

Case Report

Tumefactive perivascular spaces: A diagnostic dilemma in neuroimaging - A case report

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Key words: Tumefactive perivascular spaces, Neuroimaging

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Received: 18 Oct 2024, Accepted revised version: 07 Jan 2026, Published: 20 Mar. 2026

Competing Interests: Authors have declared that no competing interests exist

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Introduction

Tumefactive perivascular spaces are enlarged fluid-filled cystic spaces in the brain which can be detected by magnetic resonance imaging (MRI). Recognizing their radiological features is critical for avoiding misdiagnosis and unnecessary interventions.

Case History

A 37-year-old, previously healthy woman presented with sudden onset of generalized body numbness of one days duration. She had no weakness in her limbs, no speech or swallowing difficulties or incontinence. She also denied any seizures, loss of consciousness, chest pain or palpitations before the episode. Her past medical, surgical, and family history was unremarkable.

On examination, she was afebrile and alert and her GCS was 15/15. Neurologically, her cranial nerves were normal with normal power and reflexes in all limbs. However, she had reduced sensation to pain and touch in her arms and legs while joint position sense was intact. Her blood pressure was 130/90 mmHg, her pulse 76 bpm, regular and the rest of the cardiovascular and other system examination was normal.

Blood tests, including blood sugar and electrolytes and inflammatory markers, were normal and her ECG showed no abnormalities. A non-contrast CT (NCCT) of the brain revealed cystic lesions between the pons and basal ganglia, suggestive of old infarctions

or hemorrhage into tumor metastasis. Further tests, including a 2D echocardiogram, Holter monitoring and carotid duplex scan, were normal.

Due to the findings on the NCCT, an MRI brain was arranged, revealing abnormal signal intensity focal lesions in the right basal ganglia, bilateral thalami, midbrain and pons. Lesions appeared in a low-intensity signal pattern on T1W, high signal pattern on T2W, low signal on flair, with no DWI restriction and no contrast enhancement on post enhancement (Figure 1). There was no mass effect or perilesional oedema. Vessels of the circle of Willis and ventricular system appeared normal. The MRI appearances were highly suggestive of multiple old ischemic lesions or bleeding into multiple tumor metastases involving the right basal ganglia, bilateral thalami, midbrain, and pons.

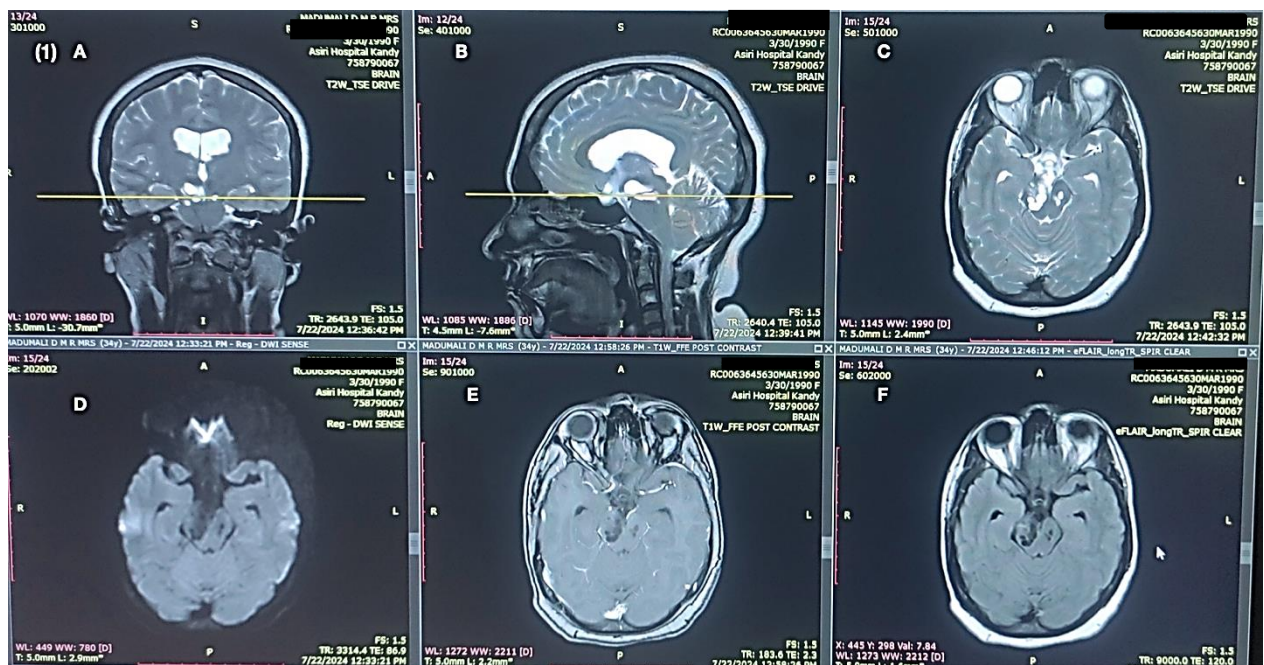


Figure (1) MRI Brain showing abnormal signal intensity in Right basal ganglia, bilateral thalami, midbrain and Pons
A, B, C - Shows Coronal, Sagittal and Axial views of lesions showing high signal on T2W FLAIR respectively
D, E, F- Shows Axial views showing no DWI restrictions, low intensity pattern T1W and Low signal on FLAIR respectively

However, the patient had no risk factors or clinical signs of stroke nor a history, examination or investigation findings suggestive of a primary or a secondary tumor with brain metastasis. Therefore, neuroradiology opinion was taken, and it was reported that the areas that were previously identified as infarctions or metastasis had pathognomic MRI features of tumefactive perivascular spaces. The patient was not started on any treatment and her symptoms resolved spontaneously within two days. She was discharged with instructions to return if new symptoms occurred.

Discussion

Perivascular spaces (PVSs) in the brain are pial-lined, small, fluid-filled cystic spaces that envelop the walls of blood vessels as they travel through the brain parenchyma [1,2]. They are believed to function similarly to the lymphatic system, helping to drain fluid, remove waste and possibly contribute to immune defense in the brain [1]. Although PVSs are a normal part of brain vasculature and typically seen through histology, they can also become detectable on MRI when they surpass a certain size, depending on the MRI's resolution which is called MRI visible PVSs or enlarged PVSs [3]. They may become enlarged and form giant PVSs (over 15 mm) also called tumefactive PVSs [1]. Giant tumefactive PVSs (GTPVSs) usually present as clusters of cysts of varying sizes, the pathognomonic features being isointense to cerebrospinal fluid (CSF) in all sequences, the absence of contrast enhancement with gadolinium and typical location along and at the site of a penetrating blood vessel [4]. They are most frequently found in the mesencephalothalamic region [2].

Patients with giant PVSs often show nonspecific symptoms with headaches being the most common, affecting around 50% [2]. Our patient, too, had non-specific symptoms of generalized body numbness which resolved spontaneously. Other symptoms include dizziness, seizures, syncope, stroke, visual changes, cranial neuropathy, memory issues and poor concentration [5]. Clinical symptoms typically do not match the imaging findings of enlarged spaces. PVSs are sometimes discovered incidentally during autopsies [2]. Widespread dilatation of PVSs is associated with dementia and Parkinsonism while Giant PVSs can lead to the development of hydrocephalus [1,2]. Giant PVSs may be misinterpreted as cystic neoplasms, parasitic cysts, ventricular diverticula, cystic infarction, non-neoplastic neuroepithelial cysts or mucopolysaccharidosis [4].

Therefore, prompt recognition of the pathognomonic radiological features of tumefactive PVSs is crucial to differentiate them from other pathologic processes, prevent frequent repeated brain imaging, unnecessary invasive procedures such as biopsies or surgical resection and unnecessary treatment.

Conclusion

Tumefactive PVSs are cystic lesions occurring in the brain. These lesions can be easily misinterpreted as neoplastic, vascular, infectious, or immunologic lesions on imaging, leading to frequent imaging of the brain or unwanted invasive neurosurgical procedures. Physicians must be familiar with the typical imaging characteristics of tumefactive PVSs to avoid such misdiagnoses which may lead to unnecessary investigations and treatment.

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