CASE REPORT

Decreased consciousness: bilateral thalamic infarction and its relation to the artery of Percheron

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SUMMARY

This case series highlights two patients seen in the same stroke centre presenting with unusual symptoms. They were later diagnosed with bilateral thalamic infarcts, probably related to an unusual anatomical variant. The difficulties in establishing the diagnoses due to their relative rarity and complexity could have impacted on patient outcomes.

BACKGROUND

Stroke is the most common cause of acquired disability in the UK, with 300 000 people left severely disabled as a result.¹ Approximately 110 000 people have a stroke each year,² which resulted in more than 43 300 deaths in 2010.³

Stroke is defined as a clinical syndrome of rapid onset focal neurological symptoms or signs persisting longer than 24 h.⁴ Twenty-six per cent of strokes arise from the vertebrobasilar system and relatively few of these occur within the thalamus.⁵

Two cases of a relatively uncommon stroke subtype, bilateral thalamic infarction, are discussed. Both patients presented similarly with a decreased consciousness and visual disturbance. The incidence for this bilateral type of stroke is not yet established so we present these cases to illustrate a rare but nonetheless important cause for reduced consciousness with the aim of increased diagnostic awareness.⁶

CASE PRESENTATION

Case 1

A previously fit and healthy 22-year-old man presented with fluctuating consciousness had been found unrousable at home. His only symptom was a mild headache. On clinical examination, he appeared confused with a dilated left pupil, rightwards divergent gaze and bilateral upgoing plantars but with no other focal neurology. The patient underwent a head CT scan to rule out an intracerebral event during which he dropped his Glasgow Coma Scale (GCS) score to 6/15. He was intubated and ventilated on the intensive therapy unit (ITU) and treated for presumed encephalitis as the head CT scan was normal. A lumbar puncture was performed, but cerebrospinal fluid (CSF) analysis was negative. Therefore, the patient underwent an MRI of the head and MR angiography (MRA) for further evaluation. This revealed bilateral thalamic midbrain ischaemic lesions and raised the possibility of occlusion or spasm in the A1 and A2 vessels (figures 1 and 2).

Owing to the unusual neurological presentation, the neuroradiologists suggested further evaluation

Figure 1 T2-weighted MRI showing bilateral hyperintensities in the thalamic regions.

Figure 2 MRI demonstrating restricted diffusion in the same loci as the bilateral thalamic hyperintensities.

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of the arterial system with CT angiogram. The vertebral basilar circulation appeared normal and there was no evidence of dissection, aneurysm, vasculitis or vasospasm.

The patient was extubated, but he was still markedly confused with an abbreviated mental test score of 5/10. His abnormal neurology persisted with horizontal diplopia in all gaze directions, left-sided ptosis and reduced upgaze bilaterally. At this point, it was noted that he had extensive behavioural changes with a degree of confabulation, attention problems and short-term memory deficits. He also appeared to be disinhibited. His Mini-Mental State Examination score was 21/30. However, he consistently admitted to frequent recreational drug use; he smoked cannabis on a daily basis and used ketamine on occasion, and also admitted to taking 'two lines' of ketamine shortly before admission. However, only cannabinoids and orphenadrine were detected on toxicological screening.

The patient was investigated for secondary causes of stroke. A bubble echocardiogram revealed a patent foramen ovale (PFO) and the patient is currently awaiting cardiology input regarding closure of the PFO. Whether this is directly related to his presentation is unclear. He received extensive neurorehabilitation with a focus on the psychological component. He was discharged home after functioning independently and has had a graduated programme to return to work.

Case 2

A 72-year-old active male smoker presented with fluctuating consciousness. He had a history of hypertension and hyperlipidaemia. His wife stated that he had symptoms of dizziness and blurred vision before being found unresponsive at home. Examination on admission revealed bilateral pinpoint pupils, upgoing bilateral plantar reflexes and new left-sided ptosis. A head CT scan on the day of admission did not show any evidence of an intracerebral event. He was managed on the High Dependency Unit for 2 days due to his fluctuating consciousness. He was treated for presumed encephalitis, which was subsequently excluded after CSF analysis. The patient did not improve with the appropriate treatment and so he underwent an MRI of the head. This demonstrated acute bilateral thalamic infarcts (figures 3 and 4).

The patient's GCS improved over the course of a week. Unfortunately, he developed a hospital-acquired pneumonia 4 days postadmission but this was treated appropriately with antibiotics.

The patient underwent extensive neurorehabilitation as he had a power grade of 4/5 in all the 4 limbs. His cognition returned to baseline and the patient had an uneventful discharge home. An extensive investigation for secondary causes of stroke did not yield any positive findings.

DISCUSSION

We have described two cases of bilateral thalamic infarction presenting with decreased consciousness. In order to understand this clinical syndrome, we must first review the arterial supply of the thalamus and midbrain. This consists of a complex arterial network involving the anterior and posterior cerebral circulation. The anterior and inferior midbrain and thalami are supplied by the internal carotid artery while the medial, lateral and posterior aspects derive their supply from the vertebrobasilar system.⁷

The paramedian arteries normally supply the medial ventral thalami, hypothalamus and subthalamic-mesencephalic junction and derive from the proximal segment of the posterior cerebral artery.⁷ In 1973, Percheron described three distinct anatomical variations of this.⁸ One such variation—the *artery of Percheron*—arises unilaterally from one proximal segment to

Figure 3 CT scan on the day of admission showing no gross abnormality.

provide bilateral paramedian supply. If this artery becomes occluded, bilateral paramedian thalamic infarction occurs. This is a rare presentation that has been described in the context of an unusual anatomical variation affecting the posterior cerebral circulation.⁷

The clinical syndrome that presents due to bilateral paramedian thalamic infarction is complex due to the presence of multiple nuclei and the reticular activating system. Typical features include disturbances of consciousness, confusion and even

Figure 4 MRI showing bilateral restricted diffusion in the thalami consistent with infarction.

coma. Severe cognitive impairment, an amnesic syndrome and impairment of executive dysfunction can occur, which can still be present some months after presentation.⁹ Behavioural problems with inappropriate social conduct, apathy and flattened emotions are reported.¹⁰ Signs include a vertical gaze paresis, miosis, internuclear ophthalmoplegia and loss of convergence.⁷ Ipsilateral ptosis has also been reported.¹¹

Bilateral thalamic infarction due to the occluded artery of Percheron is difficult to diagnose not only clinically but also radiologically. This variant is difficult to visualise with either invasive or non-invasive angiography, but lack of visualisation does not exclude its presence.¹² As CT scan has a low sensitivity, diagnosis can be delayed.¹³ Therefore, we mainly rely on MRI to aid diagnosis. Although bilateral lesions can be seen on MRI, it is important to exclude inflammatory, infectious and neoplastic causes before a diagnosis of infarction due to occlusion of the artery of Percheron is given. Venous infarction and neoplastic infiltration do not follow a particular arterial territory.

In order to aid diagnosis by MRI, one group have described the 'V sign' which is a hyperintense signal seen in the midbrain on axial fluid-attenuated inversion-recovery (FLAIR) and diffusion-weighted imaging (DWI).¹² They describe a sensitivity of 67% in cases of occlusion of the artery of Percheron. It is reasonable to suggest that this anatomical variation is the underlying factor in the disease despite its rare, but as yet undetermined, incidence within the population. The very distinct clinical picture described in cases of confirmed artery of Percheron occlusion correlates very closely with other paramedian bilateral thalamic infarcts in the literature as well as the two cases described in this paper.

Learning points

- ▶ Bilateral thalamic stroke is a complex clinical syndrome, which can present with fluctuations in consciousness, often in combination with other neurological signs.
- ▶ Inflammatory, infectious and neoplastic causes must be excluded as the underlying aetiology before occlusion of the artery of Percheron can be considered as a cause as it is a normal anatomical variant.
- ▶ These cases highlight that the diagnosis must be considered in all cases of fluctuating consciousness even in the absence of clear stroke risk factors, especially in young patients.
- ▶ The neurological complications of this type of stroke are atypical; therefore, without full investigation, the diagnosis can remain somewhat elusive, leading to negative long-term sequelae.

The risk factors for stroke—hypertension, hyperlipidaemia and smoking—for case 2 are clear. In case 1, the exact aetiology is not certain, especially given his age. A predisposition to embolism due to his patent foramen ovale (PFO) is a possibility. However, as there is an incidence of 27% in the general population,¹⁴ the significance of this finding is often debatable. Reported cases of drug use associated with stroke could also be considered but the evidence base is conflicting. A temporal relationship between stroke and consumption of cannabis has been described; however, further discussion is beyond the scope of this paper.¹⁵

Contributors All the authors contributed significantly to this case report. The report itself was written and researched by JT with significant editing and critical revisions by TR. Overall direction and approval for submitting for publication were provided by IK, as well as providing critical review and ensuring the intellectual content was valid. Interpretation of patient's data and suggestion for academic pursuit of the subject provided by SV with critical appraisal and editing of the radiological aspect of the case report. All four parties also had a significant contribution in the day-to-day care and management of the two patients involved.

Competing interests None.

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