

Case Report

Role of Neuro-Imaging in Dengue Encephalitis

Madhavi C¹, GS Kejriwal², Giridhar Gopal G³

Abstract : Dengue infection is endemic in many tropical countries and its incidence is increasing worldwide. The important neurological complications are encephalopathy and encephalitis, the former being more common. Along with serological and CSF examinations, imaging with CT or MRI is important to look for structural changes in brain and if present, to define the pattern and extent of involvement of brain parenchyma. Here we report 2 cases of a children with serologically proven dengue fever having features of dengue encephalitis on imaging. This report is to emphasize the role of imaging in dengue fever with neurological manifestations.

Key Words : Bilateral thalamic hypodensity, CT scan, Dengue fever, Encephalitis, Neurological involvement

Introduction

Dengue viruses are single stranded viruses of Flaviviridae family, which can cause dengue fever and dengue hemorrhagic fever. A myriad of systemic manifestations can occur and the neurological manifestations play a great role in increasing the mortality and morbidity. The role of imaging has become indispensable to evaluate the structural changes in brain and thereby assessing the prognosis of the patient.

Case Report

Case 1 A boy, 10 yrs of age came to the emergency department with complaints of high-grade fever for 7 days, seizures for 3 days and altered sensorium for 2 day, There was no evidence of any muco-cutaneous rash or haemorrhagic manifestations.

The patient was admitted in pediatric intensive care unit. On examination, there was hypertonia involving all 4 limbs, brisk reflexes, plantar extensor & ankle clonus. His Glasgow Coma Scale was '6' at admission. Laboratory examinations revealed a platelet count of 1.4 lakhs and serum was positive for IgM and IgG dengue antibodies and negative for Malarial parasite, Hepatitis A, B, C and Japanese encephalitis virus. CSF examination showed evidence of dengue antigen, protein 8.4mg/dl, sugar 60mg/dl and differential count showing 100% lymphocytes.

Associate Professor¹ & Professor^{2,3}, Department of Radiodiagnosis, Maharajah's Institute of Medical Sciences, Nellimarla, Vizianagaram - 535217, AP.

Corresponding author : C Madhavi

Email: chmadhavi80@yahoo.com

Patient developed involuntary movements during second week of stay in hospital and imaging of brain was performed. MRI brain was attempted but abandoned as sedation failed. Hence plain & contrast CT scan was taken. On plain CT, there were areas of multiple focal hypodensities in parietal lobes, right frontal lobe and in both cerebellar hemispheres. Hypodensities were also noted involving bilateral thalami with foci of hyperattenuation within, suggesting hemorrhage (Fig1&2). Pons & midbrain were mildly expanded with diffuse hypodensity (Fig3). Cortical sulci are diffusely effaced with mild compression of lateral ventricles, suggesting diffuse cerebral edema (Fig4).



Fig 1: NECT brain showing bilateral thalamic hypodensity with small foci of hemorrhagic attenuation

The diagnosis of encephalitis was made and with conservative treatment he recovered slowly. After 40 days he was discharged. On follow-up 3 weeks later, he has regained near normal tone of limbs with only persistence of involuntary movements to some extent.



Figure 2: CECT brain showing no enhancement of bilateral thalamic hypodensity and central area of hemorrhagic attenuation.



Figure 3: CECT brain showing non enhancing hypodensity with mild expansion of pons and symmetrical hypodensities in both cerebellar hemispheres



Figure 4: CECT brain showing non enhancing hypodense areas in both high parietal lobes

Case 2 : Another boy, 5 Years of age attended the outpatient department of paediatrics with complaints of high grade fever of 4 days duration. There was no history of respiratory, gastro-intestinal or neurological symptoms, Examination revealed mild hepato-splenomegaly. His TLC was 3,100/cmm DC N 65, L 25, E 5 and platelets 81,000/cmm. He was tested negative for Malaria Parasite and Positive for Dengue IgM and IgG antibodies.

His CT scan showed ill defined hypodensities in both the Thalami and pons , resulting in mild expansion(Fig.5)

Within few hours of admission the child developed hematemesis and seizures with tonic posturing of limbs. His platelet count dropped to 10,000/cmm within a span of 6 hours. Despite aggressive management including platelet infusion and ventilator assistance, the child expired on the second day.



Fig 5: Plain CT brain showing ill-defined hypodensity with mild expansion of pons

Discussion

Dengue viruses are single stranded viruses of Flaviviridae family, which can cause dengue fever and dengue hemorrhagic fever. The involvement of brain in dengue fever can occur either in the form of encephalopathy or encephalitis. Encephalopathy is more common and may occur with multi-system derangement like hepatic failure, shock, coagulopathy and bacterial infections. As the pathogenesis implies, the changes in brain on imaging are seen diffusely, with no particular focal lesion. On the other hand, Encephalitis occurs due to inflammation of brain tissue due to direct virus infection¹. Although it was previously thought that dengue virus was non-neurotropic, recently there is increasing evidence of neurotropic nature of virus as the virus was isolated from CSF². The other neurological complications of dengue infection are meningitis, myositis, myelitis, stroke, hypokalemic paralysis, post infection sequelae like acute disseminated encephalomyelitis, neuromyelitis optica, optic neuritis, Guillian-Barre syndrome etc³.

On imaging in our case of encephalitis, CT and MRI depict the multiple focal lesions in cerebral parenchyma, cerebellum, and brainstem along with the bilateral thalamic involvement. This pattern of brain involvement was classically described in case of Japanese encephalitis⁴ However, now there are case reports with similar brain lesions in case of dengue encephalitis too⁵ Bilateral thalamic involvement with evidence of hemorrhage in dengue fever, similar to our case has been described by Kapil B. et al⁶. The list of differential diagnosis with this kind of bilateral thalamic lesions includes Flavivirus infection, Bilateral thalamic glioma, Wilson's disease, hypoxia, Osmotic myelinolysis, Cerebral arterial and deep vein thrombosis, Creutzfeldt-Jacob disease and Leigh's disease.

Conclusion

Whenever a patient with serologically proven dengue infection is encountered with features of encephalopathy, the possibility of encephalitis has to be considered and prompt imaging should be carried out. Imaging is of utmost value to confirm or rule out the presence of encephalitis, to rule out the other differential diagnoses and in the follow-up of the critically ill patient. MRI is the most sensitive modality and the imaging method of choice as it can provide better visualization of brain substance and

superior in displaying the posterior fossa structures. However, the role of CT is indispensable in case of non co-operative and sick patients, in whom the study cannot be conducted for long time, and in remote areas, where MRI is not available.

References

1. Varatharaj A. Encephalitis in the clinical spectrum of dengue infection. *Neurol India*. 2010;58:585–91.
2. Kularatne SA, Pathirage MM, Gunasena S. A case series of dengue fever with altered consciousness and electroencephalogram changes in Sri Lanka. *Trans R Soc Trop Med Hyg*. 2008;102:1053–4.
3. Murthy J.M.K., Neurological complications of dengue infection. *Neurol India*. 2010; Vol 58, No 4:581-584.
4. Kumar S, Misra UK, Kalita J, Salwani V, Gupta RK, Gujral R., MRI in Japanese encephalitis. *Neuroradiology*. 1997Mar;39(3): 180-4
5. Kamble R, Peruvamba JN, Kovoov J, Ravishankar S, Kolar BS. Bilateral thalamic involvement in dengue infection. *Neurol India* 2007;55:418-9.
6. Kapil B, Parikshit P, Atul W, and Swati D., Dengue encephalitis., *Indian J Crit Care Med*. 2011 Jul-Sep; 15(3): 190–193

Financial Support : Declared None

Conflict of Interest : Declared None