A Case of Acute Wernicke's Encephalopathy with Atypical Findings on Magnetic Resonance Imaging

Rosaria Buccoliero, MD[1]
is a Consultant Neurologist based at Harrogate District Foundation Trust, Harrogate and has been in post since June 2008. She previously trained at the University of Siena, Italy, where she graduated in Medicine and achieved a CCT in Neurology. She has particular interest in multiple sclerosis and neurometabolic diseases.

Jayam P Lazarus, MD[2], David Scullion, MD[2], Sibte Hasan, MD[3], Alessandra Rufa MD[4], Alfonso Cerase, MD[5]

1: Department of Neurology, Harrogate District Foundation Trust, Harrogate, UK
2: Department of Neurology, Diana Princess of Wales Hospital Grimsby, Grimsby, UK
3: Department of Radiology, Harrogate District Foundation Trust, UK
4: Department of Neurophysiology, York General Hospital, York, UK
5: Department of Neurological, Neurosurgical and Behavioural Sciences, University of Siena, Viale Bracci, Siena, Italy
6: Unit NINT Neuroimaging and Neurointervention, Department of Neurological and Sensorineural Sciences and the Interdepartmental Center of Nuclear Magnetic Resonance, Azienda Ospedaliera Universitaria Senese, "Santa Maria alle Scotte" General Hospital, Viale Mario Bracci, 16, 53100, Siena, Italy

Correspondence to:
Dr Rosaria Buccoliero,
Harrogate District Hospital, Harrogate HG2 7SX, UK.
Tel: +44 (0)1423 553038/448
Fax: +44 (0)1423555348
Email: rosaria.buccoliero@hdft.nhs.uk

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Wernicke's encephalopathy is a neurometabolic disorder caused by vitamin B1 (thiamine) deficiency. We report a case of a 35-year-old chronic alcoholic and malnourished male patient who developed clinically acute Wernicke's encephalopathy (aWE). Brain magnetic resonance imaging (MRI) showed signs of chronic alcohol abuse and non-specific subacute cerebral ischaemia (unusual term) . Intravenous thiamine treatment resulted in complete recovery. In order to ensure rapid and appropriate treatment, it is important to be aware that the diagnosis of aWE is a clinical one, and that brain MRI maybe normal or demonstrate atypical features.

Introduction

Wernicke's encephalopathy (WE) is a neurological disorder caused by a deficiency of vitamin B1 (thiamine). It is typically characterised by a triad of symptoms, namely ophthalmoplegia, acute confusional state, and ataxia. However clinical presentation varies widely in both adults and children. Acute WE is most commonly associated with chronic alcohol abuse. Additional causes include infection (e.g. HIV syndrome or disseminated tuberculosis), gastrointestinal surgery, prolonged vomiting, pregnancy, neoplasia with or without chemotherapy, and malnutrition. Brain magnetic resonance imaging (MRI) is the most powerful tool which may support the clinical hypothesis, or lead to an alternative diagnosis.[4-12] In some cases, brain MRI may be normal[6,9] and the correct diagnosis, management, and patient's outcome depends on clinical judgment.

The purpose of this report is to present an adult patient with clinically acute WE and complete clinical regression after intravenous vitamin B1. The imaging findings were considered atypical.

Case report

A 35-year-old male (height 172cm, weight 57.7kg, BMI 19.3) was admitted to hospital acutely confused, disorientated in time and place, presenting with difficulties in verbal expression and understanding/interpreting questions. Neurological examination showed expressive and receptive dysphasia, confusion, generalized tendon areflexia with mild sensory ataxia. No significant ocular abnormalities were noted. The rest of the clinical examination was normal. He was apyrexial. His history revealed heavy alcohol abuse (up to 50-60 units a week) for the past four years, and depression coupled with poor nutritional intake over the last year.

Urine analysis, full blood count, CRP, liver function tests, urea, creatinine, electrolytes, IgG, IgA, IgM, vitamin B12, folic acid, serum protein electrophoresis, ANA, and ANCA were all normal. B1 vitamin levels were not checked. Antibodies against Borrelia, HIV, Treponema pallidum (TPHA), Hepatitis B and C were negative. An alpha-galactosidase A assay for Fabry disease was negative. ECG, transthoracic echocardiogram, carotid duplex ultrasound, and abdominal ultrasound were normal. CSF examination revealed mildly increased protein of 0.47g/L (n.v.0.20-0.40 g/L) and glucose concentration of 3.1 mmol/L with a blood glucose concentration of 4.1. mmol/L. CSF culture was negative. Nerve conduction studies (NCS) showed evidence of generalized peripheral axonal neuropathy with greater sensory axonal loss in the upper and lower sample nerves and with relatively preserved motor potentials. Electromyography was normal. EEG showed relatively poor alpha rhythm and some excess slow waves over the left hemisphere.

Brain MRI (Figures 1a-c) showed subtle cortical and subcortical swelling and signal alteration in the left parietal and temporal lobes, and signal alteration of the head of the ipsilateral caudate nucleus. None of these lesions showed gadolinium-enhancement. Additional findings included diffuse brain and cerebellar atrophy, and atrophy of the mammillary bodies. These findings were considered consistent with a subacute ischemic lesion in the left cerebral hemisphere in a chronic alcoholic and malnourished patient. The typical imaging findings of aWE were absent.

On the basis of the clinical findings and history, the diagnosis of aWE was suspected and the patient was treated with parenteral B1 vitamin (Pabrinex, 250 mg three times daily, Archimedes Pharma UK Ltd) for twelve days and by mouth B1 vitamin 100mg three times a day subsequently. Within one week of treatment, his neurological status improved dramatically, returning to normal by 20 weeks. Follow up imaging, performed at 3 (Figure 1 d) and 28 weeks post presentation showed regression of the left cerebral hemisphere lesions which underwent gliotic and gliotic-malacic changes.

Discussion

The classical clinical triad of WE is not always present, and this may delay the diagnosis, especially in comatose patients.[1,6] Ideally, the serum B1 vitamin levels should be performed in all suspected cases, however this is not routinely done.[12] In our patient, the diagnosis of acute WE was considered likely due to the history of alcohol consumption and

malnutrition, clinical symptoms, neurological signs though extra-ocular palsies were not present, and the results of the NCS/EMG studies. The excellent clinical response to intravenous Thiamine confirmed the diagnosis.

Brain MRI findings are helpful in establishing a diagnosis.[3-12] The most frequent findings include symmetric areas of signal alterations in the mamillary bodies, periaqueductal gray matter, tectal plates and medial thalami, which are more frequently seen in alcoholic patients. Less commonly, symmetrical signal alterations may be seen in the cerebral cortex, cranial nerve nuclei, basal ganglia, cerebellar hemispheres and vermis, and the splenium of the corpus callosum.[5,7-10,12] These latter findings are more frequently seen in non alcoholic patients. Intravenous gadolinium administration may be useful, since contrast-enhancement may be present, possibly in areas without signal alteration on unenhanced sequences.[5,12] This pattern of enhancement is most frequently seen in alcoholic patients. Brain MRI may be normal or show atypical features.[12]

The exact pathogenesis of brain lesions in WE remains controversial. Thiamine plays an important role in maintaining transcellular osmotic gradients, and has a high concentration in the blood-brain barrier.[4,12] The most likely hypothesis for the changes on MRI is that they are a result of a combination of vasogenic and cytotoxic oedema. Serial brain MRI studies in patients with WE have demonstrated reversible lesions that could be due to the latter process.[3,5,12]

In our patient, MRI showed atrophy of the mammilary bodies (a finding consistent with heavy consumption of alcohol and chronic WE), and lesions in the cortical and subcortical regions of the left parietal and temporal lobes. Abnormalities of signal were also observed in the head of the ipsilateral caudate nucleus. Systematic literature review revealed that unilateral cortical and unilateral subcortical brain lesions on MRI have not been previously reported in cases of WE. Despite its atypical clinical presentation, the most likely MRI diagnosis was a non specific subacute ischaemia (an unusual term). The possibility of an ischaemic lesion induced by WE is speculative. The diagnosis of demyelination was considered unlikely due to the marked asymmetry of the lesions and relative sparing of the brain stem.[7] MRI follow-up showed evolution of the lesion towards gliotic and gliotic-malacic changes. Vitamin B1 supplementation resulted in a clear-cut improvement in the patient's clinical condition.

In conclusion, clinical judgement remains the gold standard for establishing a diagnosis and guiding therapeutic management of acute WE. Brain MRI scan remains the most important imaging modality, however this may be normal or may show confusing or atypical features, as in our patient. ◆

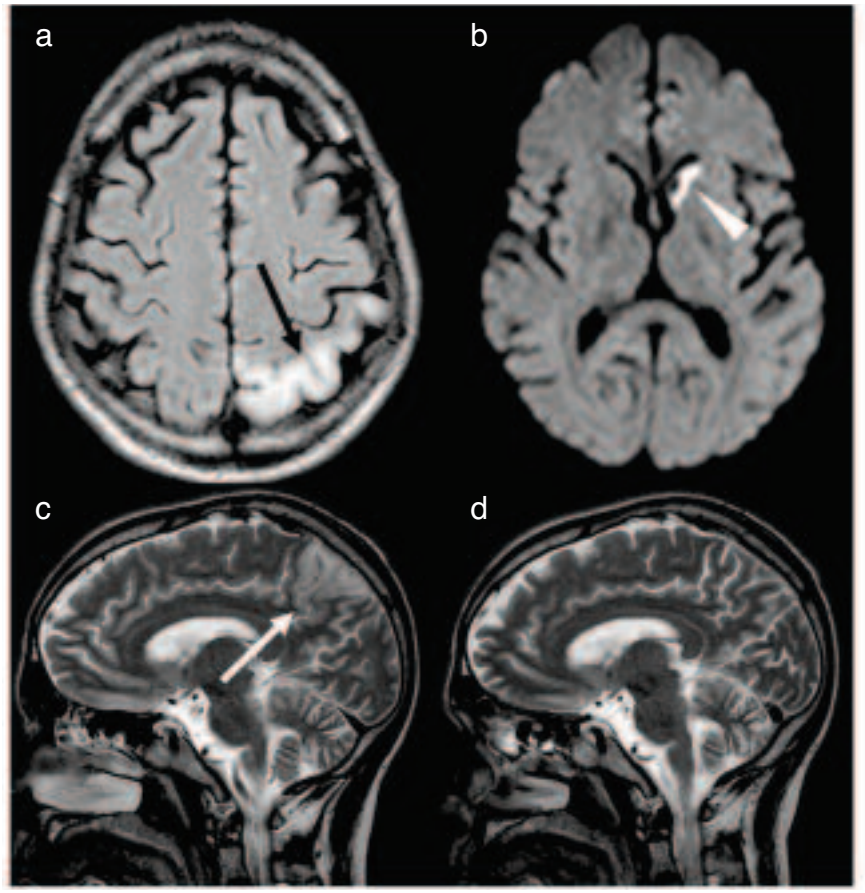

Figure 1: Magnetic resonance and diffusion-weighted imaging of the brain at diagnosis and follow-up.
At diagnosis, fluid-attenuated inversion recovery (a) and diffusion-weighted (b) axial, and T2-weighted sagittal (c) images show prominent cortical and subcortical swelling and high signal intensity (arrows) of the left parietal lobe, and high signal intensity of the head of the left caudate nucleus (arrowhead). Similar signal changes were present in the left temporal cortex (not shown). Additional findings included atrophy of the mammillary bodies (not shown). Twenty-one days later, T2-weighted sagittal (d) images show a clear cut reduction of the abnormal findings. Also in the left temporal cortex and in the head of the left caudate nucleus the abnormal findings regressed (not shown).

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