CASE REPORT

Hunting mimics and chameleons: diagnostic difficulties in atypical acute ischaemic stroke

Nicholas Russell Plummer,¹ Kemparaju Hari-Bhaskar²¹Acute Stroke Unit, Lancashire Teaching Hospitals NHS Foundation Trust, Preston, Lancashire, UK²Acute Medicine, Lancashire Teaching Hospitals NHS Foundation Trust, Chorley, UK**Correspondence to**
Dr Nicholas Russell Plummer,
nickplummer@cantab.net

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SUMMARY

The seemingly straightforward diagnosis of acute ischaemic stroke can be complicated by the presence of conditions presenting similarly to stroke, and atypical strokes presenting with confusing and non-classical signs. We present a diagnostic quest to disentangle the effects of a number of stroke mimics from those of an underlying bilateral cerebrovascular phenomena, where with appropriate treatment of the non-stroke conditions the patient was able to make a near complete neurological recovery.

BACKGROUND

Although the diagnosis of acute stroke is usually straightforward, the situation can be clouded by the presence of non-vascular stroke 'mimics',¹ which are often just as significant diagnoses to make. Additionally, acute ischaemic stroke can itself manifest with confusing clinical pictures, leading clinicians down to an ultimately incorrect alternative diagnostic and management pathway; hence so-called stroke 'chameleons'.² We present the case of a 76-year-old woman admitted to the Acute Stroke Unit with sudden onset dysphasia and agitation, where a number of mimics and chameleons had to be addressed in the hunt for a definitive diagnosis, with ultimately an excellent clinical outcome.

CASE PRESENTATION

On arrival the patient was confused and drowsy, but had no obvious limb weakness and only mild left facial droop. She was noted to be mildly feverish and to be in previously undiagnosed atrial fibrillation (AF). The patient's family gave a history of 3 weeks worsening headache following a head injury nearly 2 months prior, and her medical history included hypertension, type II diabetes mellitus and multiple transient ischaemic attack. She lived at home with her husband, and was normally independent with all activities of daily living.

INVESTIGATIONS

Admission bloods demonstrated hyperglycaemia with normal serum ketones, hyponatraemia (Na 124) and raised inflammatory markers (white cell count (WCC) 11.4, C reactive protein (CRP) 138), but were otherwise normal including liver function tests and bone profile. Her chest X-ray showed left basal consolidation, and a CT of the head was reported as showing no intracranial abnormalities.

DIFFERENTIAL DIAGNOSIS

A chronic subdural haematoma following her earlier head injury, or indeed another cerebral mass lesion, could have accounted for her headache and neurological findings,³ but was ruled by the negative CT. Hyperglycaemia with hyperosmolar state⁴ and hyponatraemia⁵ can cause focal neurological defects and seizure, so glycaemic control was achieved via variable-rate insulin infusion, and hyponatraemia corrected with fluid restriction. Subsequent low serum osmolality confirmed a dilutional hyponatraemia rather than a hyperosmolar state. With these treatments initiated and a lack of definitive focal neurological signs or pathology on neuroimaging she was managed as sepsis, a common stroke mimic,⁶ secondary to a lower respiratory tract infection given her chest X-ray, with intravenous cefuroxime due to allergies to penicillins and macrolides.

The day following admission she experienced a witnessed unresponsive episode associated with hypertension, peaking at 211/100 mm Hg. This resolved within minutes, leaving residual forced gaze deviation to the left, mild right facial droop, and visual and sensory neglect on the right. Repeat CT of the brain was once again normal, so she was started on antiplatelet and antihypertensive agents as a presumed new presentation of a left middle cerebral artery infarct. An EEG was requested to rule out seizure activity mimicking stroke.⁶

The next day she remained drowsy but was moving all four limbs equally. EEG showed non-specific changes reflecting global reduced cortical function, with differential diagnoses including cerebrovascular, space occupying, metabolic and infective causes. However, the EEG lacked convincing features of acute stroke such as hemispheric asynchrony.⁷ It was felt that a septic or metabolic encephalopathy would most likely give rise to this presentation, although the history of transient left hemispheric focal signs would be unusual in this setting. Given a clinical picture in keeping with encephalopathy she was started on aciclovir in addition to cefuroxime to cover herpes encephalitis, and a lumbar puncture was performed for microscopy, culture and PCR analysis to rule out an infective meningitis or encephalitis.

On day 5 microbiology were asked to review the patient, as inflammatory markers continued to rise despite intravenous broad-spectrum antibiotics, and negative urine, cerebrospinal fluid (CSF) and blood culture results. In the absence of convincing clinical or CSF features of meningitis aside from a high CSF lactate they advised starting meropenem as per local protocols to cover septic encephalopathy⁸ secondary

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Figure 1 Axial T2-weighted (left) and coronal T2 fluid attenuated inversion recovery (right) MRI acquired on day 9 of admission, demonstrating acute ischaemic infarcts in right frontoparietal and left parietal regions.

to *Listeria*⁹ in the penicillin allergic patient. CSF PCR as well as *Mycoplasma*, *Legionella* and *Listeria* serology would later also all come back negative. After 24 h of meropenem the patient became more responsive, pulling out her nasogastric tube. Her WCC fell from a peak of 24.3, and CRP plateaued at 489. Although her right facial droop persisted, she was able to move all her limbs normally. By day 7 she was able to provide one-word answers, although she remained confused, and the following day she was fully alert and conversant.

Despite a good neurological recovery she remained subjectively and clinically breathless. Blood gases were normal, so a CT pulmonary angiography was performed. Although negative for pulmonary embolism, this demonstrated a 15 mm lobulated and slightly speculated mass anteriorly in the right mid-zone. This was considered suspicious for a bronchial neoplasm; however, a potential mimic diagnosis of carcinomatous meningitis¹⁰ was not supported by CSF microscopy, which showed only few lymphocytes and several macrophages with smudge cells, but no atypical or malignant cells.

By day 9 she was sufficiently stable to undergo MRI of the brain (figure 1), which showed an area of high signal in the left posterior temporal lobe, with similar smaller lesions in right frontoparietal and left parietal regions. Although initially suspected to reflect metastatic disease, it was felt these were in fact multiple embolic infarcts, with further isolated periventricular white matter lesions bilaterally. Transthoracic echocardiogram and carotid Doppler ultrasound were normal, suggesting that the source of the emboli was either aortic arch, not seen on the chest CT, or secondary to AF.

OUTCOME AND FOLLOW-UP

The patient was diagnosed with multiple embolic acute ischaemic infarcts and coexisting sepsis with septic encephalopathy. Antibiotics were stopped 2 weeks after admission, and she underwent physiotherapy, speech and language therapy, and occupational therapy treatment. She was discharged home with only some residual mild dysphasia and dysarthria after 23 days.

Anticoagulation with dabigatran¹¹ was initiated for AF which persisted despite resolution of sepsis, and she was followed up by the respiratory team as an outpatient, where it was felt that the lung lesion was unlikely to reflect malignancy.

DISCUSSION

We feel this case is significant due to the diagnostic difficulty presented by a stroke mimic, septic encephalopathy, occurring simultaneously with a chameleonic acute ischaemic stroke.

A number of mimics had to be ruled out to reach the diagnosis of stroke, namely metabolic derangements (hyperglycaemia and hyponatraemia), carcinomatous meningitis, seizure and intracranial mass lesions. The patient rapidly improved clinically and biochemically once meropenem was initiated, so septic encephalopathy due to a sensitive organism was almost certainly a contributing factor,¹² although the source of the infection was never elucidated. It was difficult in this case to clarify the link between sepsis and the ischaemic event—it is known that coexisting sepsis can worsen neurological deficits in patients who have suffered stroke,⁶ and much has been made of new-onset AF in sepsis itself causing ischaemic strokes.¹³

Our diagnosis of stroke was also potentially delayed by the presence of repeat negative CT head imaging. This imaging modality rarely clarifies the clinical picture in potential acute stroke if associated with diagnostic confusion from the outset, and we were initially unable to use most sensitive imaging due to the patient's clinical instability. This diagnostic conundrum was further confounded by the lack of classical EEG findings of acute ischaemic stroke,^{14 15} most likely due to a combination of coexisting septic encephalitis and bilateral stroke disease confusing the encephalographic picture.

We do wonder whether further CSF markers of infarction would have been appropriate to pursue in this case. Lactate has been repeatedly demonstrated to be raised in cerebral ischaemia,^{16 17} peaking on the third day postinfarction¹⁸ with some degree of correlation with infarct size.¹⁹ There is a similar association with raised lactate dehydrogenase levels and structural brain pathology in acutely ill patients with a decreased level of consciousness²⁰ that on reflection there may have been value in

Learning points

- ▶ Stroke disease can coexist alongside well-known stroke mimics—the presence of a stroke mimic does not preclude an underlying cerebrovascular event.
- ▶ Aggressive and early treatment of potential stroke mimics can help clarify the diagnostic picture in such atypical presentations.
- ▶ EEG and cerebrospinal fluid analysis have an under-rated role to play in the diagnosis of atypical acute ischaemic stroke.

pursuing. We feel that in similar cases more comprehensive CSF analysis may be a worthwhile investigation for hunting chameleons, rather than simply for just ruling out mimics.

Contributors Both authors cared for the patient. KH proposed the report. NRP compiled the literature review and prepared the first draft. Both authors contributed to the report and approved the final manuscript.

Competing interests None.

Patient consent Obtained.

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