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Diagnostic challenge

Is this really a stroke?

BACKGROUND

Although acute stroke most commonly presents with hemiparesis, facial weakness and dysphasia, these symptoms can sometimes be the atypical presentations of other conditions which may be difficult to diagnose.

OBJECTIVE

This article presents three cases of stroke mimics and discusses how to improve accuracy in diagnosing stroke in the primary care setting.

DISCUSSION

Stroke is a medical emergency and urgent hospital transfer is vital. Hypoglycaemia, hyperglycaemia, epilepsy, multiple sclerosis, hemiplegic migraine, intracranial tumours or infection (meningitis/encephalitis/abscess) can all mimic stroke. The Los Angeles Prehospital Stroke Screen (LAPSS) consists of four history items, a blood glucose measure, and three examination items designed to detect unilateral motor weakness. It can be utilised to improve the accuracy in diagnosing stroke and stroke mimics in general practice.

Every year, more than 40 000 Australians suffer a stroke,¹ a third of them will die within a year,^{2,3} and half will be disabled.⁴ Stroke is a medical emergency. The phrase 'time is brain' emphasises that human nervous tissue is rapidly lost as stroke progresses and that emergent evaluation and therapy are required.⁵ In patients experiencing a typical large vessel acute ischaemic stroke, 1.9 million neurons, 14 billion synapses, and 12 km of myelinated fibres are destroyed each minute.⁵ Research evidence demonstrates that patients with acute ischaemic stroke treated early with intravenous tissue plasminogen activator (t-PA), were at least 30% more likely to have minimal or no disability at 1 year compared with patients given placebo.⁶⁻⁹ Based on this evidence, administration of intravenous t-PA is now recommended within 180 minutes after an acute ischaemic stroke.¹⁰⁻¹²

Stroke mimics

In most cases the diagnosis of stroke will be clear cut with patients presenting with acute onset of focal neurological deficits such as hemiparesis, facial weakness and dysphasia. However, in various studies of patients admitted with an initial clinical diagnosis of stroke made by emergency department physicians and general practitioners, the 'stroke' diagnosis was shown to be

incorrect following neuroimaging in 4–13% of patients.¹³⁻¹⁶

Several important specific nonvascular conditions can present with stroke-like symptoms (*Table 1*).^{13,17} These conditions can be memorised using the mnemonic 'HEMI'. The following 'stroke mimic' cases were seen in the author's practice (a group practice in an Asian city) in the 2 year period between January 2004 to December 2005, and illustrate potential diagnostic difficulty in the primary care setting.

Case study 1

Mr T, aged 79 years, had known history of diabetes mellitus and hypertension. One morning, he came to the clinic of his GP, Dr A, for regular blood tests (fasting blood glucose, HbA1c, and renal function test). Mr T developed sudden right sided hemiplegia and aphasia. After examination by Dr A, a clinical diagnosis of stroke was made, and Mr T was referred to a hospital emergency department (ED) immediately.

In the ED, Mr T's blood sugar was found to be 1.8 mmol/L. After administration of intravenous glucose by the ED doctor, the aphasia and right sided limb weakness of Mr T recovered within few minutes. The final diagnosis of transient neurological deficits caused by hypoglycaemia was established. On further questioning, Mr T revealed that he had taken oral glibenclamide without taking any food on that morning because he had been instructed to keep fasting for blood tests!

Discussion

Case study 1

The classic clinical presentations of hypoglycaemia are tremor, sweating and palpitation.¹⁸ However, hypoglycaemia may sometimes produce a stroke-like picture with hemiplegia and aphasia.¹⁹ These patients may be drowsy but are often alert and do not show the more severe clinical manifestations of confusion, diminished level of consciousness, or coma.²⁰

Case study 2

Mrs J's hemiparesis developed in a subacute course, whereas acute presentation of neurological dysfunction is the most prominent feature of stroke.²¹ This emphasises the importance of appreciating the time course of the presentation rather than simply the presenting clinical signs.

Primary central nervous system (CNS) lymphoma comprises only 3% of all primary brain tumours.^{22,23} Immunosuppression, particularly acquired immunodeficiency syndrome (AIDS), markedly increases the risk of primary CNS lymphoma.²² Behavioural and cognitive changes occur in about two-thirds of patients.²⁴ Hemiparesis, aphasia, and visual field deficits are present in about 50% of patients at diagnosis, and seizures in 15–20% of patients.²⁵ The diagnosis is usually established by stereotactic biopsy.²⁶

Case study 3

Hemiplegic migraine is characterised by episodes of recurrent hemiparesis or hemiplegia during the aura phase of a migraine headache. It typically lasts 30–60 minutes and is followed by a unilateral throbbing headache. In severe attacks, the hemiparesis or hemiplegia can persist for days or weeks.²⁷ Therefore, hemiplegic migraine is almost always diagnosed as transient ischaemic attack (TIA) or stroke at first presentation. Only with a clear history of recurrent attacks of typical headache and hemiparesis can a clinician establish (or suspect) the diagnosis of hemiplegic migraine.²⁸ In hemiplegic migraine, the hemiparesis and headache can be on the same or opposite side.^{29,30}

Other 'stroke mimics'

Case study 2

Mrs J, aged 40 years, experienced subtle right upper limb and lower limb weakness for 3 days; the right sided limb weakness increased in severity on day 4. On examination, Dr B, a general practice registrar, found that the power in Mrs J's right upper limb and right lower limb was grade 4 (over 5). With the provisional diagnosis of stroke, Dr B referred Mrs J urgently to a neurologist for further investigations and management.

After hospitalisation, nonenhanced computerised tomography (CT) scan of brain showed a 'moderately hyperattenuating mass lesion adjacent to the left lateral ventricle', and the lesion showed a 'homogenous pattern of enhancement' by intravenous contrast. Mrs J was subsequently diagnosed to have cerebral lymphoma. She was also found to be negative for HIV antibodies.

Of particular interest are multiple sclerosis and epilepsy. The clinical presentations of multiple sclerosis consist of sensory disturbances, unilateral optic neuritis, diplopia, limb weakness, clumsiness, gait ataxia and neurogenic bladder.³¹ The transient appearance of new neurological symptoms or worsening of pre-existing symptoms can be provoked by hot baths or increases in body temperature (Uhthoff's phenomenon).^{31,32} In Uhthoff's phenomenon, hemiparesis and visual impairment rarely occur together – usually either occurs in each attack³³ and the symptom usually lasts for minutes or a few hours.³² Therefore it can mimic the clinical picture of TIA.

Seizures may mimic stroke, as a neurological deficit occasionally follows a seizure. The deficit is most commonly a hemiparesis, but hemianopia, aphasia and other focal deficits can also occur (Todd's paralysis or postictal paralysis).³⁴ The deficit usually lasts a few hours; rarely as long as 24 hours.³⁴ A patient found after a seizure may present with only these postictal neurological signs.

Improving accuracy in diagnosing stroke and stroke mimics

While careful history taking and examination is important, delay in transport of stroke patients to hospital needs to be minimised.

The LAPSS

The Los Angeles Prehospital Stroke Screen (LAPSS) can help improve accuracy in diagnosing stroke and stroke mimics (Table 2). It takes less than 3 minutes to complete and allows prehospital personnel to identify acute stroke patients rapidly. It consists of

four history items, a blood glucose measure, and three examination items designed to detect unilateral motor weakness. These items were chosen not only to identify the most common acute stroke patients, but also to exclude likely stroke mimics.³⁵ A prospective study showed that LAPSS demonstrated sensitivity of 91%, specificity of 97%, positive predictive value of 97% and negative predictive value of 98% in detecting stroke by prehospital personnel.³⁵

Based on the above figures, the LAPSS can be a useful tool in improving the accuracy of clinical diagnosis of stroke (and stroke mimics) in primary care. This point can also be illustrated by using Cases 1–3. In Case 1, criteria 5 of LAPSS could detect hypoglycaemia. In Case 3, the answer of 'no' to criteria 1 (age >45 years) would alert the clinician to the possibility of a stroke mimic. However, the presentation still warranted urgent neurological assessment. In Case 2 the subacute onset of symptoms makes the diagnosis of acute stroke unlikely. The answer of 'no' to criteria 3 (symptoms duration <24 hours) would assist in this instance.

Conclusion

The diagnosis of stroke is usually straightforward, but nonvascular stroke mimics may cause diagnostic difficulty. Utilising the LAPSS criteria may improve clinical diagnostic accuracy. However, if stroke is suspected, urgent transport to hospital for assessment and neuroimaging is the appropriate course of action.

Summary of important points

- Stroke is a medical emergency and urgent

referral to a hospital ED is required.

- Nonvascular conditions may mimic stroke.
- Hypoglycaemia can occasionally present with hemiplegia and aphasia. Checking blood glucose in patients with sudden hemiplegia and aphasia is important.
- Cerebral lymphoma can present as stroke-like symptoms. AIDS markedly increases the risk of primary cerebral lymphoma.
- Hemiplegic migraine is a variant of migraine,

Case study 3

Ms W, aged 38 years, presented to her GP, Dr C, with sudden onset of right sided severe headache, nausea, and left upper limb and left lower limb weakness (power grade 1 over 5). In view of the sudden severe headache and hemiparesis, a provisional diagnosis of haemorrhagic stroke was made. Ms W was referred immediately to a hospital ED. Urgent CT scan of brain did not reveal any abnormalities. The limb weakness and headache of Ms W recovered completely within 3 hours. The hospital physicians diagnosed transient ischaemic attack (TIA).

Ms W developed two subsequent attacks over the following 12 months. CT scan of brain in these two episodes again did not reveal any abnormalities. A neurologist subsequently reviewed Ms W's condition, and the final diagnosis of hemiplegic migraine was made.

and is almost always diagnosed as TIA or stroke at first presentation. It can only be diagnosed with a clear history of recurrent attacks of typical headache with hemiparesis.

- The LAPSS can improve the accuracy of clinical diagnosis of stroke (and stroke mimics).

Conflict of interest: none declared.

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Table 1. Important mimics of stroke – HEMI

Hypoglycaemia, hyperglycaemia
Epilepsy
Multiple sclerosis, hemiplegic migraine
Intracranial tumours or infection (meningitis/encephalitis/abscess)

Table 2. Los Angeles Prehospital Stroke Screen (LAPSS)

For evaluation of acute, noncomatose, nontraumatic neurologic complaint. If items 1 through 6 are all checked 'yes' (or 'unknown'), provide pre-arrival notification to hospital of potential stroke patient. If any item is checked 'no', consider stroke mimics. (Note: the patient may still be experiencing a stroke even if LAPSS criteria are not met)

Criteria	Yes	Unknown	No
1. Age >45 years	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. History of seizures or epilepsy absent	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Symptoms duration <24 hours	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. At baseline, patient is not wheelchair bound or bedridden	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Blood glucose between 3.3 and 22.2 mmol/L	<input type="checkbox"/>		<input type="checkbox"/>
6. Obvious asymmetry (right vs. left) in any of the following three exam categories (must be unilateral)	<input type="checkbox"/>		<input type="checkbox"/>
	Equal	Right weak	Left weak
Facial smile/grimace	<input type="checkbox"/>	<input type="checkbox"/> Droop	<input type="checkbox"/> Droop
Grip	<input type="checkbox"/>	<input type="checkbox"/> Weak grip	<input type="checkbox"/> Weak grip
	<input type="checkbox"/>	<input type="checkbox"/> No grip	<input type="checkbox"/> No grip
Arm strength	<input type="checkbox"/>	<input type="checkbox"/> Drifts down	<input type="checkbox"/> Drifts down
	<input type="checkbox"/>	<input type="checkbox"/> Falls rapidly	<input type="checkbox"/> Falls rapidly

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