CASE REPORT

Herpes simplex virus encephalitis involving the right thalamus

Patrick Navin,¹ Norman Delanty,² Paul Brennan,³ Seamus Looby³

¹Beaumont Hospital, Dublin, Ireland

²Department of Neurology, Beaumont Hospital, Dublin, Ireland

³Department of Radiology, Beaumont Hospital, Dublin, Ireland

Correspondence to

Dr Patrick Navin,
paddynavin@yahoo.co.uk

SUMMARY

Herpes simplex virus (HSV) encephalitis is a rare but often fatal disease if left untreated. A 50-year-old woman was admitted with lethargy, confusion, dysphasia and cough. MRI brain demonstrated bilateral temporal and perisylvian hyperintense signal abnormality extending into the cingulate gyrus, typical of HSV encephalitis. However, there was also signal abnormality involving the right thalamus, indicating thalamic involvement. EEG and cerebrospinal fluid PCR confirmed HSV encephalitis. The patient was started on intravenous acyclovir resulting in marked improvement. Adequate assessment and prompt treatment of HSV encephalitis will aid in achieving adequate recovery. Radiological investigation plays a crucial role in diagnosis with typical MR features a useful aid to diagnosis. HSV encephalitis classically involves the medial temporal lobes, insula and cingulate gyri. The basal ganglia and thalami are nearly always spared. We present a very rare case of HSV encephalitis which involved the right thalamus.

BACKGROUND

Herpes simplex virus (HSV) encephalitis constitutes 10–16% of all encephalitides.¹ In untreated cases of HSV encephalitis, the mortality rate is 70% which drops to 19% in cases treated with acyclovir. More than 50% of those treated are left with moderate or severe neurological sequelae.²

The typical presentation of HSV encephalitis is acute, progressive onset of fever in 90% of cases and headache in 80%. Personality changes (70–85%), seizure (40–67%), aphasia (33%), motor deficit (30–40%) and memory disturbance (25–45%) are also common.³ This clinical picture, along with cerebrospinal fluid (CSF), radiological and electroencephalographic assessment leads to diagnosis. The role of radiology in diagnosis is growing and primarily involves MRI. HSV encephalitis typically presents on MRI as a T1 hypointense or T2 hyperintense, mass-like and infiltrative abnormality involving the medial temporal lobes, insula, cingulate gyri and inferior frontal lobes. Extra-temporal involvement is present in approximately 55% cases. The basal ganglia and thalami are classically spared.⁴

We present a rare case of HSV-1 encephalitis involving the right thalamus on MRI.

CASE PRESENTATION

A 50-year-old woman was admitted with a 3-day history of progressive lethargy, confusion, dysphasia and cough. Collateral history from family members demonstrated no preceding trauma with a non-eventful medical history.

On admission the patient was feverish at 38.5°C and haemodynamically stable. Her Glasgow Coma Scale (GCS) score was 9/15. Pupils were equal and reactive to light. Tone and reflexes were normal throughout the upper and lower limbs with a downgoing plantar response.

INVESTIGATIONS

Routine haematological and blood chemistry studies revealed no abnormalities. CT of the brain on the day of admission was normal. EEG was performed demonstrating generalised δ - θ wave slowing. There were bursts of asynchronous slowing over the left hemisphere with periodic lateralising epileptiform discharges (PLEDs) over the right hemisphere. There was no evidence of seizure activity and findings were deemed consistent with an encephalopathic process. MRI of the brain demonstrated bilateral temporal and perisylvian grey and white matter hyperintense signal abnormality extending into the cingulate gyri. The basal ganglia and left thalamus were normal. However, there was diffuse T2 and fluid-attenuated inversion recovery (FLAIR) hyperintense signal abnormality with mild swelling of the right thalamus. Throughout the signal abnormality, there was diffusion restriction with some scattered areas of gyriform enhancement (figures 1–4). Lumbar puncture and analysis of CSF demonstrated elevated white cell count of 220 cells/ μ L with 85% lymphocytes. Glucose and protein were both elevated. CSF PCR was positive for HSV 1.

DIFFERENTIAL DIAGNOSIS

The presentation of a patient with encephalopathic symptoms, as stated above, and fever is highly indicative of an infective process of the central nervous system (CNS). Accompanied with the radiological evidence of thalamic involvement leaves a considerable differential diagnosis.

Viral infections are most common with West Nile encephalitis, Japanese encephalitis, Murray Valley encephalitis, Eastern Equine encephalitis and rabies most prevalent. Cerebral toxoplasmosis is an opportunistic infection associated with HIV infection and is also known to commonly affect the thalami. The result of the CSF PCR, however, makes herpes simplex virus (HSV) encephalitis involving the thalamus the most probable.

TREATMENT

The patient was started on intravenous acyclovir and continued for 3 weeks. Dexamethosone was introduced and tapered down over 2 weeks. As the

To cite: Navin P, Delanty N, Brennan P, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2013-010206

Figure 1 Fluid attenuation inversion recovery sequence demonstrates asymmetric right greater than left abnormal hyperintensity throughout the right insular cortex (single arrow) with more patchy areas in the left insular cortex (double arrow). The distribution abnormality is highly suggestive of herpes simplex virus encephalitis.

patient was also demonstrating some intermittent seizure-like activity, levetiracetam was added. There was marked improvement over her inpatient course with full multidisciplinary team involvement.

OUTCOME AND FOLLOW-UP

The patient was discharged 3 weeks following admission with a GCS of 15/15, mobilising under supervision but with marked cognitive impairment particularly in language, calculation and reasoning abilities.

DISCUSSION

Encephalitis is the presence of an inflammatory process in the brain parenchyma associated with clinical evidence of brain

Figure 2 Fluid attenuation inversion recovery (FLAIR) sequence again demonstrates bilateral insular cortex and medial temporal lobe oedema. However, there is distinct abnormal FLAIR hyperintensity in the right thalamus (arrow).

Figure 3 Diffusion weighted image demonstrating right insular cortex (see arrow) and right thalamic (see double arrow) diffusion restriction. Diffusion restriction is a common imaging feature of herpes simplex virus encephalitis.

dysfunction. HSV infiltrates the CNS via haematogenous spread or neuronal transmission of an extracerebral focus of infection.⁵ Neuronal transmission is thought to be the mechanism in HSV 1 encephalitis. This is evident with the typical medial temporal and frontal lobe abnormality with probable transmission intracranially via the meningeal branches of the trigeminal nerve. The cingulate gyrus can also commonly be affected via the efferent connections of the hippocampus.⁶

Clinical assessment does not allow for definitive diagnosis of the causative virus. It can however give a clue as to the area of the brain involved. For example, temporal lobe seizures are not uncommon in HSV encephalitis involving the temporal lobe.

EEG is beneficial in arriving at a diagnosis and the finding of generalised slowing with PLEDs, as seen in our case, is suggestive of HSV encephalitis but is not specific.⁷

CSF assessment is essential with CSF PCR now the gold standard in diagnosing HSV encephalitis. When measuring CSF from 48 h to 10 days postsymptom onset, it demonstrates a sensitivity of 96% with a specificity of 99%.⁸

Figure 4 MRI T1-weighted postcontrast demonstrating patchy enhancement in the insula (double arrow).

Radiological assessment is routinely utilised to assess extent of the disease, estimate prognosis and aid in establishing the diagnosis. Neuroimaging reflects the pathological process of necrotising encephalitis in the medial temporal lobes and orbital surfaces of the frontal lobes. This may extend to the insular cortex, cerebral convexity and posterior occipital cortex with latter involvement of the cingulate gyrus. MRI is more sensitive and specific than CT, with early CT often normal.⁴ Typical MRI protocols involve T1 and T2 spin echo sequences. These can demonstrate diffuse T1 hypointense and T2 hyperintense oedema with a predilection for the medial temporal lobes and cingulate gyri.⁹ FLAIR and diffusion weighted imaging (DWI) are very helpful in the diagnosis of HSV encephalitis. Gradient echo sequence frequently demonstrates microhaemorrhages, a very suggestive feature of HSV encephalitis and should always be performed in suspected cases. Approximately 90% of patients with PCR proven HSV encephalitis will have MRI abnormalities involving the temporal lobes.³

Our case outlines the possibility of an atypical presentation. In a retrospective study on 20 patients with HSV encephalitis over a 12 year period, 55% had extratemporal involvement with 15% demonstrating pure extratemporal lesions.⁴ None however had any evidence of thalamic involvement. To the authors knowledge this is only the third such case of thalamic involvement in adult patients with HSV encephalitis.

Whether thalamic involvement alters clinical outcome or presentation is not yet known. In the adult cases mentioned above, one was complicated by an intracranial haemorrhage on presentation with the other developing encephalomyeloradiculitis a few days into the disease course. HSV encephalitis involving the thalamus has occurred more often in the paediatric age group, although still very rare. In one case, the patient developed involuntary movements 20 days postdischarge. The thalamus is a critical component in the mechanism of choreoathetosis or ballism and it is theorised damage to this structure leads to these movement disorders.¹⁰ This was not evident in our patient.

In conclusion, HSV encephalitis is a condition of significant morbidity and mortality. Adequate assessment and prompt treatment will aid in achieving adequate recovery. MRI is frequently used in practice to aid in diagnosis with the medial temporal lobe and insula typically affected. This case highlights the finding of thalamic involvement which although extremely rare is an important consideration when evaluating the affected patient.

Learning points

- This case highlights a very rare involvement of the thalamus in PCR-positive herpes simplex encephalitis.
- Importance of radiological investigation of suspected neurological infection.
- The use of diffusion weighted imaging and fluid attenuation inversion recovery to aid diagnosis.

Contributors PN is the author of the manuscript, ND was involved in treatment of the patient, review of the manuscript. PB was involved in review of images and review of the manuscript. SL is the author of the manuscript, was involved in review of the images and overview of the project.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Koskiniemi M, Rantalaiho T, Piiparinen H, *et al.* Infections of the central nervous system of suspected viral origin: a collaborative study from Finland. *J Neurovirol* 2001;7:400–8.
- 2 Jakob NJ, Handermann M, Darai G. Herpes-simplex-virus. In: Darai G, Handermann M, Sonntag HGeds. *Lexikon der Infektionskrankheiten des Menschen*. 3rd edn. Berlin, Heidelberg, New York: Springer Verlag 2008:388–91.
- 3 Domingues RB, Fink MC, Tsanadis AM, *et al.* Diagnosis of herpes simplex encephalitis by magnetic resonance imaging and polymerase chain reaction assay of cerebrospinal fluid. *J Neurol Sci* 1998;157:148–53.
- 4 Wasaya M, Mekana SF, Khelaeni B, *et al.* Extra temporal involvement in herpes simplex encephalitis. *Eur J Neurol* 2010;17:999–1009.
- 5 Johnson RT, Mims CA. Pathogenesis of viral infections of the nervous system. *N Engl J Med* 1968;278:23–30.
- 6 Soo MS, Tien RD, Gray L, *et al.* Mesenrhombencephalitis: MR findings in 9 patients. *AJR* 1993;160:1089–93.
- 7 Lai CW, Gragasin ME. Electroencephalography in herpes simplex encephalitis. *J Clin Neurophysiol* 1988;5:87–103.
- 8 Tebas P, Nease RF, Storch GA. Use of the polymerase chain reaction in the diagnosis of herpes simplex encephalitis: a decision analysis model. *Am J Med* 1998;105:287–95.
- 9 Tien RD, Felsberg GJ, Osumi AK. Herpes virus infection of the CNS: MR findings. *AJR* 1993;161:167–76.
- 10 Baik JS, You SJ, Lee MS. Bilateral ballism after herpes encephalitis with thalamic lesion. *Parkinsonism Relat Disord* 2010;16:303–4.

Copyright 2013 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- Submit as many cases as you like
- Enjoy fast sympathetic peer review and rapid publication of accepted articles
- Access all the published articles
- Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow