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# Herpes Simplex Encephalitis in a Neonate: Neuroimaging Findings

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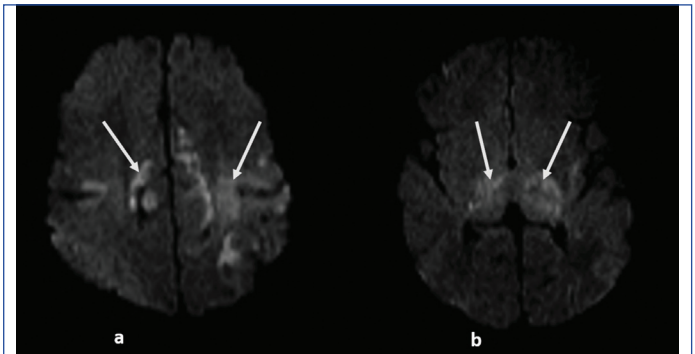
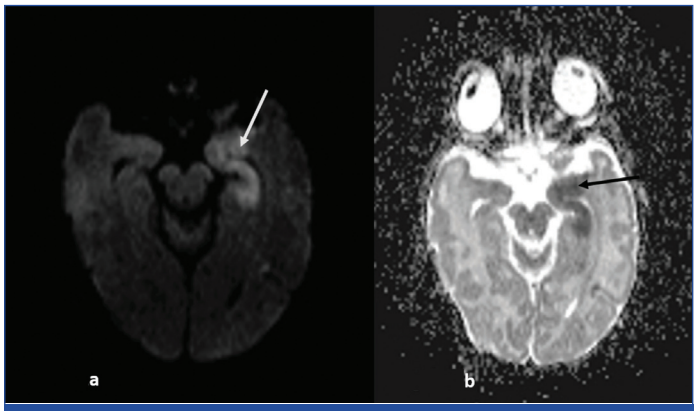
**Keywords:** Generalised tonic clonic seizures, Lumbar puncture, Metabolism, Phenobarbitone

A 21-day-old male baby born of a non-consanguineous marriage presented to the casualty department with a history of high-grade, intermittent fever for one day. The baby was conscious on arrival and was further admitted under the Department of Paediatrics. The baby was delivered by normal vaginal delivery with a normal Appearance, Pulse, Grimace, Activity, and Respiration (APGAR) score of 8 and was discharged on Day 3 of life. On examination, the baby was active with normal vital parameters. After 12 hours of admission, the baby had generalised tonic clonic seizures, which were aborted with Inj. phenobarbitone loading dose of 20 mg/kg and maintenance dose of 5 mg/kg. The baby was also started on oxygen with nasal prongs at 2 L/min. The baby had two more episodes of generalised tonic clonic seizures for which Inj. levetiracetam 20 mg/kg was loaded and continued as maintenance dose. To rule out inborn errors of metabolism, serum ammonia was sent and was within normal limits. Ultrasonography (USG) of the cranium was performed and revealed no significant abnormalities. Blood investigations, including serum electrolytes, calcium, magnesium, and complete haemogram, were within normal limits. On day 2 of admission, a lumbar puncture was performed. Cerebrospinal Fluid (CSF) analysis revealed an increased total leukocyte count with lymphocytic predominance, along with elevated protein levels. The baby was subjected to Magnetic Resonance Imaging (MRI) of the brain. MRI of the brain showed multiple patchy areas of restricted diffusion and corresponding low Apparent Diffusion Coefficient (ADC) values involving cortical and subcortical white matter of bilateral frontal and parietal lobes, bilateral centrum semiovale, bilateral corona radiata and posterior limb of bilateral internal capsule, thalamus, left medial temporal lobe and left insular cortex. These imaging features with selective diffusion restriction involving bilateral frontal and parietal lobes, left medial temporal lobe and left insular cortex were suggestive of herpes simplex encephalitis [Table/Fig-1,2]. CSF Polymerase Chain Reaction (PCR) was sent and returned positive for Herpes Simplex Virus (HSV)-1. The baby was started on Inj. Acyclovir at a dose of 20 mg/kg/day, which was continued for 21 days. Chorioretinitis was ruled out after obtaining Ophthalmology opinion. The baby was weaned off to room air on Day 3 of admission and was maintaining




**[Table/Fig-1]:** Axial diffusion weighted MR imaging showing multiple patchy areas of restricted diffusion involving cortical and subcortical white matter of bilateral frontal and parietal lobes, bilateral centrum semiovale, bilateral corona radiata, thalamus (white arrows).




**[Table/Fig-2]:** a) Axial diffusion weighted MR imaging and corresponding; b) Apparent Diffusion Coefficient (ADC) image showing patchy area of restricted diffusion involving left medial temporal lobe (white and black arrows).

saturation at room air. On Day 3 of admission, Inj. phenobarbitone and levetiracetam was changed to oral form. Phenobarbitone was tapered and stopped on Day 5 of admission. Baby had no further episodes of seizures in the hospital stay and improved gradually.

HSV encephalitis, caused by HSV, of the Herpesviridae family can establish a latent infection with periodic reactivation. In neonatal encephalitis, HSV-2 is the most detected genome, though HSV-1 is also implicated, particularly in postnatally acquired infections [1]. Vertical transmission is most common in neonates, especially in cases with maternal genital herpes, leading to diffuse cerebral involvement within the first month after birth. Postnatal transmission through contact with infected caregivers or fomites is uncommon [2]. Neonatal HSV encephalitis often presents with non-specific symptoms such as lethargy, poor feeding, temperature instability, and seizures [2]. CSF analysis typically reveals lymphocytic pleocytosis with elevated protein levels, consistent with this case. The classic imaging pattern includes asymmetric involvement of the medial temporal lobes, insular cortex, cingulate gyrus, and sometimes frontal lobes, with areas of restricted diffusion and haemorrhage [3].

Thalamic involvement in neonatal HSV encephalitis, like in this case, is atypical. The bithalamic sparing is said to be due to patterns of viral tropism and immature myelination. Differential diagnosis for bithalamic involvement includes Japanese Encephalitis infection [4,5]. Sankararaman S et al., (2012), reported a case of HSV encephalitis in a seven-month-old female infant similar to the present case. MRI findings showed bilateral thalamic involvement with bilateral frontal, temporal and parietal lobes. Thalamic lesions can be associated with abnormal movements such as ballism, choreoathetosis. CSF for HSV type 1 DNA PCR was positive. [5]. Maia R et al., (2011), also reported a case of HSV encephalitis in seven-month-old male infant with left thalamic, bilateral frontal and left temporo-parietal lobe involvement [6].

In this case, imaging features were strongly consistent with HSV encephalitis. Differential diagnoses considered included other viral

encephalitides such as enterovirus and parechovirus infections, as well as hypoxic-ischaemic encephalopathy. However, the absence of a sentinel hypoxic event and lesion distribution along with a positive HSV-1 PCR confirmed the diagnosis. Development of generalised tonic-clonic seizures within 12 hours of admission after normal post-natal transition is suggestive of an acute encephalitic process. Serum electrolytes, calcium, magnesium, and ammonia were within normal limits, helping exclude metabolic aetiologies. To conclude, HSV-1 encephalitis should be considered in neonates presenting with fever, seizures, and characteristic MRI findings, even in the absence of a known maternal infection or birth complications.

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