The syndrome of headache and neurologic deficits with CSF lymphocytosis (HaNDL) is a self-limited, benign entity, characterized by one or more episodes of severe headache, transient neurologic deficits, and lymphocytic pleocytosis in CSF. Functional imaging studies have shown changes in blood flow and brain activity whose temporal and spatial characteristics are similar to those of cortical spreading depression (CSD) mechanism similar to that proposed for migraine with aura. The clinical utility of a prominent vein named index vein, found on susceptibility-weighted imaging (SWI), draining the cortical area responsible for patient’s symptoms, was described during migraine aura. Our study reports a patient with HaNDL and index vein, adding further evidence for spreading depression-like mechanism, similar to that proposed for migraine.

Case

A previously healthy, 45-year-old, right-handed man presented to the emergency department with acute onset of speech problems. Three days before, he complained of holocephalic, oppressive, severe headache accompanied by nausea and vomiting. Physical and neurologic examinations were unremarkable except for global aphasia (the National Institute of Health Stroke Scale score of 9 points). Blood biochemistry and hematologic work-up were normal. To rule out stroke, routine and angio-CT of the head were performed, showing no abnormalities. Analysis of CSF revealed lympho-pleocytosis (244 cells/mm³) with 128 mg/dL proteins and normal glucose. Virologic and microbiological CSF analyses (PCR for herpes simplex virus [HSV]-1/HSV-2, human herpesvirus 6, varicella-zoster virus, enterovirus, cytomegalovirus, Parechovirus humano, Escherichia coli K1, Haemophilus influenzae, Listeria monocytogenes, Neisseria meningitidis, Streptococcus agalactiae, Streptococcus pneumonia, and Cryptococcus neoformans/gatti) were negative. Routine T1- and T2-weighted images, fluid attenuation inversion recovery, and diffusion-weighted imaging (DWI) findings were normal. Gradient recalled echo T2*-weighted imaging (GRE T2*WI) showed prominence of the draining vein (approximately 2 times larger than the contralateral corresponding vein) adjacent to the left superior temporal gyrus (figure, A). The symptoms resolved completely within 72 hours. He was discharged with the diagnosis of HaNDL. A follow-up brain MRI, 3 months later, demonstrated the disappearance of the dilated vein (figure, B). No other episodes were reported in the 1-year follow-up period.

Discussion

Taking into account the complete clinical course with the episode of headache accompanied by transient focal neurologic deficits, aseptic CSF lymphocytosis, and normal radiologic findings, except for transient prominence of the venous vasculature on GRE T2*WI, our patient fulfilled the diagnostic criteria for HaNDL. We rationally excluded ischemic and infectious causes

PRACTICAL IMPLICATIONS

Index vein adds further evidence for cortical-spreading depression as the responsible mechanism in HaNDL and can be useful in distinguishing stroke mimics in the emergency setting.
because virologic and microbiological CSF analyses were negative, and there were neither diffusion abnormalities nor vascular occlusion on the neuroradiologic studies.

HaNDL is a rare condition that can present with stroke-like manifestations which can lead to therapeutic dilemmas regarding thrombolysis. Its pathophysiology is not completely understood, but there are previous studies that propose CSD, an event characterized by a slowly propagating abnormal neuronal excitation followed by prolonged inhibition, as the responsible mechanism. Head CT perfusion imaging and MRI perfusion techniques in several studies have demonstrated global hemispheric or focal regions of hypoperfusion correlating with neurologic deficits, supporting CSD as the mechanism in the pathophysiology of HaNDL.2 Findings on SPECT studies have showed focal or widespread areas of decreased blood flow on the side of origin of the neurologic deficits suggestive of the CSD mechanism, similar to that proposed for migraine with aura.3 Moreover, CSD is further supported by transcranial Doppler that showed asymmetrical fluctuations in middle cerebral arterial blood flow velocity and pulsatility, indicative of intracranial vasomotor changes, resembling those seen in patients with migraine.4

In our patient, GRE T2*WI revealed prominent hypointense signals of the venous vasculature within the area responsible for the patient’s symptoms. The imaging finding can be explained by an uncoupling between oxygen supply and demand, caused by the reversible cortical dysfunction, that results in higher oxygen extraction and a relative increase of deoxyhemoglobin levels in the draining veins, which causes the cerebral veins to seem prominent and hypointense on SWI.6 Furthermore, the absence of ischemic changes on DWI confirms that the perfusion changes during HaNDL do not fall below the threshold for brain ischemia and the reversibility of the imaging sign supports that it is caused by a functional process, such as CSD, and not by an anatomical variant.5

To conclude, our study reports a patient with HaNDL who had a prominent draining vein on GRE T2*WI within the area that points to the region of the cerebral cortex responsible for the functional deficit, providing stronger support for a CSD mechanism. A limitation of our study lies in the fact that it includes only 1 case report. If further studies confirm the utility of index vein as a biomarker of transient cortical dysfunction, index vein may play a role in understanding the pathophysiology of HaNDL and distinguishing stroke mimics in the emergency setting.

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**Appendix Authors**

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<tr>
<th>Name</th>
<th>Location</th>
<th>Contribution</th>
</tr>
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<tbody>
<tr>
<td>Anca Loredana Alungulese, MD</td>
<td>Department of Neurology, Principe de Asturias University Hospital, Madrid, Spain</td>
<td>Conception and design, drafting the article, and final approval</td>
</tr>
<tr>
<td>Miguel Angel Garcia Soldevilla, MD</td>
<td>Department of Neurology, Principe de Asturias University Hospital, Madrid, Spain</td>
<td>Revised the manuscript for intellectual content and final approval</td>
</tr>
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(A) GRE T2*WI during HaNDL revealing the prominence of the draining vein adjacent to the left superior temporal gyrus associated with the clinical symptomatology. (B) GRE T2*WI showing the disappearance of the dilated vein 3 months later. GRE T2*WI = gradient recalled echo T2*- weighted imaging; HaNDL = headache and neurologic deficits with CSF lymphocytosis.
References


Anca Loredana Alungulese, Miguel Ángel García Soldevilla, Laura Izquierdo Esteban, et al.

**Index Vein in Headache and Neurologic Deficits With CSF Lymphocytosis**

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