Dengue encephalitis and 'double doughnut' sign

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DESCRIPTION

A 15-year-old woman was admitted to the emergency department with fever, headache, vomiting and altered mental status for 4 days. At presentation, she was unconscious with a Glasgow Coma Scale score of 6 out of 15. Her pulse rate was 112 beats per minute, and her blood pressure was 80/40 mm Hg. Neurological examination revealed neck rigidity. The remainder of the physical examination was normal. Brain MRI revealed T2-weighted signal hyperintensity in bilateral thalami with central haemorrhages suggesting a 'double doughnut' sign (figure 1). Laboratory investigation revealed thrombocytopenia with a platelet count of $50 \times 10^9/L$ (reference, $150\text{--}450 \times 10^9/L$), and a normal coagulation profile (international normalised ratio 1.19). Serum non-structural protein-1 antigen for dengue was tested positive. Cerebrospinal fluid analysis showed a total cell count of $10/\mu L$, normal glucose (72 mg/dL), mildly elevated protein (117 mg/dL) and positive dengue IgM antibodies. She received intravenous fluids, mechanical ventilation and intensive supportive care for dengue encephalitis. She improved and was discharged after 10 days of hospitalisation. At discharge, she was conscious but had slow responsiveness to the verbal commands.

The aetiology of acute encephalitis syndromes largely depends on local epidemiology.

Dengue-associated encephalitis syndromes are increasingly being recognised in the tropical and subtropical regions, with an incidence of 0.5–5.0.^{1–3} The spectrum ranges from mild encephalopathy to severe encephalitis. Dengue encephalitis is postulated to occur because of direct neuronal injury causing cerebral oedema and haemorrhage secondary to vascular leak, which typically involves basal ganglia and thalamus complex bilaterally, resulting in a characteristic 'double doughnut' appearance on brain MRI.⁴ Other less common affected regions are the cerebral hemispheres and brain stem. The neuroradiological 'double doughnut' appearance may also be seen in other flavivirus encephalitis syndromes, such as Japanese encephalitis; however, in a given clinical setting (eg, acute febrile thrombocytopenia), the finding remains diagnostic because of the difficulty in performing lumbar puncture with severe thrombocytopenia.⁵ The management of dengue encephalitis mainly remains supportive.

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Figure 1 Brain MRI showing T2-weighted signal hyperintensity with central haemorrhages in bilateral thalami appearing as a 'double doughnut'

Learning points

- ▶ The incidence of dengue-related neurological abnormalities is increasingly being recognised.
- ▶ Direct neuronal injury by dengue infection causes cerebral oedema and haemorrhage due to vascular leak, which typically affects bilateral thalami resulting in a characteristic 'double doughnut' appearance on T2 MRI.
- ▶ In the conditions where the lumbar puncture is challenging to perform, such as thrombocytopenia, coagulopathy, breakthrough seizures, raised intracranial pressure, characteristic neuroimaging findings substantially add to the diagnosis.
- ▶ The management of dengue encephalitis mainly remains supportive.

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