Cytomegalovirus encephalitis radiographically mimicking lateral medullary stroke

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Cytomegalovirus (CMV) is a double-stranded DNA virus from the herpes virus family. Disseminated or focal end-organ disease typically occurs in immunocompromised individuals, often in the setting of advanced HIV or organ transplantation. Neurologic manifestations include focal encephalitis, meningitis, ventriculoencephalitis, and polyradiculitis. After the advent of highly active antiretroviral therapy (HAART), the incidence of CMV disease has decreased by as much as 80%.¹ This decrease largely predates the widespread adoption of MRI into routine patient care. As a result, our understanding of CMV and the spectrum in which it radiographically manifests is limited.² We report a case of CMV ventriculoencephalitis and myelitis radiographically mimicking lateral medullary stroke in a patient with advanced HIV.

PRACTICAL IMPLICATIONS

Cytomegalovirus encephalitis may demonstrate unique MRI characteristics that allow for earlier diagnosis and treatment.

Case report

A 50-year-old HIV-positive man was admitted for a 4-day history of diarrhea. He was referred to neurology for left-sided sensorimotor deficits, and an MRI reported as demonstrating a lateral medullary infarct (figure 1A). He was diagnosed with HIV 14 years ago and was well controlled on HAART up until 4 years ago, at which time he stopped all treatment because of a refusal to accept his diagnosis. His CD4⁺ count reached a nadir of 10 cells/mm³, and the peak viral load was 263,132 copies/mL. Seven months before presentation, he was admitted with disseminated CMV infection manifesting as CMV colitis and retinitis. At that time, he was treated with IV ganciclovir and discharged on prolonged suppressive therapy with oral valganciclovir. Collateral history revealed that he began having slowly progressive left hemibody sensorimotor symptoms 11 months before his current admission.

His examination was remarkable for encephalopathy. He had a left-sided Horner syndrome. There was reduced pinprick and temperature sensation over the left face and right hemibody. There was spastic hemiparesis of the left arm and leg. A repeat colon biopsy showed CMV colitis. Serum CMV PCR was positive at 136,000 IU/mL. A lumbar puncture could not be completed because of thrombocytopenia (platelet count of 10), which was believed to be secondary to underlying HIV and CMV infection.

Discussion

Despite a substantial reduction in the incidence of CMV disease in the post-HAART era, CMV-HIV coinfection continues to be an independent predictor of mortality. The presence of CMV DNA in plasma has been shown to independently predict death even after adjusting for HIV RNA load and CD4⁺ cell count.³ Reactivation of CMV infection in HIV typically presents as retinitis or colitis. Neurologic complications, though less common, are heterogeneous. CNS disease classically manifests as ventriculoencephalitis, which is characterized by the subacute onset of encephalopathy. Other features including weakness, ataxia, nystagmus, and cranial nerve palsies may be seen as well, suggesting focal encephalitis. CSF may show high protein, hypoglycorrhachia, and a pleocytosis with either a polymorphonuclear or mononuclear

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(A) Initial MRI showing restricted diffusion of the left lateral medulla. Repeat scans at (B) 1 month and (C) 10 months showing progression of the medullary lesion with the circumferential pattern of involvement and persistence of restricted diffusion. (D) FLAIR and (E) post-gadolinium T1-weighted sequences at 10 months demonstrating circumferential FLAIR hyperintensity and contrast enhancement, respectively. (F) Dedicated cervical spine diffusion-weighted imaging (DWI) showing extension of the medullary lesion into the cervical cord, again in a circumferential pattern. (G) Repeat FLAIR and (H) DWI sequences after treatment of HIV and cytomegalovirus at 13 months showing interval development of hemiatrophy of the left medulla and resolution of restricted diffusion, respectively.

predominance. Detection of CMV DNA via PCR is most specific. Neuropathologic examination reveals periventriculitis with ependymal necrosis, CMV intranuclear inclusion bodies, microglial nodules and focal parenchymal necrosis.⁴

In the pre-HAART era, MRI in HIV-associated CMV encephalitis has previously been shown to be nonspecific,⁵ with the most common finding being nonspecific T2-weighted white matter hyperintensity, similar to HIV leukoencephalopathy.⁶ Since this time, however, MRI technology has improved substantially. The use of diffusion-weighted imaging (DWI) has

allowed better characterization of more specific changes in CMV encephalitis; however, few cases document these features.² We describe a case of CMV ventriculoencephalitis and myelitis followed with serial MRI demonstrating disease progression. Our findings of ventricle wall diffusion restriction (figure 2) are consistent with those of previous reports⁷ and are in keeping with known ependymal tropism of the virus seen in autopsy studies.⁴ The persistence of restricted diffusion in CNS CMV has previously been reported,² though never beyond 1 month, as was the case in our patient who continued to demonstrate restricted diffusion beyond 10 months. This salient feature helps differentiate from other etiologies, including

Figure 2 DWI of ventricle wall diffusion restriction

(A) Diffusion-weighted imaging with (B) corresponding apparent diffusion coefficient values showing restricted diffusion of ventricular wall suggesting ventriculitis (arrows). (C) Post-gadolinium T1-weighted image showing contrast enhancement (arrows) of the same area. (D) Interval resolution of restricted diffusion at 13 months after treatment of HIV and cytomegalovirus.

stroke, which was the initial reason for consultation in our patient. The underlying pathophysiology has been hypothesized to represent nonlethal cellular edema as a result of accumulation of CMV viral inclusions.² With treatment of his HIV and CMV, the patient stabilized clinically with residual hemibody sensorimotor deficits. Repeat imaging at 13 months demonstrated resolution of diffusion restriction (figures 1 and 2). The circumferential pattern of involvement of the brainstem and spinal cord in our patient is a unique and rare finding.

Neurologists should be familiar with the heterogeneous presentations of CNS CMV. Neuroimaging in this condition may mimic more common conditions, including stroke. Unique features on MRI, particularly DWI, should raise suspicion for the disease, prompting early treatment.

Author contributions

D. Li: writing of the manuscript and review of the literature. S. van Gaal: editing of the manuscript and review of the literature.

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