

# Dengue Encephalitis with ‘Double Doughnut Sign’ – A Rare Case Report

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## Abstract:

*Dengue fever is one of the most common arboviral infections, and it is the world’s fastest-spreading tropical illness. According to the World Health Organization, fifty million cases of clinical dengue infections occur each year, posing a significant public health hazard, primarily in Southeast Asia and the Western Pacific. The clinical spectrum of dengue fever ranges from asymptomatic infection to dengue shock syndrome. Although dengue virus is non-neurotropic virus, there is increasing evidence for dengue viral neurotropism suggesting there may be an element of direct viral encephalitis. Encephalopathy has been thought to result from the multisystem derangement that occurs in severe dengue, with*

*liver failure, shock and coagulopathy causing a cerebral insult. Dengue encephalitis is a rare disease. We report dengue encephalitis in a 55-year-old female, admitted in Rajshahi Medical College Hospital, Rajshahi, Bangladesh who presented with fever, vomiting, and altered level of consciousness. Her serum dengue NSI was positive. MRI of brain showed hyperintensity in both basal ganglia & cerebellar region, which is identical to “Double Doughnut sign” found specifically in dengue encephalitis.*

**Key wards:** Dengue encephalitis, Dengue fever, Double Doughnut sign.

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## Introduction:

Dengue is caused by dengue virus (DENV) a single – stranded RNA virus belongs to the family Flaviviridae causing dengue fever and dengue hemorrhagic fever. The virus has four separate but closely related serotypes (DENV-1, DENV-2, DENV-3, and DENV-4) among them DENV-2 and 3 are the major serotypes that lead to neurological disorders.<sup>1</sup> A relatively frequent neurological effect of dengue illness is encephalopathy. Usually, many system disturbances such as shock, hepatitis, coagulopathy, and concomitant bacterial infection lead to dengue encephalopathy.

The neurological manifestations seen in dengue are encephalitis, meningitis, encephalopathy, stroke, and Guillain-Barré syndrome. Dengue encephalitis is an extremely rare disease<sup>2,3,6</sup>, the incidence being about 4-5% only<sup>4,5</sup> and occurs because of directly invading neurons leading to neuronal infiltration by dengue virus.

The most frequent symptom of dengue encephalitis is

altered consciousness, headache, and seizures which occur in 52.3% of patients<sup>7,8</sup>. MRI findings of brain in dengue vary. MRI may be normal but hemorrhages cerebral edema, and focal abnormalities involving the hyperintense lesion involving basal ganglia, thalamus, cerebellum, and hippocampus are the classical features of dengue encephalitis. A characteristic feature of dengue encephalitis is bilateral thalamic with central area hemorrhage gives characteristic ‘Double Doughnut’ Sign. Supportive therapy and symptomatic management are the treatment of Dengue Encephalitis.

## Case

A 55-year-old female presented with the complaints of continued high-grade fever associated with chills and rigor, the recorded temperature being 103 (degree)F for three days. She had three episodes of non-projectile, non-bilious, not blood tinged vomiting for two days and altered sensorium which was gradually progressive, for one day. She also noticed black-tarry, soft stool which was difficult to flush out and foul smelling for one day.

She had no history of any neck pain, convulsion, and facial deviation, weakness of any side, trauma, head injury, sinusitis, ear discharge, yellowish discoloration of skin or mucous membranes, skin rashes, joint pain, photo sensitivity, oral or genital ulceration.

There was no history of taking any half-eaten fruits or fruit juices, contact with any TB patients or contact with any patients with similar kind of illness. She was normotensive and non-diabetic.

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On examination, neurological examination revealed altered higher psychic function with GCS 7/15 (E2, M3, V2), planter was bilaterally extensor, fundoscopic examination revealed bilateral papilledema. All other neurological examinations, abdominal, respiratory, and cardiovascular examinations were unremarkable.

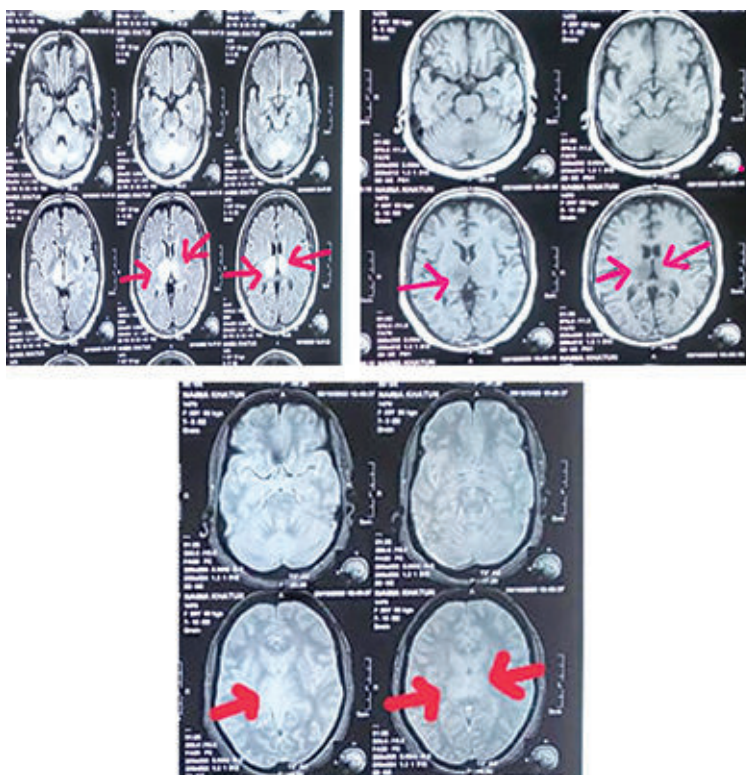
On investigations (3<sup>rd</sup> febrile day), haemoglobin (Hb) – 10 g/dL, platelet count (PLT) -1,08,000/cumm, White Blood count (WBC) -24,600/cumm with Neutrophils- 65.9%, Lymphocytes-25.9%. Both dengue NS1 and serum dengue IgM antibody were positive. The liver function tests: ALT-140 U/L and AST-255 U/L, serum albumin (3.8g/dL) &

Prothrombin Time with INR (12 secs, INR 1) were normal. The renal function test was normal (Creatinine 1.0 mg/dL). Blood thick & thin film for detection of malarial parasite, ICT for Plasmodium falciparum was negative. Blood & respiratory tract samples for Nipah virus RT-PCR were negative. Sinus tachycardia on ECG. We couldn’t do the CSF study as the patient’s attendance denied to lumbar puncture procedure.

A MRI of the brain showing hyperintense lesions in all segments involving the bilateral basal ganglia & cerebellar region (figure below). The basal ganglia lesions were typical of ‘Double Doughnut Sign’.

**Table-I**

<i>Laboratory reports</i>			
On admission (3 <sup>rd</sup> febrile day)	5 <sup>th</sup> febrile day	7 <sup>th</sup> febrile day	10 <sup>th</sup> febrile day
Hb. 10.0 g/dL	Hb 8.4 g/dL	Hb 10.9 g/dL	Hb-11g/dl
ESR 26 in the 1 <sup>st</sup> hr	ESR 40	ESR 36	ESR 30
TC. 24,600/cumm	TC 20,200	TC 10,700	TC- 10,000
Platelet 1,08,000/cumm	·Platelets 30,000	Platelets 1,20,000	Platlets- 2,09,000
HCT 30.1%	HCT 26.2%	HCT 31%	HCT- 32%



**Fig-1:** MRI of brain showing bilateral cerebellar & basal ganglia lesions depicting the “Double Doughnut Sign.

Based on the history, clinical examination and investigations, the patient was diagnosed as dengue encephalitis. The patient was managed with proper ABC maintenance, nutrition through Ryle's tube, 2 units of fresh whole blood transfusion (for ongoing melaena), IV fluid management according to the recent Dengue guidelines (while CBC was done daily to monitor the HCT, TC & platelet count), injectable ceftriaxone, omeprazole and IV dexamethasone. During management, the patient's intake output chart was properly maintained, and care of skin & mucous membranes were taken as well. Her condition began to improve gradually over the course of 10 days. The patient was discharged on 10<sup>th</sup> day of illness with great improvement of her health condition without any neurological findings.

### Discussion:

Dengue fever is classically known to be a non-neurotropic disease [9]. The exact pathophysiology of encephalitis is not clear. In dengue fever the virus mainly replicates in cells of the macrophage line with well understood pathophysiology of dengue encephalitis as a brief breakdown in the blood-brain barrier integrity by the migration of dengue virus-infected macrophages into the central nervous system [10].

The common symptoms of dengue encephalitis are headache, seizures, and altered level of consciousness [11]. The criteria of dengue encephalitis include: (I) the presence of fever, (II) acute signs of cerebral involvement like altered level of consciousness or personality and/or seizures and/or focal neurologic signs, (III) positive IGM dengue antibody or positive dengue PCR in serum and/or Cerebrospinal fluid, (IV) exclusion of other causes of viral encephalitis and encephalopathy [12].

This patient was presented with fever, vomiting and alteration of consciousness which was suggestive of encephalitis and her laboratory investigations proved the presence of dengue virus and ruled out other causes of encephalitis. So, she filled the criteria for dengue encephalitis. Though on admission her TC was high, most probably had co-infection in the lung. It would be better if we could do CSF study.

Though MRI findings in dengue can vary. In our case, we found typical Dengue encephalitis 'Double Doughnut sign' in Brain.

### Conclusion:

This is the first reported rare case of dengue encephalitis with 'double doughnut sign' from Bangladesh. The case is a rare presentation of dengue fever but also to emphasize to exclude other possibilities like cerebral malaria, meningoencephalitis, and Japanese encephalitis, which should be ruled out before a diagnosis of dengue encephalitis is made.

Dengue encephalitis should be kept as a differential in patients with a short history of fever and altered consciousness in countries like Bangladesh, where the DF is endemic. Clinicians should also have a high clinical suspicion level because the prognosis is favorable if treated promptly.

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