

## **Visual Diagnosis in Emergency Medicine**

### **THE DOUBLE DOUGHNUT SIGN ON BRAIN MAGNETIC RESONANCE IMAGING CAUSED BY JAPANESE ENCEPHALITIS**

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#### **CASE REPORT**

A 30-year-old previously healthy man presented to the emergency department with a fever and recurrent vomiting for 2 days followed by altered sensorium for 6 h, a history that was provided by his spouse. There was no history of seizures or recent travel. The physical examination revealed that he was febrile (38.3°C [101°F]) with a pulse of 112 beats/min, a blood pressure of 146/98 mm Hg, a respiratory rate of 32 breaths/min, and there were no rashes anywhere on the body. A neurologic examination revealed obtunded sensorium (Glasgow coma scale score 6/15), and the motor, sensory, and cerebellar system could not be examined because of altered mentation. There was hyperreflexia and neck rigidity. Cardiac, pulmonary, and abdominal examinations were within normal limits. A clinical possibility of meningo-encephalitis was considered, with a differential diagnosis of bacterial or viral encephalitis. Viral encephalitis was considered to be more likely because the patient lived in a location where Japanese encephalitis was endemic. Cerebrospinal fluid analysis, including polymerase chain reaction testing for viral

antibodies was positive for Japanese encephalitis. A contrast-enhanced magnetic resonance imaging scan was obtained, which revealed a distinctive finding that contributed to the determining diagnosis (Figure 1).

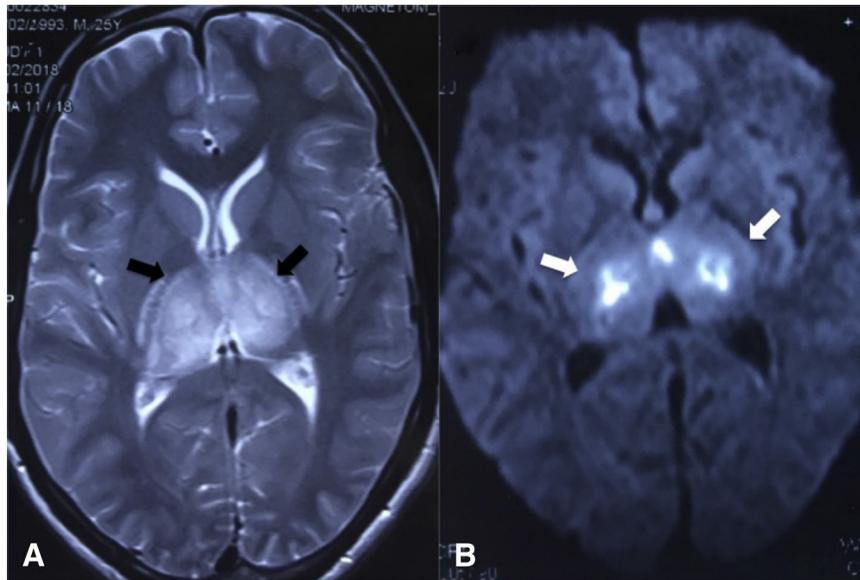
#### **DISCUSSION**

Acute encephalitis syndrome is defined as a fever and change in the mental status with or without a seizure. Acute encephalitis syndrome has a significant burden in developing countries, including >10,000 deaths each year in Asia alone (1). Viral encephalitis is a major cause of acute encephalitis syndrome.

The diagnosis of acute encephalitis syndrome was made based on clinical criteria and supported by serologic tests (herpes simplex virus, Japanese encephalitis virus, Dengue virus, and rabies virus). Imaging studies may be suggestive of an underlying etiology but are most often obtained to rule out other causes. Bilateral thalamic involvement is seen on magnetic resonance imaging scans of patients with various infections, such as tuberculosis, enterovirus, West Nile virus, Dengue encephalitis, and Japanese encephalitis (2).

Thalamic involvement is seen in 50–90% of patients with Japanese encephalitis. This classical

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**Figure 1. (A) T2 and (B) diffusion-weighted images show symmetrically enlarged hyperintense bilateral thalami (black arrows) with intense central diffusion restriction (white arrows).**

bilateral thalamic involvement with central diffusion restriction in viral encephalitis is described as the double doughnut sign (3). The treatment of Japanese encephalitis, as is the case for most causes of viral encephalitis and other viral syndromes, is centered upon the provision of supportive and symptomatic care.

## REFERENCES

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