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## VARICELLA-ZOSTER VIRUS ENCEPHALITIS MIMICKING TOXOPLASMOSIS RELAPSE

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**Case report.** A 37-year-old woman was admitted with seizures, confusion, and fever following weeks of apathy and self-neglect. HIV-1 infection and cerebral toxoplasmosis were diagnosed 4 months before, with good clinical and radiologic response to sulfadiazine and pyrimethamine after 1 month<sup>1</sup> (figure, A). After discharge she had poor adherence to antitoxoplasmosis and antiretroviral drugs.

At this admission, examination revealed slow verbal and motor responses, disorientation, and pyrexia (38°C). Hemoglobin was 5.9 g/dL, CD4 = 4 cells/μL (1%), and HIV viral load was 114,294 copies/mL. Serologies were reactive for *Toxoplasma* and negative for *Cryptococcus*, hepatitis B and C, and syphilis. Brain MRI revealed more gadolinium-enhancing lesions (figure, B). Toxoplasmosis treatment and truvada/darunavir/ritonavir were restarted, with clinical and radiologic improvement of enhancement pattern after 6 weeks (figure, C).

Two weeks later, clinical worsening ensued, with fluctuating consciousness, apathy, aphasia, and food and medication refusal. MRI showed significant increase in T2/fluid-attenuated inversion recovery lesion number and extension and multiple new hemorrhagic and enhancing lesions following arterial territories (figure, D). CSF analysis showed 8 white cells/mm<sup>3</sup>, protein 1,330 mg/dL, and positive varicella-zoster virus (VZV) DNA (negative cryptococcal antigen, HIV, cytomegalovirus, Epstein-Barr virus, herpes simplex virus, and adenovirus PCR, antineuronal antibodies). Acyclovir (10 mg/kg, tid) was added.

Deterioration continued, with no eye or verbal response to stimuli, food and medication refusal, and tetraparesis with hyperreflexia and bilateral extensor plantar response. EEG excluded status epilepticus. CSF showed 1,350 erythrocytes/mm<sup>3</sup>, protein 2,400 mg/dL, no lymphocytes, and lower VZV DNA copies.

VZV hemorrhagic encephalitis with vasculopathy was assumed, so foscarnet (60 mg/kg/day) and IV methylprednisolone (3 g over 3 days) were added. Rapid improvement ensued, with the patient being

alert with spontaneous eye opening and directing gaze to stimuli after 2 days and showing intentional movements later. Throughout, her attention fluctuated and she refused to engage. Despite considerable clinical improvement, MRI performed 2 months later still demonstrated widespread cerebral lesions (figure, E).

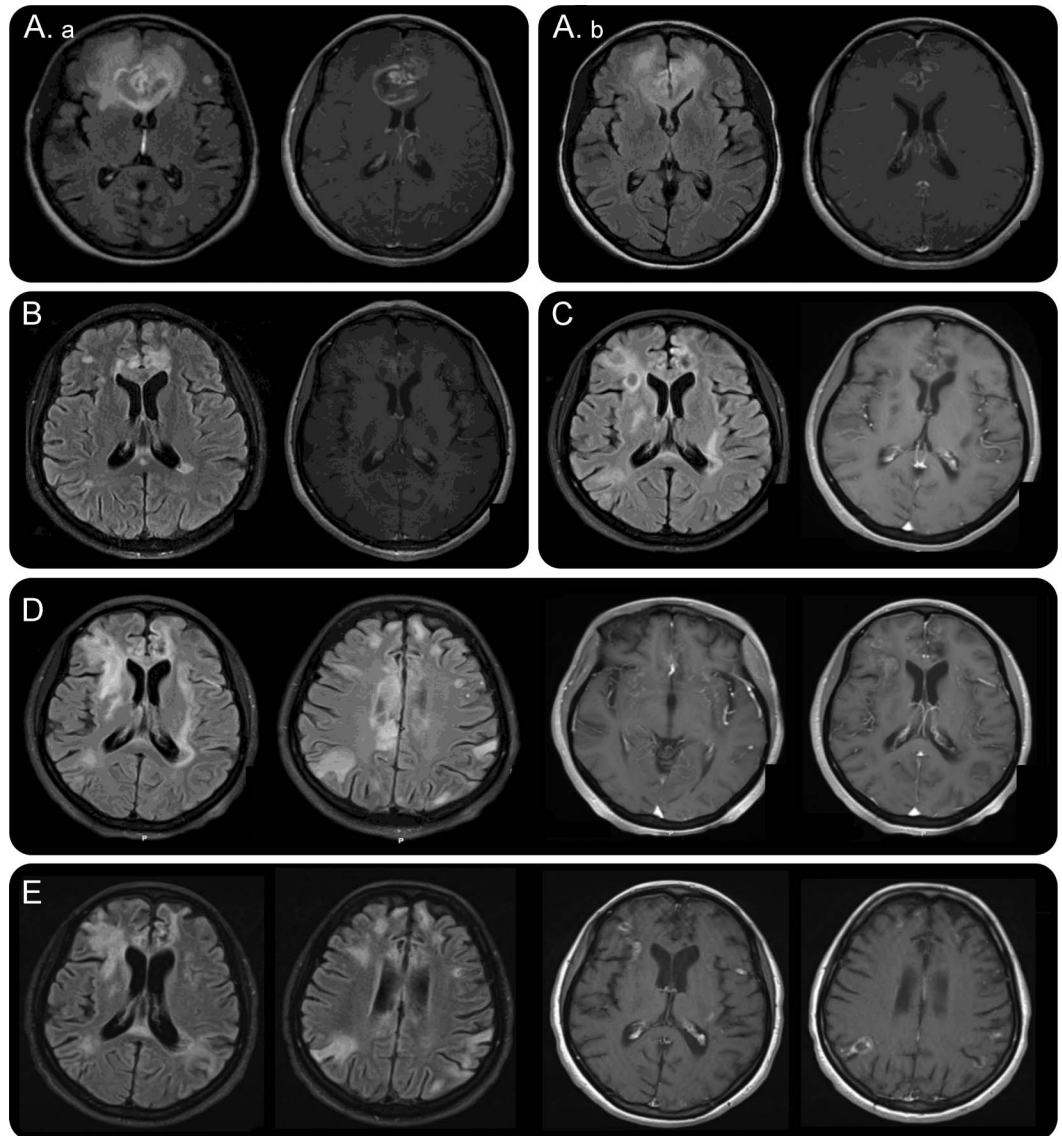
**Discussion.** Encephalitis etiology frequently remains unknown.<sup>2,3</sup> In immunosuppressed patients, CNS infections are among the most common complications, but clinical, radiologic, and laboratory features are similar in CNS infections, neoplasms, and HIV encephalopathy. Concurrent CNS pathologies must be considered when patients do not respond to treatment or present with rebound worsening, after excluding treatment nonadherence, drug resistances, misdiagnosis, and immune reconstitution inflammatory syndrome (IRIS). Toxoplasmosis-IRIS is rare, and new perivascular/vascular gadolinium-enhancing lesions extending through perforator territories of middle cerebral arteries with punctate hemorrhagic signal with restricted diffusion-weighted signal areas and CSF VZV DNA were more suggestive of VZV vasculopathy in the case reported.

VZV is estimated to cause 5%–8% of adult encephalitis cases.<sup>3</sup> Clinical suspicion is essential, especially in immunocompromised patients. In HIV-infected patients, VZV encephalitis is less frequent than tuberculosis, progressive multifocal leukoencephalopathy, cryptococcosis, or primary CNS lymphoma. In addition, its presentation is usually subacute and unspecific (headache, fever, altered consciousness, seizures, and/or focal neurologic deficits)<sup>4</sup> and the rash is absent.<sup>5</sup> VZV encephalitis is catastrophic despite therapy, with an estimated 33% mortality in HIV-infected patients and frequent neurologic sequelae in survivors.

VZV causes a productive infection in arteries,<sup>5</sup> with secondary inflammation inducing vascular remodeling causing stenosis/occlusion. Hemorrhage can result from necrotizing angiitis or media disruption with aneurysm formation.<sup>6</sup> Therefore, VZV infection must be considered in cryptogenic stroke patients or CNS vasculitis.

Brain MRI usually shows multiple ischemic lesions typically involving the gray-white matter junction.<sup>4</sup> Angiographic features include focal stenosis, often with

**Figure** Brain MRI of the patient throughout the disease course



(A) Brain MRI at the time of cerebral toxoplasmosis diagnosis (a) and after 1 month of toxoplasmosis treatment (b). (B) Brain MRI at admission showing increase in lesion number and contrast uptake. (C) Brain MRI showing radiologic response to toxoplasmosis treatment. (D) Brain MRI after progressive clinical deterioration showing increase in lesion number and multiple new enhancing vessels in the periventricular and peripheral distribution of middle cerebral artery territories. (E) Brain MRI after 2 months of foscarnet treatment. Despite significant clinical improvement, radiologic lesions persist.

poststenotic dilation.<sup>4,5</sup> CSF is normal (40% of HIV-infected patients) or shows modest pleocytosis, erythrocytes, and/or increased proteins.<sup>4</sup> VZV DNA in CSF has 98% specificity and 80% sensitivity in HIV-infected patients,<sup>7</sup> with a correlation between the viral load and CNS disease severity. However, VZV DNA becomes undetectable after weeks.<sup>5</sup> CSF anti-VZV immunoglobulin G (IgG) has greater diagnostic value, increasing as VZV DNA becomes undetectable.

Optimally, CSF/serum VZV IgG index is needed to confirm intrathecal antibody production. DNA or IgG virologic confirmation in CSF is required for VZV encephalitis diagnosis, and only a negative result in both can rule out this infection. VZV in CSF is not

routinely or timely tested, and VZV encephalitis diagnosis may be frequently missed.

First-line treatment for VZV encephalitis is acyclovir (10–15 mg/kg, tid, 10–14 days).<sup>2,4</sup> In severe cases, oral/IV steroids are an option for arterial inflammation,<sup>4</sup> but long-term steroids are not recommended.<sup>1,4</sup> If acyclovir resistance is suspected, foscarnet is advised.<sup>1</sup>

In our patient, timely histopathologic confirmation was impossible; however, VZV DNA in CSF and sustained improvement after foscarnet and steroids support our diagnosis.

**Conclusions.** VZV encephalitis has an unspecific presentation and may explain a significant proportion

of cases of encephalitis classified as undetermined. Clinical suspicion is essential and routine screening for VZV in CSF needs to be implemented.

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