

“A CASE SERIES ON MRI FEATURES IN VIRAL ENCEPHALITIS: A SUPPORTIVE EVIDENCE TOWARDS PARTICULAR VIRAL ETIOLOGY”

Contributors

1. **Deepak Varshney**, MD Radiodiagnosis, Associate Professor , Department of Radiodiagnosis, SAMC & PGI, Indore (MP), India
2. **Garima Agrawal Varshney**, MD Pediatrics, Associate Professor, Department of Pediatrics , Nandkumar Singh Chouhan Govt. Medical College, Khandwa (MP), India
3. **Archit Gupta** , MD Radiodiagnosis, Assistant Professor, Department of Radiodiagnosis , S.N. Medical College, Agra (UP), India
4. **Purti Agrawal Saini**, MD Pathology, Associate Professor, Department of Pathology, Nandkumar Singh Chouhan Govt Medical College, Khandwa (MP),India.

Corresponding Author:

Name: : Dr Purti A Saini,

Address: C-202, Staff residential quarter, Govt Medical College campus, Khandwa (MP)-450001

Email: purti.agrawal.saini@gmail.com, Mobile No. 7869141334

Abstract: Viral encephalitis is an acute inflammatory process affecting the brain and caused by viruses. It affects any age group from children to old aged people. The presenting features are fever, headache, seizure, loss of consciousness and other neurological features. For the diagnosis of viral encephalitis magnetic resonance imaging (MRI) along with clinical features, laboratory investigations on cerebrospinal fluid (CSF) and serum plays a significant role. MRI is helpful in identification of particular causative organism and also in differentiating the mimickers. The present case series highlighted the some characteristic MRI features of common viral encephalitis.

Key words: Viral encephalitis, magnetic resonance imaging, Herpes simplex virus, Japanese B encephalitis, Cytomegalovirus, Dengue

Introduction: Acute infectious encephalitis is a life-threatening condition caused by many pathogens like bacteria, fungi, protozoa, parasite and virus. Most of the cases are due to viral infections.^[1] Clinical diagnosis is usually based on signs and symptoms such as fever and new neurological features. The next most important as well as crucial step in diagnosis and also to rule out mimickers is brain imaging. MRI brain is the modality of choice for acute encephalitis. MRI findings are sensitive and specific which helps in reaching the diagnosis, and sometimes MRI findings are more specific to diagnose the causative agents; can estimate the extent of brain involvement which can help in predicting the prognosis.^[2] Laboratory investigations on cerebrospinal fluid (CSF) such as raised protein, lymphocytic pleocytosis support the diagnosis of viral encephalitis and CSF nucleic acid testing like polymerase chain reaction (PCR) and serology helps in confirmation of particular viral encephalitis which can be predicted in MRI by specific location and specific features shown by particular virus.^[2]

In our study, on the basis of clinical history and MR brain findings we diagnosed seven cases of viral encephalitis, which confirmed by CSF- PCR study and presence of antibodies in serum and CSF.

Results: Total six cases of viral encephalitis received in Radiodiagnosis department of Topiwala National Medical College & BYL Nair Charitable Hospital, Mumbai, India from January 2018 to December 2018.

Herpes simplex virus (HSV) encephalitis: 03 cases

All three cases of HSV encephalitis were summarized in Table-1.

Table:1 Clinical features and MRI features of HSV encephalitis cases:

Parameter	Case 1	Case 2	Case 3
Age (Years)	27	30	51
Gender	Male	Male	Male
Clinical presentation	Fever, headache, disorientation	Fever, headache, disorientation	Fever, headache, disorientation and behavioral disturbances
CSF analysis	Raised protein, Lymphocytic pleocytosis	Normal	Raised protein, Lymphocytic pleocytosis
MRI features a. Site of affection	Insular cortex, temporal lobes, inferior frontal lobes and left thalamus	Insular cortex, temporal lobes, inferior frontal lobes	Insular lobes, temporal lobes,
b.MRI findings	-T2/FLAIR hyperintensity in the affected area. - Diffusion restriction	- Coronal FLAIR hyperintensities in the affected area. - Parenchymal hemorrhage.	-T2/FLAIR hyperintensity in the affected area.

Diagnosis was made on basis of clinical history, MRI findings [Figure 1] which later confirmed by positive HSV IgM antibodies.

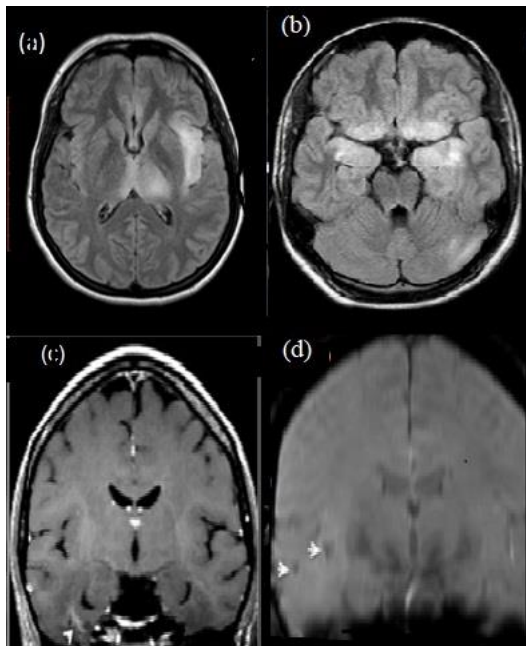


Figure-1: HSV Encephalitis: Axial T2/FLAIR image shows hyperintense signal in left insular cortex and thalamus (a), in bilateral inferior frontal lobes, medial temporal lobes, basal ganglia and insular cortex (b) , contrast enhancement in Rt temporal lobe on T1W1 postcontrast image (c), Foci of blooming in temporal lobe on T2* coronal image (d).

CMV Encephalitis: 01 case

A 52 years old female patient presented with complaints of fever, difficulty in walking, cognitive impairment, urinary incontinence, intermittent drowsiness and convulsions with history of multiple admissions. Clinical diagnosis was suggestive of normal pressure hydrocephalus. Blood investigations were normal. Previous MRI brain was suggestive of hydrocephalous with small vessels ischemic changes and cerebral atrophic changes. Patient was immunocompetent.

Present MRI brain done in our department showed T1 hypointense and T2/ FLAIR hyper intense patchy as well as confluent areas with post contrast enhancement seen in the deep white matter in bilateral fronto-parietal and left temporal region as well as in the left basal ganglia [Figure 2].

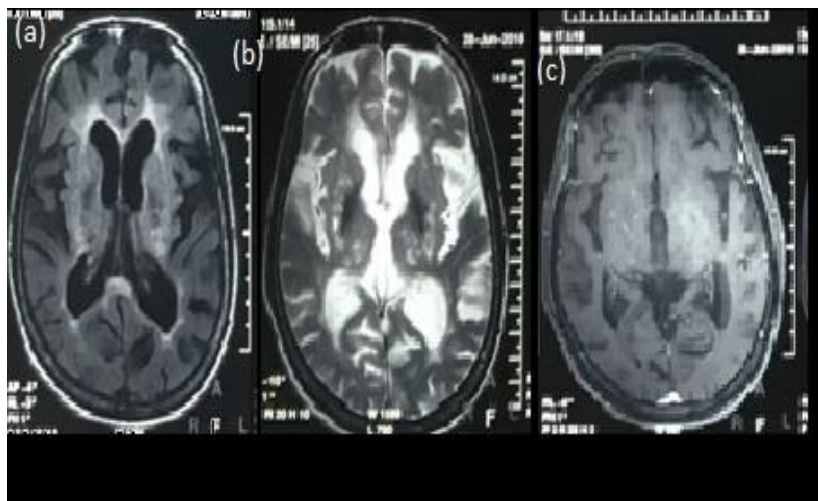


Figure-2: CMV Encephalitis: Axial T2/FLAIR images show hyperintense signal in bilateral fronto-parietal lobe and basal ganglia (a,b), contrast enhancement in both fronto-parietal lobes on post contrast image (c).

Subtle periventricular nodular enhancement was also seen. Possibility of viral encephalitis considered. CSF revealed normal cell count with mildly raised protein level. CSF polymerase chain reaction test was positive for CMV.

Dengue: 01 case

A 36 years old female patient came with history of fever, headache, seizure, disorientation, and behavioural disturbances with low platelet count, however no history of unnatural bleeding tendencies.

MRI brain showed bilateral thalamic and lentiform nucleus hyperintensities. Left temporal lobe involvement was seen on T2WI / FLAIR with restrictive diffusion on DWI/ADC and Post contrast enhancement [Figure 3].

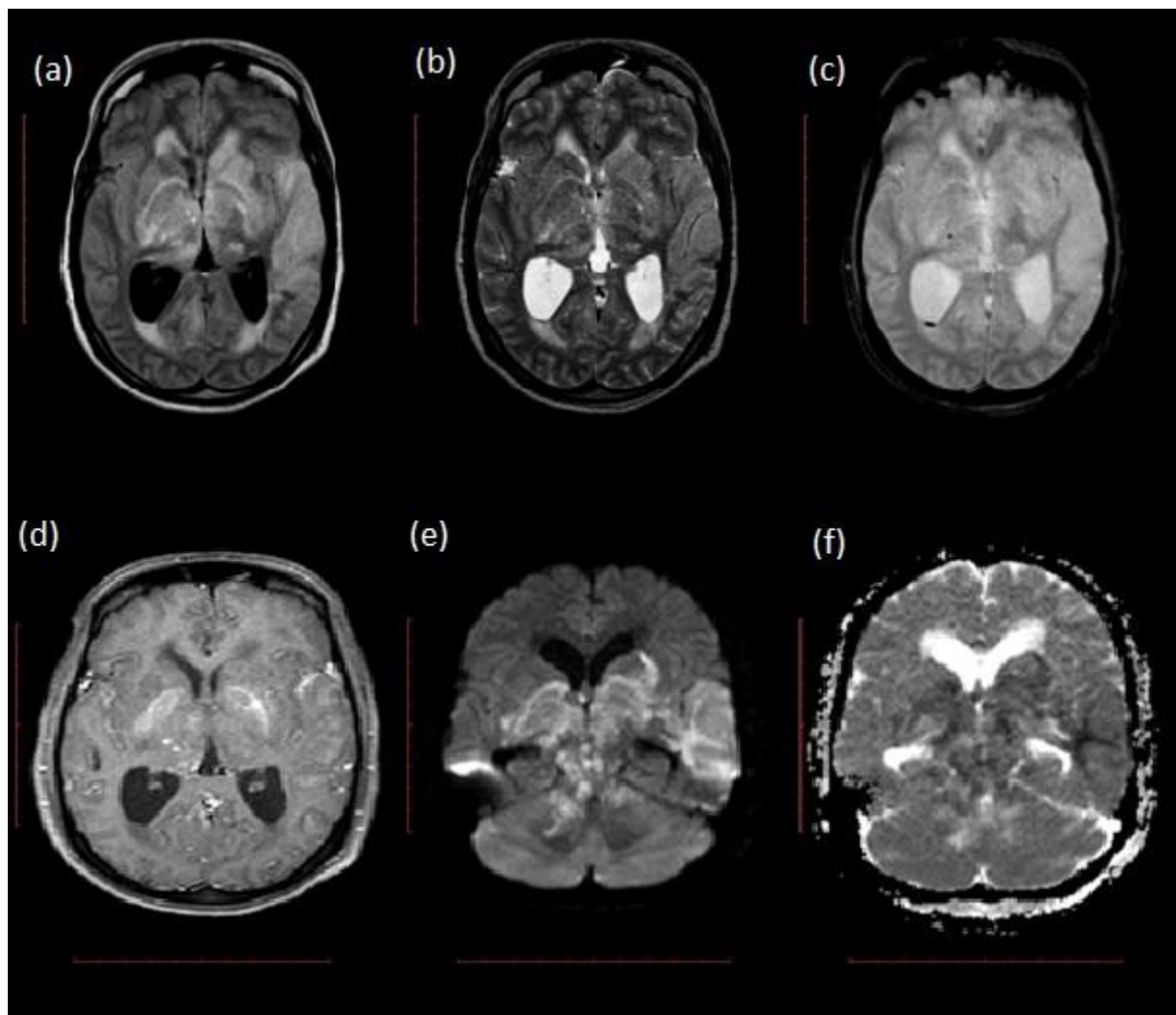


Figure-3: Dengue Encephalitis: Axial T2/FLAIR images show hyperintense signal in bilateral thalamic and lentiform nucleus and in left temporal lobe (a,b), No blooming in axial FFE image (c), contrast enhancement in axial T1 postcontrast image (d), restrictive diffusion in axial DWI/ADC image (e,f).

These findings were in favor of viral encephalitis, considering low platelet counts possibility of Dengue encephalitis was considered. Later Dengue encephalitis was confirmed by positive IgM antibodies and NS-1 antigen positivity.

Japanese encephalitis: 01 case

A 3 years old patient, resident of eastern Uttar Pradesh came with history of fever, headache, seizure and disorientation. Clinical diagnosis of acute encephalitis was made. MRI Brain showed areas of T2/ FLAIR hyperintensities in bilateral thalamus and substantia nigra (more prominent), basal ganglia, and midbrain with restrictive diffusion on DWI/ADC and few areas blooming on FFE in bilateral thalamus. Post contrast enhancement was seen in bilateral thalamus [Figure 4].

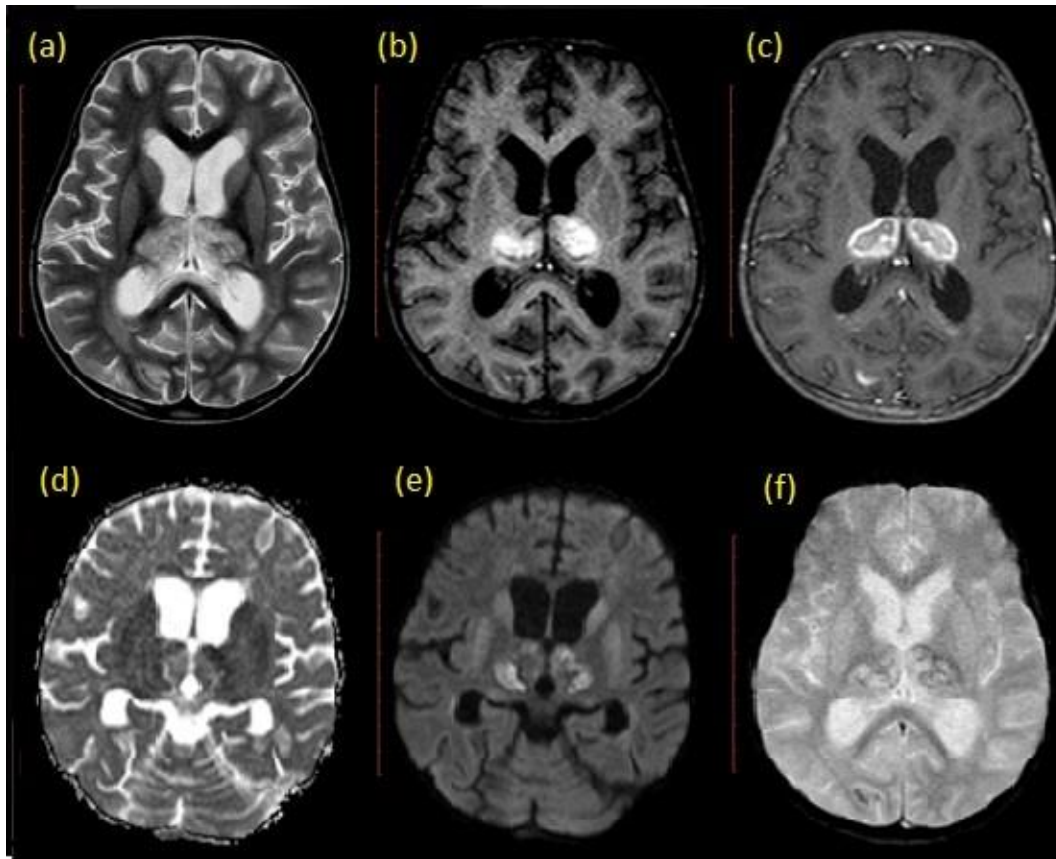


Figure-4: Japanese B Encephalitis: Axial T2/FLAIR images show hyperintense signal in bilateral thalamus, basal ganglia and midbrain (a,b), contrast enhancement in bilateral thalamus in axial T1 postcontrast image (c), restrictive diffusion in axial DWI/ADC images (d,e), foci of blooming in bilateral thalamus in FFE image (f).

On the basis of clinical history and typical MRI findings, diagnosis of viral encephalitis most likely Japanese encephalitis was given.

Discussion:

In the present study all three case of HSV encephalitis suspected and diagnosed on the basis of clinical history and MRI findings. All three cases showed typical temporal lobe and insular cortices involvement which was strongly suggestive of HSV encephalitis, similar to previous studies.^[3-4] In accordance with Gupta et al.^[4] none of the case demonstrated the hippocampal involvement. A normal brain MRI does not rule out HSV encephalitis, however in the present study all three cases had abnormal MRI. In concordance with other studies^[4,5] CSF lymphocytic pleocytosis and presence of IgM antibodies of HSV were helpful for confirmation of HSV encephalitis.

The current case was suspected as CMV encephalitis in immunocompetent patient having MRI findings suggestive of acute ventriculitis and hydrocephalous. Seok JH et al.^[6] reported these MRI findings, along with subependymal diffusion restriction, suggestive of CMV encephalitis in his study.

One case was diagnosed as dengue encephalitis having bilateral thalamic and lentiform nucleus hyperintensities as well as left temporal lobe on T2WI / FLAIR with restrictive diffusion on DWI/ADC and Post contrast enhancement. These findings were similar with Gupta et al.^[4] who also revealed bilateral thalamic involvement in MRI of all four cases of dengue whereas diffusion restriction and hemorrhage were observed in two cases. A large retrospective study by Wasay et al.^[7] on confirmed cases of dengue showed generalized cerebral edema, focal involvement of globus pallidus and internal capsule, pontine hemorrhage, acute disseminated encephalomyelitis, and involvement of

cervical and thoracic spinal cord in MRI study. Mathew T et al.^[8] in his case report found hyperintensity in the splenium of corpus callosum in MRI brain (FLAIR/T2W) manifesting as “Dot sign”. The lesion was hypointense on T1w image and showed restricted diffusion. Hemorrhages or microhemorrhages were seen in study conducted by Hegde V et al.^[9]

Laboratory tests such as reverse-transcription PCR (RT-PCR) , anti-dengue virus IgM or IgG antibodies and NS1 antigen testing have been developed for rapid diagnosis of dengue.

The present case of Japanese B Encephalitis in MRI showed abnormal T2/ FLAIR hyperintensities in bilateral thalamus (more prominent), basal ganglia, and midbrain with restrictive diffusion on DWI/ADC and few areas blooming on FFE in bilateral thalamus. Post contrast enhancement is seen in bilateral thalamus. Similar MRI findings suggestive of Japanese B Encephalitis were also described in studies of Gupta et al.^[4] and Handique SK et al.^[10] Gupta et al.^[4] also concluded diffusion restriction as consistent finding in Japanese encephalitis which also helps in characterization of the duration of the lesions.

HSV encephalitis is main differential diagnosis of Japanese encephalitis but the involvement of posterior part of hippocampus, thalami, substantia nigra, basal ganglia and sparing of anterior temporal lobe allow the MRI diagnosis of Japanese encephalitis rather than HSV encephalitis.^[10]

Conclusion: Acute encephalitis has high mortality, so the early diagnosis and treatment helps in better outcome of patient. Viral encephalitis in contrast to bacterial or fungal encephalitis shows some specific features and localization in MRI which contributes in early diagnosis of particular viral etiology. The present study concluded that MRI should be done in all suspected cases of encephalitis along with other laboratory tests for early diagnosis and treatment to improve prognosis.

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