Case Report
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Multicystic Perivascular Spaces Mimicking Cystic Neoplasm of Brain

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Background: Virchow-Robin (VR) spaces are the fluid-filled perivascular spaces adjacent the brain vessels. The signal intensities of the VR spaces are very similar to those of cerebrospinal fluid (CSF). VR spaces should be distinguished various pathologic conditions, including lacunar infarctions, cystic periventricular leukomalacia, cryptococcosis, cystic neoplasms and neuroepithelial cysts.

Case presentation: 32-year-old female with 6 month history of worsening severe headaches. The clinical examination and laboratory findings were congruent with hypothyroidism. MR imaging revealed multiloculated, thin-walled, "soap bubble" like lesions cystic lesions involving anterior part of left cingulated gyrus. Cystic lesions showed the same signal intensity characterstics with CSF. There was no any mass effect, enhancement, peripheral edema and no restriction in diffusion-weighted images. After 10 month follow-up there was no any change in size or in MRI features.

Conclusion: Knowledge of the signal intensity characteristics, locations of VR spaces and absence of any change in follow up prevents unnecessary biopsy.

Keywords: Virchow-Robin spaces, perivascular spaces, cingulate gyrus, cystic lesion of brain, neuroepithelial cyst

Introduction

Virchow-Robin (VR) spaces are perivascular spaces surrounding the brain vessels. Although, the signal intensities of the VR spaces are identical to those of CSF, they do not communicate directly subarachnoid space or ventricles. One of the most basic roles of the VR spaces is the regulation of CNS fluid movement and drainage [1].

VR spaces can be distinguished by it's signal characterictics and location from various pathologic conditions, including lacunar infarctions, cystic periventricular leukomalacia, cryptococcosis, cystic neoplasms and neuroepithelial cysts.

Case Report

A 32-year-old female, presented with 6 month history of severe headache. The clinical examination and was laboratory findings were congruent with hypothyroidism (fT3=2.16 Pg/ml; fT4=0.33 ng/ml; TSH=76.45 μIU/ml;). MR imaging examination was performed and revealed multiloculated, clusters of variable-sized, thin-walled, "soap bubble" like lesions cystic lesions involving anterior part of left cingulated gyrus (figure 1). Cystic lesions showed the same signal intensity characterstics with CSF. There was no any mass effect, enhancement and peripheral edema, calcification or haemorrhagia. Diffusion-weighted images showed no restricted diffusion. The patient has a history of traumatic brain injury 20 years before. We decided to follow-up and after 10 month there was no any change in size or in MR imaging features (figure 2).

Discussion

Virchow-Robin spaces surround the walls of vessels as they course from the subarachnoid space through the brain parenchyma. Dilated VR spaces typically occur in three characteristic locations: Type I VR spaces found along the lenticulostriate arteries entering the basal ganglia; Type II VR

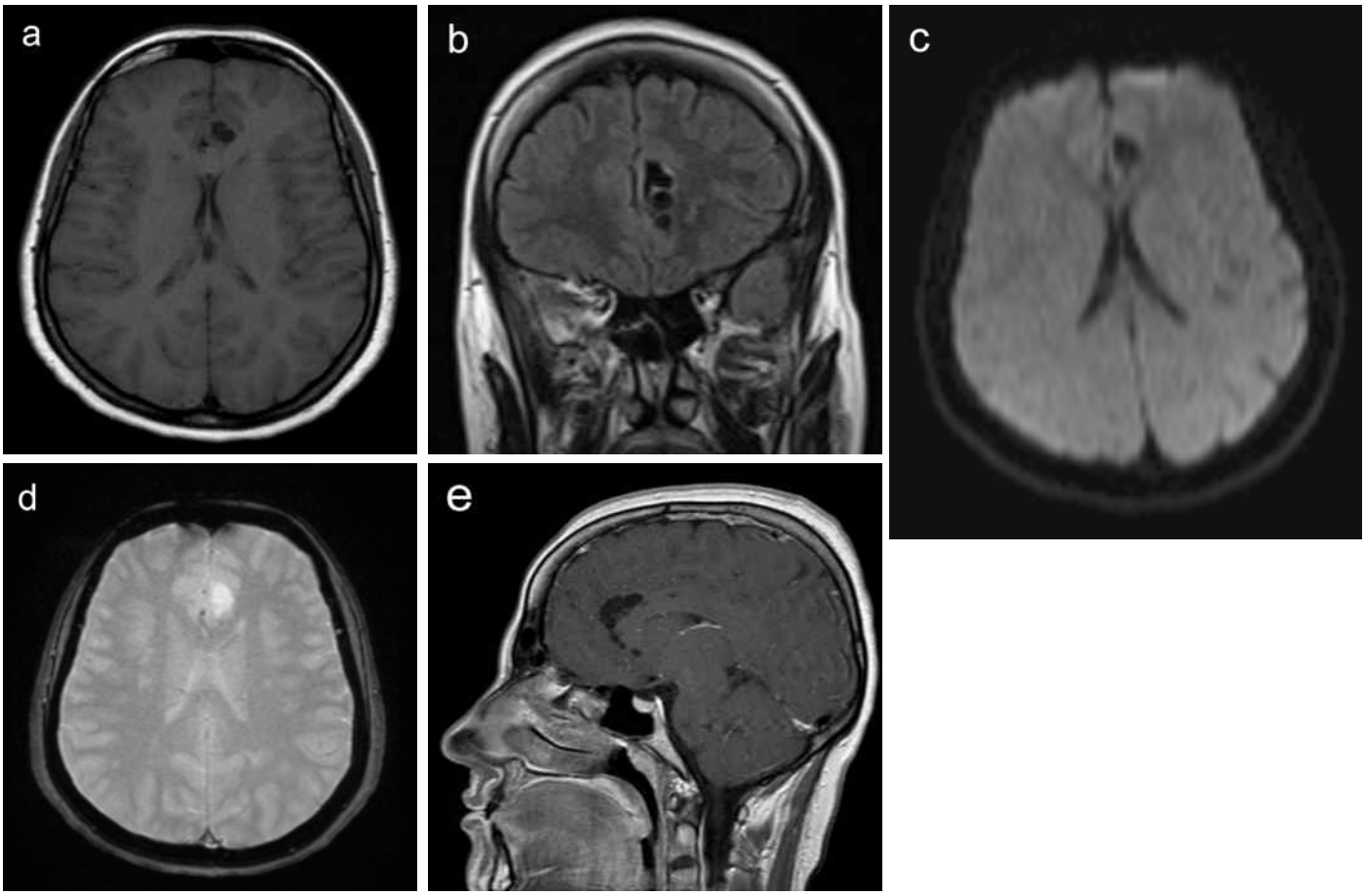

Figure 1. Axial T1-weighted (repetition time - TR:550ms, echo time - TE:10ms, averages:4, flip angle:90°) images **(a)** shows parasagittal hypointense multicystic lesions in cingulate gyrus that completely suppressed in FLAIR (TR:8000ms, TE:118ms, averages:1, flip angle:150°) images **(b)**. There is no restriction diffusion-weighted (b-value:1000) images **(c)** and no calcification or haemorrhage in T2W-Fast Field Echo (TR:757ms, TE:23ms, averages:2, flip angle:18°) sequence **(d)**. No contrast enhancement in T1-sequence was detected **(e)**.

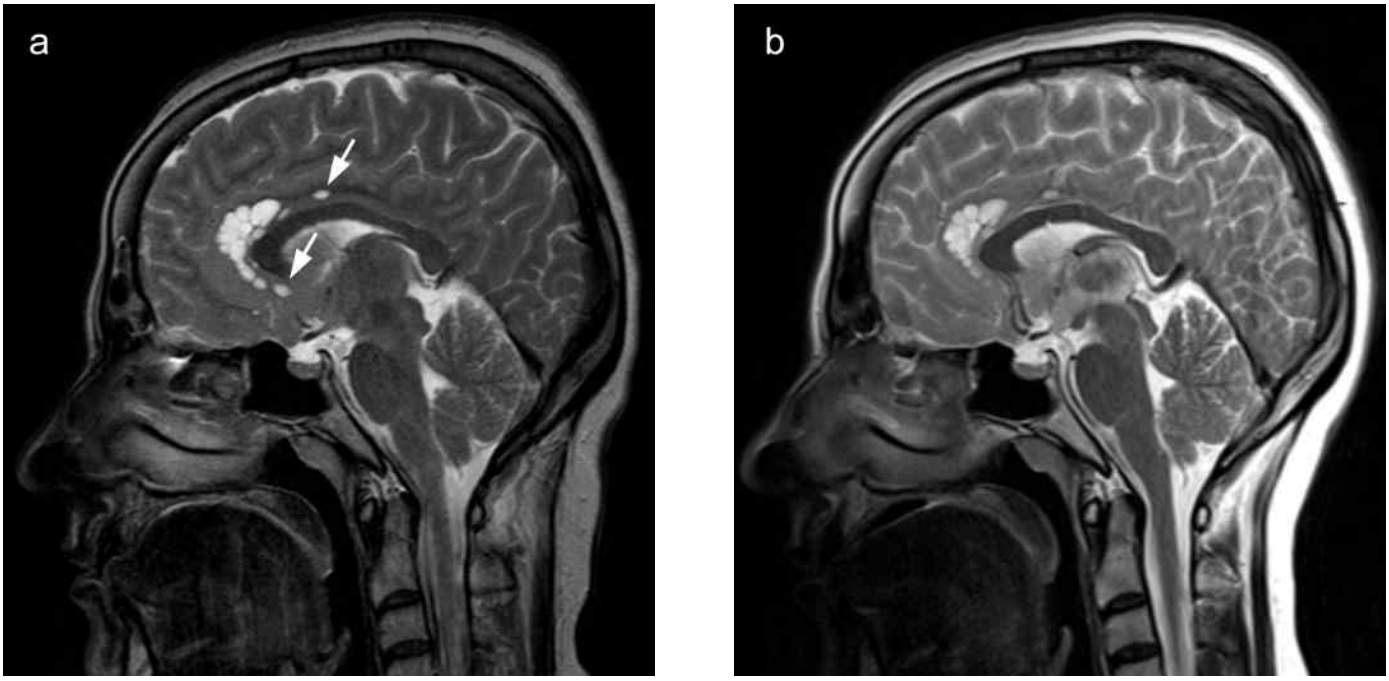

Figure 2. a. Sagittal T2-weighted image shows hyperintense multicystic "soap-bubble"like Virchow-Robins spaces with some small cysts (arrows) that isolated from grouped ones and lined along the cingulate gyrus. **b.** Nearly the same section T2-weighted image shows no change after 10 months follow-up.

spaces found along the paths of perforating medullary arteries as they enter the cortical gray matter over the high convexities; and Type III VR spaces in the midbrain [1]. Occasionally, VR spaces appear markedly enlarged, cause mass effect, and assume weird cystic formations.

Awareness of the signal intensity characteristics and locations of VR spaces helps differentiate them from various pathologic conditions, including cystic tumors, parasitic cysts, cystic infarctions, non-neoplastic neuroepithelial cysts, cystic periventricular leukomalacia, multiple sclerosis, mucopolysaccharidoses, and arachnoid cysts [1]. Rarely, as seen in the present patient, they can also occur at an atypical location causing diagnostic confusion. There is no adjacent T2W or FLAIR hyperintensity, that excludes multiple sclerosis, cystic infarctions and cystic periventricular leukomalacia. No contrast enhancement excludes cystic neoplasms. No restriction in diffusion-weighted images excludes cryptococcosis.

The imaging features of neuroepithelial cysts are very identical to those of VR spaces. Both suppresses in FLAIR, there is no contrast enhancement, no restriction in diffusion-weighted images. Certain differentiation can be made only by pathologic study. The best radiological clue to exclude neuroepithelial cysts is being its single, unilocular cystic nature and greater in size [2]. Besides, in our case, some small cysts that isolated from grouped ones are lined along the cingulate gyrus (figure 2). Whereas, neuroepithelial cysts are tending to group concentrically.

The causes of enlarged VRS are still remain unclear. Commonly, size and frequency of VR spaces increase with advancing age. An association shown with neuropsychiatric disorders, recent-onset multiple sclerosis and diseases associated with microvascular abnormalities [1]. Inglese M. et al found a correlation between dilated VR spaces and mild traumatic brain injury [3]. In our case, the past traumatic brain injury may support this hypothesis. However, it is hard to prove injury, that been 20 years ago.

Conclusion

Virchow-Robin spaces are benign lesions with unknown ethiology. Awareness of the signal intensity characteristics and locations of VR spaces helps differentiate them from various pathologic conditions and avoids unnecessary biopsies.

References

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