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Unusual Pseudotumoral Location of Cystic Dilation of Virchow-Robin Perivascular Spaces. A Case Report and Literature Review

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Abstract **Case Report**

The giant dilation of the Virchow-Robin perivascular spaces in temporal location is rare. We report a case of a 17-year-old patient who presented an isolated convulsive seizure. Brain magnetic resonance imaging (MRI) was performed and noted a right temporal subcortical lesion of fluid signal on all the sequences, not enhanced after injection of gadolinium, measuring 15.5x10.5mm. Magnetic resonance imaging is an important imaging modality for the diagnosis of giant dilation of Virchow-Robin perivascular spaces when it notes a lesion with liquid signal on all sequences in neighborhood brain vascular topography.

Keywords: Pseudotumoral dilation, Virchow-Robin perivascular spaces, unusual location.

INTRODUCTION

Giant cystic dilation of Virchow-Robin perivascular spaces is rare, and its etiology remains unclear. Virchow-Robin perivascular space is an extension of the subarachnoid space that surrounds and accompanies vessels as they pass through the brain parenchyma. Their expansion corresponds to the trapping of the interstitial fluid around these vessels. Classically, their topography sits at the level of the lower and anterior part of the lenticular nuclei, with a bilateral and often symmetrical location.

They can be in unusual topographies and simulate cystic pseudotumoral lesions. The goal of our work is to describe in magnetic resonance imaging the symptomatic temporal pseudotumoral cystic dilation of Virchow-Robin perivascular spaces.

CASE PRESENTATION

We report a case of a 17-year-old patient, with no particular medical and surgical history, who presented an isolated convulsive seizure. A brain cerebral MRI before and after injection of gadolinium was performed.

It noted a right subcortical temporal well-defined oval lesion with liquid signal on all the sequences: in T1 hyposignal and FLAIR, T2 hypersignal and Diffusion, not enhanced after injection of gadolinium measuring 15.5X10.5mm (Fig 1), without any sign of gliosis around on FLAIR sequences, no anomalies on angiographic sequences (Fig 2). There were other small lesions near the first, with similar characteristics. The largest mesured 6.3mm of diameter (Fig 3).

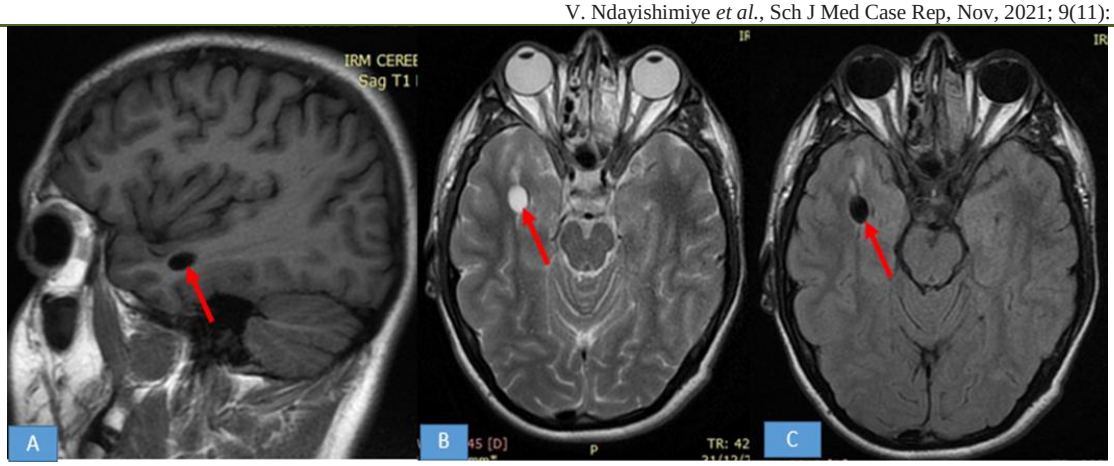

Figure 1: Brain MRI: T1 Sagittal (A), T2 axial (B) and FLAIR axial (C) sequences: right temporal subcortical lesion (red arrows), oval, well limited with regular contours, in T1 and FLAIR hyposignal, T2 hypersignal.

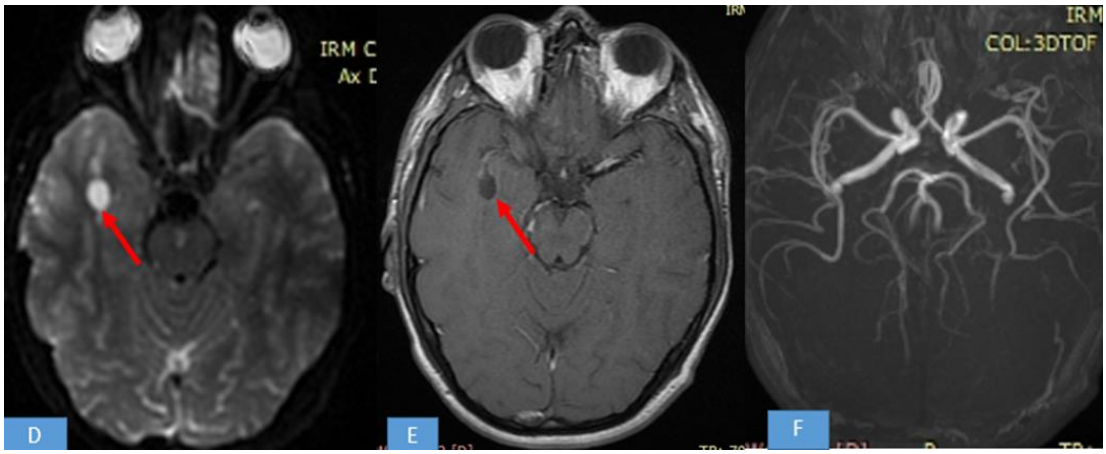

Figure 2: Brain MRI: Diffusion Axial (D), T1 axial after Gadolinium injection (E) and arterial angiography reconstruction (F) sequences. This lesion (red arrows) is in diffusion hypersignal, not enhanced by the contrast product. There is no abnormality in the arterial angiographic sequences

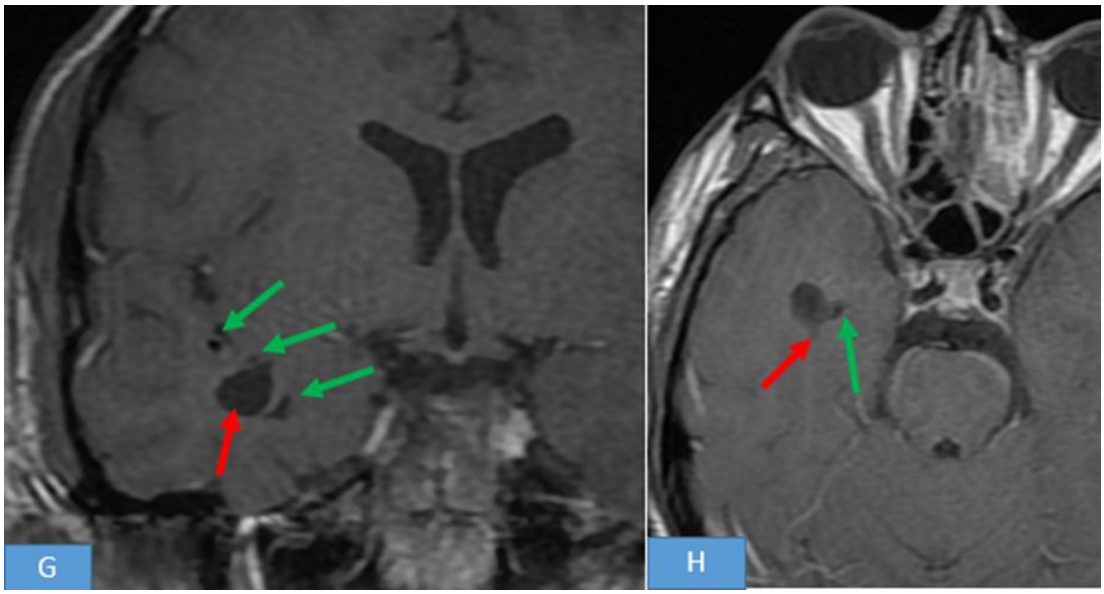

Figure 3: Brain MRI: T1 Coronal (G) and axial (H) sequences after Gadolinium injection: Other small lesions (Green arrows) adjacent to the first one (Red arrow), with similar characteristics

DISCUSSION

Virchow-Robin spaces surround the vessel wall from the subarachnoid spaces to the entire brain parenchyma. Moderate dilations, less than 2 mm are ubiquitous [1].

In more atypical appearances, Virchow-Robin spaces can appear as dilated structures, which can be misinterpreted as a cystic tumor lesion [2].

The cause of their hypertrophy is poorly understood. The enlargement mechanisms include arterial elongation or increased vascular permeability, loss of brain volume and cerebrospinal fluid (CSF) or interstitial fluid dynamics, including altered or increased CSF pulses with increased pressure in the perivascular space, or obstruction to the flow of interstitial fluid [3].

Previous literature on dilated perivascular spaces has demonstrated the tendency of these lesions to exhibit regional preference. The largest series of dilated perivascular spaces, reported by Salzman *et al*., [4] described 37 cases, of which 21 were located in the mesencephalothalamic region, while in 14 patients they were in the subcortical white matter.

The recent series of Rawal *et al*., [5] noted a temporal subcortical location in 15 patients.

The physiological perivascular spaces role has been the subject of much controversy. Nowadays, it is accepted that the perivascular spaces intervene during exchanges between the three compartments of the central nervous system: blood-CSF-cerebral parenchyma. In particular, they constitute a drainage route for interstitial fluid to the subarachnoid space, then to the lymphatic chains of the cephalic end. They are attributed an immunological role [6].

Kumar *et al*., [7] distinguish three types of expansion of Virchow-Robin perivascular spaces according to their topography.

- Type I, along the lenticulostriate arteries: the dilations are located between the anterior perforated substance and the central gray nuclei (or striatum). Type I is the most common form.
- Type II whose dilations are located along the perforating arteries from the cortex to the white matter. Type I and II dilations are most often multiple and involve both hemispheres but in a totally asymmetric way;
- Finally, type III dilations involve the diencephalomeencephalic junction.

The discovery of Virchow-Robin perivascular spaces dilations is most often fortuitous. A statistical association seems to exist in patients with epilepsy, dementia syndrome or migraine.

Hydrocephalus by mass effect on the ventricular system is described for mesencephalic dilations [8].

Dilated Virchow-Robin perivascular spaces are visible on CT as a small rounded cystic formation and / or tubular without mass effect, hypodense compared to the surrounding parenchyma with a density identical to that of the CSF [9].

On MRI, the exam of choice for diagnosis, there is a well-defined round, oval or curvilinear lesion, with smooth edges, with a signal identical to the cerebrospinal fluid in all sequences, with a site compatible with penetrating vessels, without mass effect [10].

CONCLUSION

MRI is an important imaging modality for the diagnosis of giant dilation of Virchow-Robin perivascular spaces when it notes a lesion with liquid signal on all sequences in neighborhood brain vascular topography

Competing Interests: The authors declare no conflict of interest.

Contributions from authors

All the authors contributed to the conduct of this work. They also state that they have read and approved the final version of the manuscript.

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