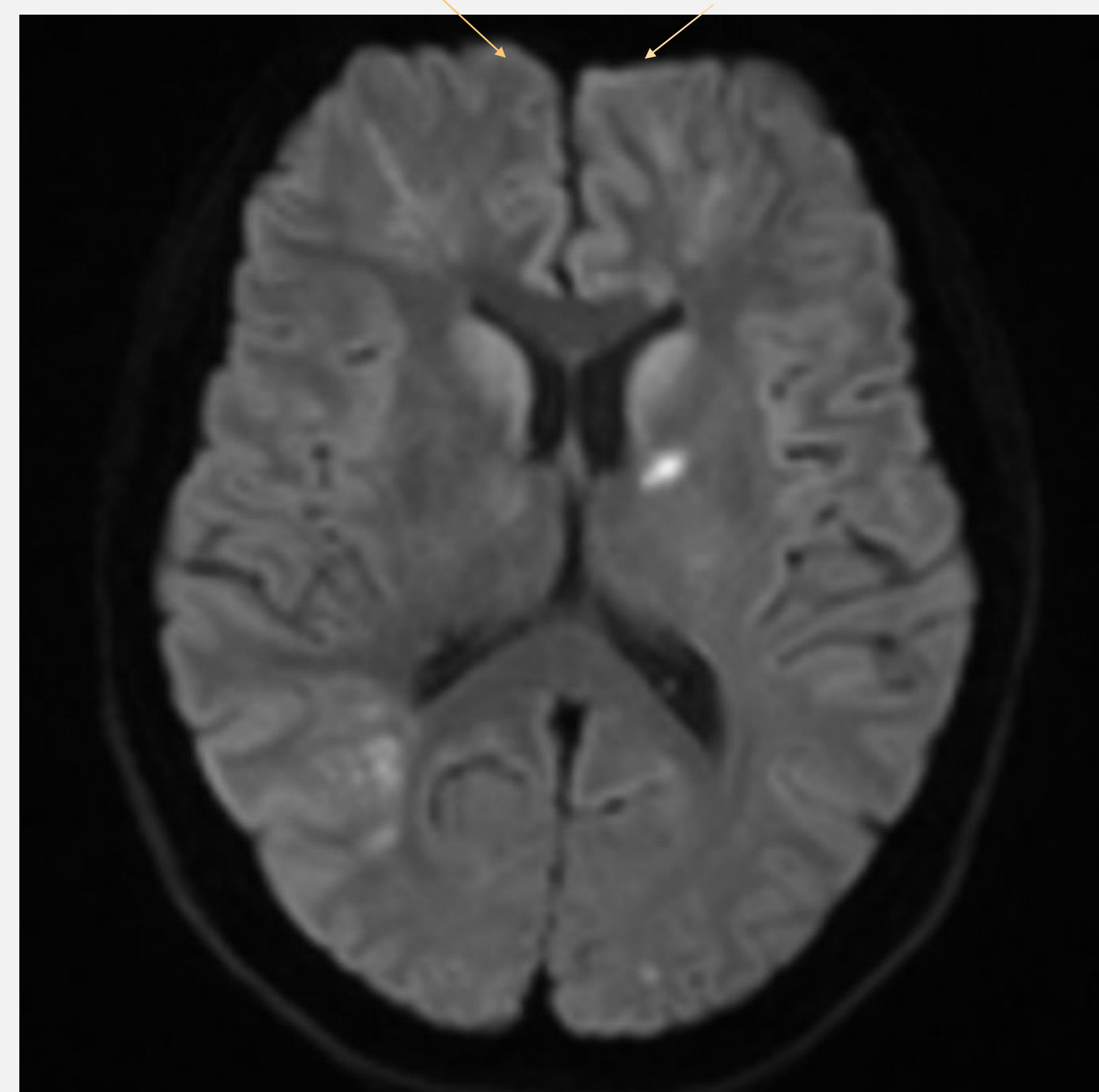
- Day 1:** Diagnosed with meningitis and possible early hydrocephalus. She was admitted to the intensive care unit for neurosurgical monitoring.
 - Started on IV ceftriaxone and vancomycin
- Day 3:** CSF culture and sensitivities returned
 - Discontinued vancomycin and started dexamethasone
- Given ongoing fever:**
- Day 5:** CT head: No adverse interval change, ventricles were stable and no worsening hydrocephalus
- Day 7:** LP, with CSF: low glucose, high protein, no growth.
 - EEG: diffuse cerebral function disturbance, no overt seizures.
 - Gynecology ruled out pelvic source of infection given presence of intrauterine device
 - TTE: negative for endocarditis
- Day 16:** Completed MRI vessel wall imaging: evidence of inflammatory or postinfectious vasculitis (**Figure 1**).
 - Started methylprednisolone 1g IV x 3 days, then prednisone taper
- Day 18:** Neurology noted lip smacking, right hand automatisms, right gaze deviation, concerning for seizure like activity
 - Started levetiracetam complicated with rash, thus agent was switched to clobazam

- Day 19:** Immunodeficiency work-up negative for HIV, normal serum immunoglobulins, C3/C4/CH50, IGRA and strongyloidiasis serology.
- Day 28:** She defervesced and was stable medically. She was transferred back to local hospital. At this time, GCS 11, E4V1M6, with no abnormal movements or seizure activity.
- Day 40:** At the end of the 6 week ceftriaxone course, MRI head: persistent bilateral rim-enhancing collections and perilesional edema. Thus, ceftriaxone was extended to 10 weeks.
- Day 55:** After 10 weeks of IV ceftriaxone, MRI head: decreased extent of white matter hyperintensity as well as decreased enhancing lesions compared to the previous examination. There were some residual areas of enhancing foci present representing residual active disease. IV ceftriaxone was discontinued.
- Day 92:** Discharged from hospital, stabilized. She was gradually improving and vocalized nonsensical words. She had significant neglect. She did not follow verbal instructions or mimic. She moved both sides symmetrically but does not follow formal power testing.
- Day 92-152:** 2 months of neurorehabilitation was required prior to discharge to long term care.

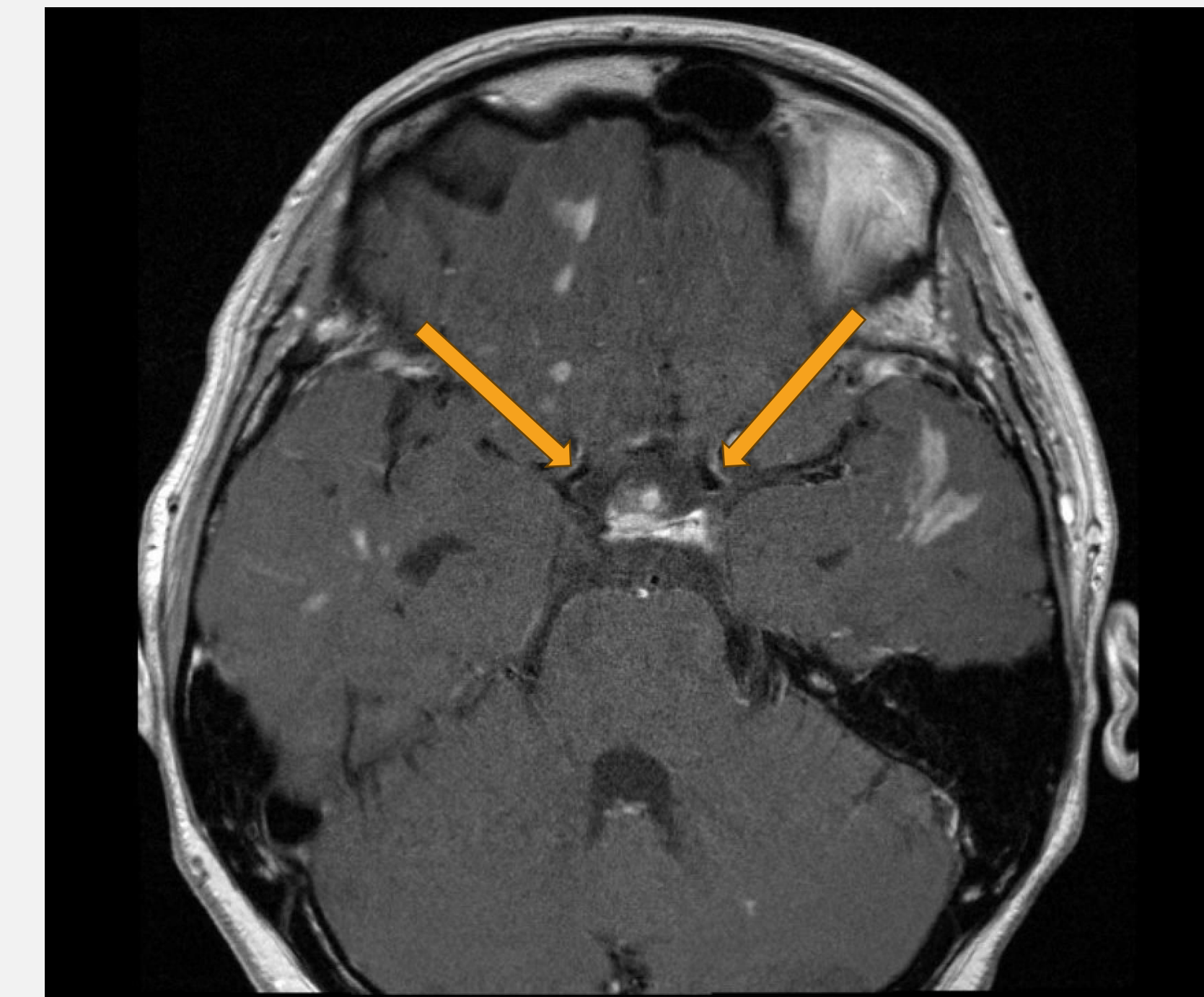
Figure 1: MRI Vessel Wall Imaging demonstrating evidence of vasculitis



a) T2 Fluid Attenuated Inversion Recovery: Increased signal in the infarcted regions in keeping with subacute infarcts secondary to vasculitis.



b) Diffusion weighted imaging: Restricted diffusion in the in the bilateral frontal lobes, right parietotemporal lobe and bilateral basal ganglia.



c) Post gadolinium T1: Enhancement of the vessel wall of the narrowed segments (orange arrows) of the supraclinoid ICAs.

Outcome

- She is currently at a long-term care facility requiring supports for all activities of daily living.
- 1 year later, she has persistent residual deficits including left-sided neglect, no verbal output, limited ability for interaction with environment described but does follow commands, hyperreflexia diffusely.

Discussion

- Vasculitis secondary to bacterial meningitis occurs shortly after or even weeks to months after the initial acute phase of meningitis.
- In a review of 13 available case reports, patients were reported to develop vasculitis on an average of 7±3 days (1)
- Suspicion for vasculitis should occur with persistent fever, rising intracranial pressure, encephalopathy, seizures, cranial nerve palsy, myelopathies, hemiplegia
- This can prompt clinicians to obtain MRI imaging to identify signs of cerebral infarction on imaging and prompt them to start treatment.
- In the literature, most providers used IV steroids of varying doses and unspecified duration as treatment, and all recovered. In cases where no steroids were given, it led to death or persistent neurological symptoms.
- With the patient in this case, steroids were administered with improvement in symptoms, but significant neurologic deficits persisted.

Conclusions

- Ultimately, there is no standard treatment regimen for cerebral vasculitis associated with streptococcal pneumoniae meningitis.
- Steroid treatment seems to be efficacious but not entirely consistent, as evident with our case.
- It is likely vasculitis may be underdiagnosed and conducting more research in identifying and treating it will likely reduce the high mortality rate of meningitis.

References

- Ali, Bader, et al. "Bacterial meningitis associated cerebral vasculitis: A case report and review of the literature." *Clinical Infection in Practice*, vol. 23, July 2024, p. 100366, <https://doi.org/10.1016/j.clinpr.2024.100366>.

Acknowledgements

Thank you to the patient and her family for allowing us to use the data.

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Presented by Veronica Chan

Evidence of Conflict of Financial Interest

	Co-author	Conflict disclosures
1	Veronica Chan	None
2	Abdalmohsen A A A A Almodahka	None
3	Ahmed Bayoumi	None