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FLAIR Vascular Hyperintensity Preceding Stroke in Cryptococcal Meningitis

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Abstract

BACKGROUND AND PURPOSE—Ischemic stroke is a common complication of cryptococcal meningitis. Fluid attenuated inversion recovery vascular hyperintensity (FVH) is a neuroimaging marker of sluggish blood flow usually seen in the setting of acute stroke. FVH have never been described in the setting of meningitis.

METHODS—Case report.

RESULTS—A 20-year-old man with cryptococcal meningitis and a magnetic resonance imaging demonstrating FVH had subsequent neurological deterioration and was found to have bilateral ischemic stroke.

CONCLUSIONS—In conditions with high risk of stroke, such as meningitis, the presence of FVH should alert the clinician to the possibility of impending infarction.

Keywords

Stroke; HIV/AIDS; magnetic resonance imaging; meningitis; cryptococcus

Introduction

Ischemic stroke is seen in up to one-third of cryptococcal meningitis cases.¹ While the mechanism of stroke is unclear, it may involve (a) exudates causing strangulation of blood vessels at the base of the brain, (b) meningeal inflammatory exudates spreading along the adventitia, causing necrotizing panarteritis and thrombosis, (c) increased intracranial pressure compromising venous outflow, and (d) dilated ventricles stretching already compromised blood vessels.¹ In addition, some strains of *Cryptococcus* may have a greater propensity to cause vasculitis and thrombosis.^{1,2}

Neuroimaging, particularly magnetic resonance imaging (MRI), can aid in the diagnosis of central nervous system infection and its complications. During evaluation subtle findings of clinical importance may go unnoticed. One such finding is vascular hyperintensity on fluid-attenuation inversion recovery (FLAIR) sequences,³ most commonly seen in acute stroke and intracranial steno-occlusive disease.⁴ FLAIR vascular hyperintensity (FVH) denotes sluggish or disordered blood flow and can be a marker of increased stroke risk.⁵ We report a case of FVH on MRI preceding ischemic stroke in a patient with cryptococcal meningitis.

A 20-year-old man with acquired immune deficiency syndrome presented with severe headache of 3 weeks duration. Diagnostic evaluation revealed a CD4 count of 88; lumbar puncture demonstrated elevated opening pressure of 28-cm H₂O, 0 WBC, 0 RBC, glucose of 42, protein of 40, and India Ink prep revealed Cryptococci. On physical exam, the patient was alert, oriented, and had no focal neurological signs. The patient was admitted for treatment with fluconazole. A repeat lumbar puncture 4 days later demonstrated an opening pressure greater than 50-cm H₂O. Initial MRI of the brain revealed scattered subcortical T2-hyperintense lesions (Fig 1), however, close inspection in retrospect reveals FVH (arrows) in bilateral sylvian fissures and other sulcal locations corresponding to middle and posterior cerebral artery (middle cerebral artery [MCA], PCA) segments.

Eight days after presentation, the patient was witnessed to have a generalized tonic-clonic seizure followed by an acute deterioration in mental status. On examination, he no longer followed commands and had decreased spontaneous speech. MRI acquired shortly after this event revealed bilateral acute ischemic strokes in the territories adjacent to the previously noted FVH (Fig 2). The patient was treated with daily lumbar punctures for a week and ultimately, ventriculoperitoneal shunt placement.

Discussion

FVH has not been reported in meningitis, likely due to its subtle nature and lack of known clinical significance. In this case there was no mention of presence of this imaging marker on the prestroke MRI. In all clinical situations, the presence of FVH should raise concern of slow flow, vascular insufficiency, and the possibility of stroke.

The slow flow manifested as FVH in this case was likely secondary to meningovascular infectious involvement of pial or leptomeningeal vessels. The mechanism of ischemia may be related to diffuse spasm of distal MCA and PCA branches. Alternatively, in the setting of proximal stenosis, more distally noted FVH represents retrograde leptomeningeal collateral flow. The direction of flow is unclear in this case and could be anterograde through stenotic vessels affected by vasospasm. Previously it has been shown that elevated cerebral blood flow velocities on transcranial Doppler indicating proximal stenosis were common in cryptococcal meningitis, present in 8 of the 22 cases in one study.⁶ A vasculitic process may contribute to ischemia in cryptococcal meningitis, which is supported by the successful use of intravenous steroids to treat the late ischemic complications.⁷

FVH may predict an increased risk of stroke in patients with cryptococcal meningitis, and possibly in other chronic meningeal infections. Recognition of this subtle radiological may

alert the clinician to disordered blood flow and lead to directed stroke prevention therapy. Patients with FVH in the setting of meningitis may be candidates for antiplatelet therapies, aggressive fluid resuscitation, and potentially other therapies.

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Fig 1. Axial MRI obtained prior to clinical deterioration revealing scattered vascular hyperintensities on FLAIR sequences in bilateral sylvian fissures and over the cerebral cortex (A and B, FVH indicated by the arrows).

Fig 2. Axial FLAIR and diffusion-weighted MRI obtained after clinical deterioration revealing parenchymal high signal in the bilateral temporal-parietal-occipital regions that demonstrate restricted diffusion indicating ischemic stroke.