JBR–BTR, 2014, 97: 364-365.

GIANT PERIVASCULAR SPACES: UTILITY OF MR IN DIFFERENTIATION FROM OTHER CYSTIC LESIONS OF THE BRAIN

M. Ahmad, S. Narayanasamy, M.A. Siddiqui, I. Ahmad[1]

Perivascular or Virchow-Robin spaces (VR) of the brain are fluid-filled, pial-lined spaces that accompany the cerebral vessels as they pass from subarachnoid space into the brain parenchyma. They are visualized on routine MR examinations as CSF intensity spaces and are normally < 2 mm in size. These spaces may rarely enlarge massively and can be mistaken for more ominous pathologic processes on CT scan and even on MRI, but careful examination on special sequences and follow-up examination can clear the uncertainty. We describe a case of a young male who presented with mildly progressive neurological symptoms and the imaging findings were typical of enlarged VR spaces. Patient was advised follow up and is doing well.

Key-words: Brain, cysts – Brain, MR.

Virchow-Robin (VR) spaces or perivascular spaces of the brain refer to spaces that accompany the cerebral vessels as they pass from subarachnoid space into the brain parenchyma. VR spaces are typically located in the basal ganglia, along the cerebral convexities and in midbrain. These spaces increase in frequency and number with increase in age (1). Rarely VR spaces may show gross dilatation, assume various bizarre configurations and predominantly involve one hemisphere of the brain and may be mistaken for other ominous neurological pathologies. Knowledge of their typical imaging appearance and location will aid in differentiating cystically dilated VR spaces from other pathologies.

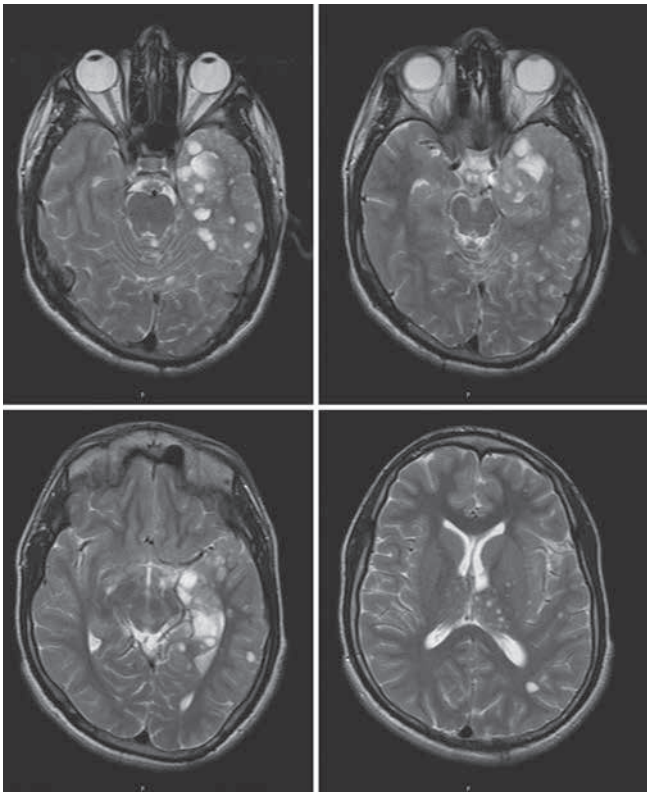

Fig. 1. — Axial T2-weighted MR images taken at various levels showing multiple, well defined, variable sized, hyperintense lesions in left cerebral hemisphere forming a cluster in temporal lobe and thalamus. The signal of the lesions is same as that of the CSF and there is no significant mass effect.

Case report

A 14-year-old male presented to Paediatrics Outpatient Clinic with the history of mild headache and vertigo for the past two years which were progressively increasing in severity. There was no history of any fever, convulsions, blurring of vision, tinnitus or any other neurological symptoms. Family history and past history were unremarkable.

On physical examination patient was anxious, however vitals were found to be stable. Otological and neurological examinations were within normal limits.

MRI examination was done and it revealed multiple, variable sized, altered signal intensity lesions in left temporal and occipital lobe, bilateral basal ganglia and thalami, along subependymal lining of temporal, occipital horn and body of left lateral and 4th ventricle, left periventricular white matter, left cerebellar hemisphere and vermis. Lesions were variable in size with larger ones measuring up to 2 centimetres. The lesions were hyperintense on T2W sequence, hypointense with hyperintense margins on FLAIR sequence and hypointense on T1W sequence. There was no evidence of restriction on diffusion weighted imaging (DWI) or enhancement on post contrast sequences. Also there was no evident mass effect. Thus a diagnosis of giant perivascular or VR spaces was made. Patient was advised followed up with MR examination after 6 months.

From: 1. Department of Radiodiagnosis, Jawaharlal Nehru Medical College, A.M.U. Aligarh, Uttar Pradesh, India.
Address for correspondence: Dr Sabarish Narayanasamy, M.D., Junior resident, Department of Radiodiagnosis, Jawaharlal Nehru Medical college, Aligrah, Uttar Pradesh, India, PIN – 202002. E-mail: nsabarish86@gmail.com

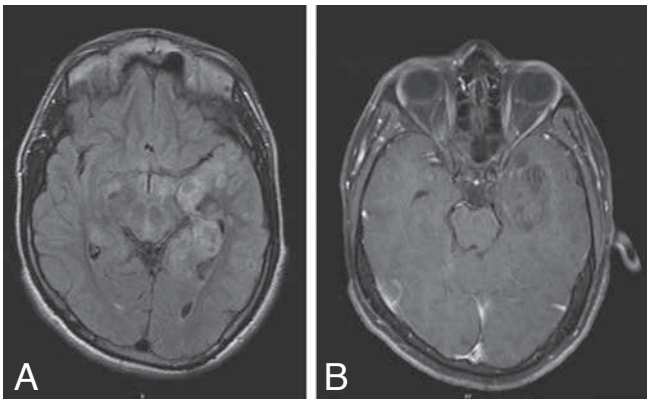

Fig. 2. — On Axial FLAIR image (A) the lesions appear hypointense with hyperintense margins. On the fat-suppressed T1WI (B) no contrast enhancement is noted after IV injection of gadolinium.

MRI revealed stable lesions with out any change in size and appearance of the lesions. Patient clinical condition remains stable and clinical improvement was seen with symptomatic treatment.

Discussion

VR spaces are seen surrounding the walls of vessels as they pass from the subarachnoid space to the brain parenchyma, however they do not directly communicate with the subarachnoid space. Few studies have found a relationship between VR spaces and multiple sclerosis, traumatic brain damage and psychiatric disorders, however no definite casual relationship has been established (2, 3). Dilated VR spaces are seen in MR imaging as round to oval well defined cystic lesions with CSF signal intensity on all MR sequences and no enhancement on contrast scans. On diffusion weighted imaging they do not show any restriction and FLAIR sequences usually shows normal signal intensity in surrounding brain parenchyma. Dilated VR spaces are divided into 3 types based on the location: Type 1 along the perforating medullary arteries in the basal ganglia, type 2 along the lenticulostriate arteries along the cerebral convexities and type 3 spaces in the midbrain (4).

Occasionally VR spaces may be markedly dilated, may assume bizarre shapes, may show mass effect and are usually encountered bordering a ventricle or a subarachnoid space. Our case showed giant cystically dilated VR spaces involving the basal ganglia, thalami, cerebral and cerebellar hemispheres predominantly localised to the left side. Clusters of atypical dilated type 2 VR spaces localised to one hemisphere has been previously reported in literature (5, 6). Atypically dilated VR spaces are fortuitously discovered because they are usually asymptomatic. Rarely patients may present with neurological symptoms of headache, dizziness, dementia and visual changes (6). Our patient presented with complaints of mild headache and vertigo for past two years, however neurological examination was normal. FLAIR imaging shows no signal heterogeneity in the adjacent brain parenchyma except in a few reported cases which showed altered signal intensity corresponding to gliosis (7).

It is essential to distinguish dilated VR spaces from other ominous cerebral pathologies such as cystic neoplasms, parasitic cysts, ventricular diverticulae, cystic infarction, periventricular leukomalacia and mucopolysaccharidoses. Cystic neoplasms do not show pure CSF intensity, parasitic cysts like neurocysticercosis usually have a small scolex with enhancing cyst walls. Patients of mucopolysaccharidoses have the typical clinical feautures. Lacunar infarcts show hyperintensity in the surrounding brain parenchyma. Periventricular leukomalacia occurs in premature infants and shows loss of white matter in periventricular regions.

The presence of cystic spaces with smooth regular margins along the course of cerebral vessels with signal intensity similar to CSF in all MR sequences with normal adjacent brain parenchyma and no enhancement after contrast administration is virtually diagnostic of Virchow robin spaces.

VR spaces do not require biopsy or any invasive examination for diagnosis. Regular timely follow up MR examinations are usually sufficient to detect any increase in size of the lesions. In few rare cases, dilated VR spaces in the mesencephalothalamic region may cause compression of the ventricles leading to obstructive hydrocephalus and may have to be relieved by an operative shunt (8, 9). Our patient was advised follow up MR examination after 6 months, which did not reveal any change in status of the lesions.

References

1. Heier L.A., Bauer C.J., Schwartz L., Zimmerman R.D., Morgello S., Deck M.D.: Large Virchow-Robin spaces: MR-clinical correlation. *AJNR Am J Neuroradiol*, 1989, 10: 929-936.
2. Esiri M.M., Gay D.: Immunological and neuropathological significance of the Virchow-Robin space. *J Neurol Sci*, 1990, 100: 3-8.
3. Achiron A., Faibel M.: Sandlike appearance of Virchow-Robin spaces in early multiple sclerosis: a novel neuroradiologic marker. *AJNR Am J Neuroradiol*, 2002, 23: 376-80.
4. Kwee R.M., Kwee T.C.: Virchow-Robin Spaces at MR Imaging. *Radiographics*, 2007, 27: 1071-1086.
5. Ogawa T., Okudera T., Fukasawa H., et al.: Unusual widening of Virchow-Robin spaces: MR appear-ance. *AJNR Am J Neuroradiol*, 1995, 16: 1238-1242.
6. Salzman K.L., Osborn A.G., House P., et al.: Giant Tumefactive Perivascular Spaces. *AJNR Am J Neuroradiol*, 2005, 26: 298-305.
7. Komiyama M., Yasui T., Izumi T.: Magnet resonance imaging fea-tures of unusually dilated Virchow-Robin spaces – two case reports. *Neurol Med Chir*, 1998, 38: 161-164.
8. Papayannis C.E., Saidon P., Rugilo C.A., et al.: Expanding Virchow Robin spaces in the midbrain causing hydrocephalus. *AJNR Am J Neuroradiol*, 2003, 24: 1399-403.
9. House P., Salzman K.L., Osborn A.G., et al.: Surgical considerations regarding giant dilations of the perivascular spaces. *J Neurosurg*, 2004, 100: 820-24.