

A CASE OF DIFFERENTIALS

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PATIENT PRESENTATION

A 38 year old male presented to the emergency department with concern for cerebrovascular accident. Limited medical history could be ascertained due to language barrier. An unenhanced computed tomography of the head was obtained for initial evaluation.

INITIAL IMAGING

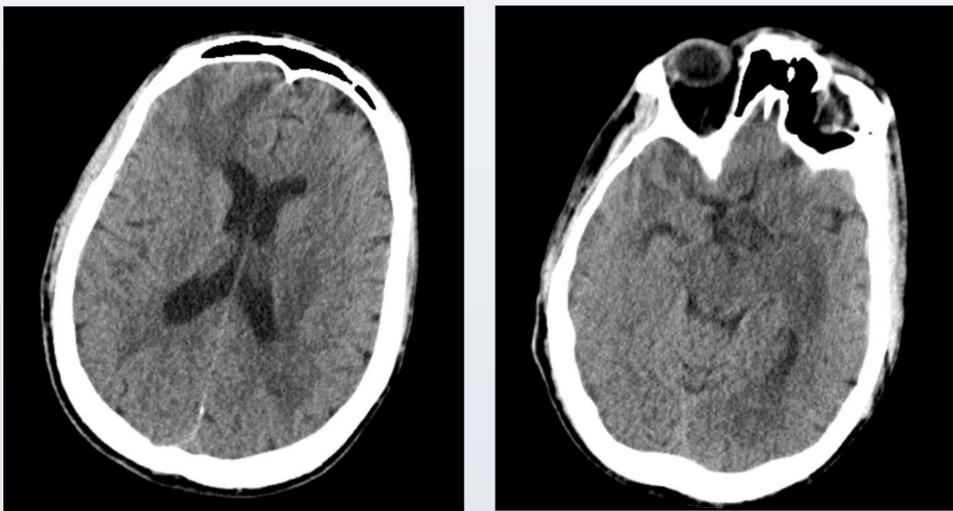


Figure 1 A (left) and B (right): Non-enhanced axial CT of the head demonstrates multiple hypoattenuating intra-axial lesions throughout the brain parenchyma. The gray-white matter differentiation is largely preserved and there is mild mass effect.

Whenever multiple lesions are considered, in any organ system, the leading differential has to be metastatic disease. In a patient of this age group, however, other causes should be considered. In this particular case, the hypoattenuation associated with these lesions is likely due to edema, specifically vasogenic edema, as the gray-white matter differentiation is largely preserved. Vasogenic edema is due to breakdown of the blood-brain barrier, and is typically seen around brain tumors and cerebral abscesses, and is less consistently seen in association with maturing cerebral contusion and cerebral hemorrhage. As the differential diagnosis remained broad for this patient, further assessment with a brain MRI was obtained.

SUBSEQUENT IMAGING

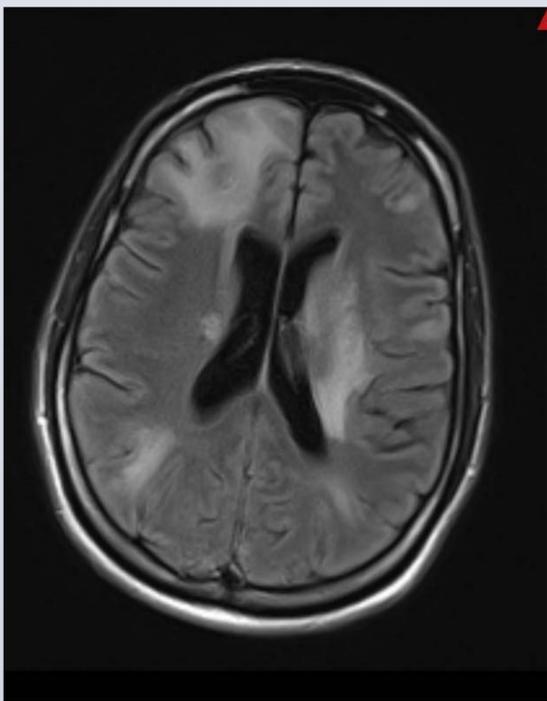


Figure 2: Axial T2 FLAIR MRI, with multiple regions of hyperintensity, the largest in the right frontal lobe, which also has an internal, circular, more hyperattenuating component. These lesions demonstrate mild mass effect.

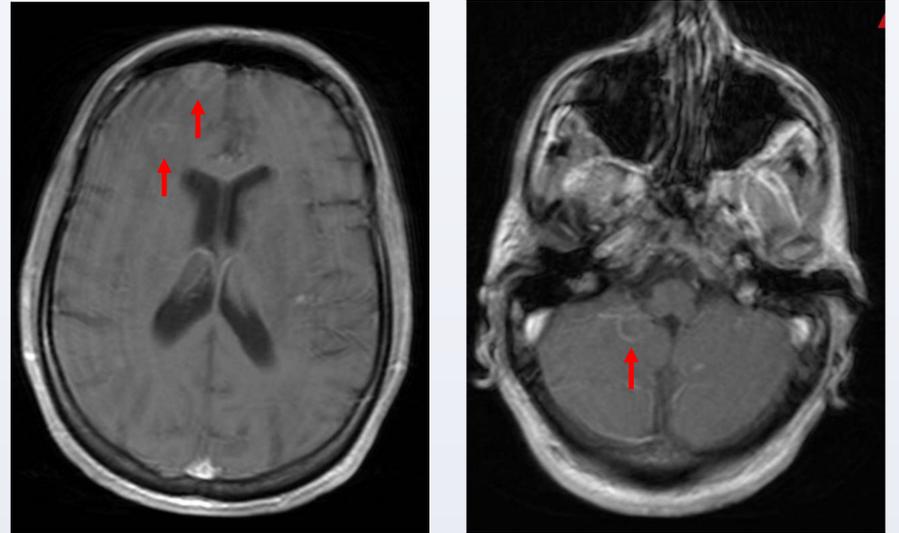


Figure 3 A (left) and B (right): Axial post-contrast MRI demonstrates multiple, bilateral ring-enhancing lesions (red arrows).

The differential diagnosis for cerebral ring enhancing lesions is broad. There are certain imaging features, however, that can help narrow the differential. The following chart outlines classic features associated with the different etiologies of ring-enhancing lesions.

Etiology	Features
Neoplasm	<ul style="list-style-type: none"> Thick and nodular enhancing wall Walls with restricted diffusion
Abscess	<ul style="list-style-type: none"> Thin and regular walls Wall thicker towards the cortex, and thin or open towards the ventricles and/or white matter Edema out of proportion to the size of the lesion Central restricted diffusion Similar-sized lesions at the grey-white matter junction
Demyelination	<ul style="list-style-type: none"> Incomplete ring, open to towards the cortex Restricted diffusion in the walls
Toxoplasmosis	<ul style="list-style-type: none"> Concentric alternating zones of hypo- and hyperintensities Edema out of proportion of the size of the lesion
Metastases	<ul style="list-style-type: none"> Location at grey-white matter junction Edema out of proportion to the size of the lesion

Going through the above chart, there are overlap in findings that can be confounding. In the above case, while the imaging is somewhat limited by motion artifact, there are certain features that can help refine our diagnosis. The walls of the lesion are more thin and regular, and the associated edema is extensive relative to the size of the lesions, pointing in the direction of abscess. The enhancement characteristics seen in Figure 3B, in the right cerebellum, additionally demonstrate a concentric ring appearance, with a central, more nodular hyperintensity, followed outwardly by a hypointense region, and finally a thin hyperintense outermost ring. While only seen in a singular lesion, this is classically described in toxoplasmosis encephalitis. The multiplicity, predominant location at the grey-white matter junction, and extensive edema, however, can also be seen with metastatic disease. Ultimately, a biopsy was needed for definitive diagnosis, which yielded toxoplasmosis.

CONCLUSION

While in most situations a definitive diagnosis is impossible by imaging, close observation and description of the features can aid the clinician honing their evaluation and treatment.

REFERENCES

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Smirniotopoulos JG, Murphey FM, Rushing EJ, Rees JH, Schroeder JW. From the Archives of the AFIP: Patterns of contrast enhancement in the brain and meninges. *Radiographics*. March-April 2007; 27 (2): 525-552.

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