

Acute confusional state in a patient with bilateral thalamic ischemic stroke

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ABSTRACT

The acute confusional state is one of the most common reasons for neurologic consultation in the hospital setting and the plethora of causes can truly be daunting. The etiology can vary from structural, metabolic, toxic to systemic infections. Our purpose is to present a rare case of acute confusional state in a patient with bilateral thalamic ischemic stroke due to occlusion of the artery of Percheron (AOP).

A 79-year-old woman with a history of hypertension and surgery for lumbar disc herniation, managed on antiplatelet therapy, angiotensin receptor blocker and diuretics, was admitted for acute confusion and paresthesia of all four limbs. She had disorientation in time and space, abnormal behavior, decreased muscle strength in both lower limbs (paraparesis 2/5 MRC since the surgery), paresthesia in all four limbs and was unable to walk due to generalized weakness. Laboratory analysis showed high blood levels of cholesterol and glucose.

Both head CT and cerebral MRI showed bilateral ischemic changes in the thalami, suggesting an infarct along the artery of Percheron territory.

However, no clear cause for the stroke could be identified. Screening for coagulation abnormalities and autoimmune disorders (lupus anticoagulant, anti-beta-2 glycoprotein, anti-cardiolipin, anti-nuclear and anti-ds DNA antibodies) came back negative. There were no pathological finds on the echocardiogram and electrocardiogram, while cervical Doppler ultrasound showed atherosclerosis without stenosis.

Keywords: bilateral thalamic stroke, acute confusional state, Percheron artery

Abbreviations (in alphabetical order)

ADC – apparent diffusion coefficient

ADEM – acute disseminated encephalomyelitis

AOP – Artery of Percheron

CT – computer tomography

DNA – deoxyribonucleic acid

DWI – diffusion-weighted imaging

ECG – electrocardiogram

FLAIR – fluid-attenuated inversion recovery

MRI – magnetic resonance imaging

MRC – Medical Research Council

PRES – posterior reversible encephalopathy syndrome

INTRODUCTION

Acute confusional state (or delirium) is one of the most common reasons for neurologic consultation in the hospital setting and the plethora of causes can truly be daunting. The etiology can vary from structural (traumatic contusions, diffuse axonal injury,

cerebral infarctions, tumors, hydrocephalus, anoxic-ischemic brain injury, central pontine myelinolysis), metabolic (hypercapnia, hypoxemia, hyper/hypo-osmolality, uremia, acute or chronic liver failure, hypothyroidism, adrenal cortical insufficiency, pituitary failure, thiamine deficiency), toxic (intoxica-

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tions with alcohol, opioid, cocaine, amphetamine, benzodiazepine, carbon monoxide poisoning, malignant hyperthermia) to systemic infections, or non-convulsive seizures, paraneoplastic neurological syndromes, ADEM and PRES [1].

As mentioned earlier, an acute confusional state can be secondary to ischemic strokes such as the occlusion of the Percheron artery, which is characterized by the triad of memory loss, fluctuating levels of consciousness, and altered mental status [2]. AOP is represented by a single perforating artery that arises from the P1 segment of the posterior cerebral artery, between the basilar and posterior communicating arteries, supplying the paramedian thalamus and rostral midbrain on both sides [3].

The main functions of the thalamus include emotions, memory, alertness, sleep-wake cycle, and sensorimotor control, and so the symptoms of AOP are different from those of other ischemic strokes and vary depending on the size and distribution of the infarct.

Also, it is important to note the AOP stroke are not the only clinical entities resulting in bilateral

thalamic infarcts. Other etiologies include the top of the basilar syndrome, deep cerebral venous thrombosis and Wernicke encephalopathy.

CASE PRESENTATION

A 79-year-old woman with a history of hypertension and surgery for lumbar disc herniation, managed on antiplatelet therapy, angiotensin receptor blocker and diuretics, was admitted for acute confusion and paresthesia of all four limbs.

On clinical examination, she had disorientation in time and space, abnormal behavior, decreased muscle strength in both lower limbs (paraparesis 2/5 MRC since the surgery), paresthesia in all four limbs and was unable to walk due to generalized weakness.

Diagnostic focus and assessment

Laboratory analysis showed high blood levels of cholesterol and glucose.

Both head CT and cerebral MRI showed bilateral ischemic changes in the thalami, suggesting an in-

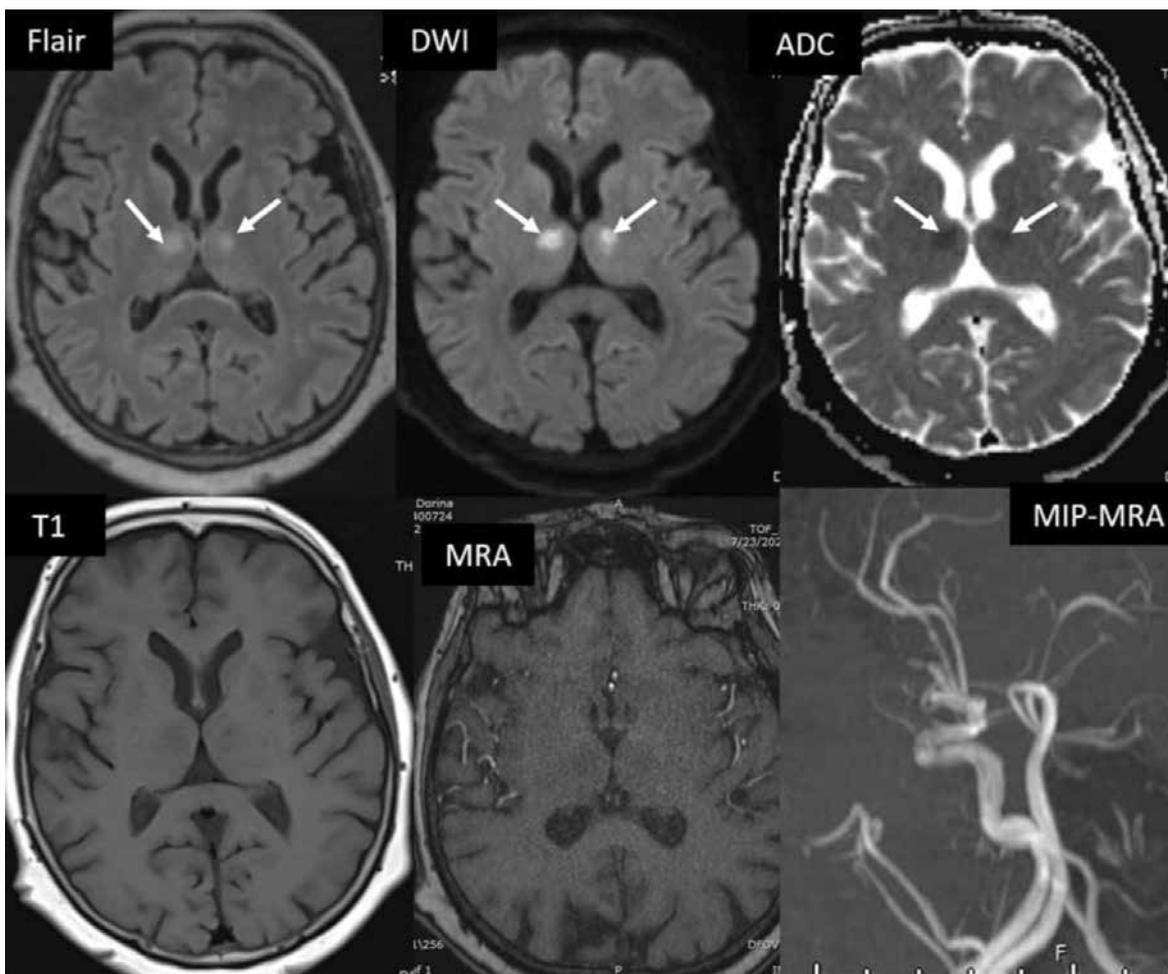


FIGURE 1. A. Bilateral Thalamic hyperintensities in T2/FLAIR; B. Diffusion-weighted MRI demonstrating increased signal in the distribution of the AOP; C. MRI with apparent diffusion coefficient confirming infarct in the area supplied by the AOP; D. Bilateral Thalamic hypointensities in T1, E, F. MR angiography: no signs of stenosis or venous thrombosis.

farct along the artery of Percheron territory (Figure 1).

However, no clear cause for the stroke could be identified. Screening for coagulation abnormalities and autoimmune disorders (lupus anticoagulant, anti-beta-2 glycoprotein, anti-cardiolipin, anti-nuclear and anti-ds DNA antibodies) came back negative. There were no pathological finds on the echocardiogram and electrocardiogram, thus a cardioembolic source was ruled out. Likewise, cervical Doppler ultrasound showed carotid atherosclerosis without stenosis. Based on the TOAST classification of ischemic strokes, we labeled it as stroke of undetermined etiology.

Therapeutic focus and assessment

Because she did not come in the first 4.5 hours from symptom onset and the NIHSS was 4, she was treated with double antiplatelet therapy (Aspirin and Clopidogrel) for 21 days, followed by Clopidogrel 75 mg once a day and high-dose statins.

Follow-up and monitoring

Her clinical picture gradually improved over the course of her hospital stay, but she remained with several neurological deficits, namely impairments in cognition and memory.

She was referred to the cardiologist for transesophageal echography and Holter ECG in order to exclude a cardioembolic source of the stroke. She will return in our clinic after 3 months for follow-up. We will evaluate her and try to prevent the possibility of developing vascular dementia and Dejerine-Roussy syndrome.

DISCUSSIONS

In 1973, a detailed account of the thalamic arterial blood supply was given by Percheron [4]. He mentioned the possibility of one or two thalamic branches arising from the communicating basilar artery, which he termed “thalamic paramedian arteries”.

The artery of Percheron (AOP), as it has come to be known, is an anatomical variant consisting of a single thalamic perforating artery, which arises from the proximal portion (P1) of the posterior cerebral artery and supplies both paramedian thalamic regions [5]. Its prevalence varies between 7-11% in the general population [6], however other authors have noted a frequency of up to 33% [2,7].

Although they can present in various ways, AOP strokes are classically characterized by the triad of ocular signs (abnormal pupillary reflex and/or vertical gaze palsy), memory impairment and altered mental status (drowsiness, confusion, or coma) [8]. The clinical picture can also include hemiparesis, hemisensory loss and cerebellar syndrome [6]. This

variability is explained by the involvement of various thalamic nuclei, with or without involvement of the rostral midbrain [9].

Hence, AOP strokes are difficult to suspect and early diagnosis is best obtained by performing brain MRI with DWI [8].

It is important to note that AOP strokes are not the only clinical entities resulting in bilateral thalamic infarcts. Other etiologies include top of the basilar syndrome, deep cerebral venous thrombosis and Wernicke encephalopathy [10].

Venous thrombosis of the deep veins draining the thalamus should be suspected in individuals with particular risk factors, such as pregnancy, hypercoagulable states, and oral contraceptive use. MRI shows T2/FLAIR/DWI hyperintensities with high ADC values, reflecting vasogenic edema from venous congestion. Diagnosis is confirmed by MR venography, which highlights the thrombus [11].

Wernicke encephalopathy occurs in the setting of prolonged malnutrition and is usually associated with chronic alcoholism [12]. There is usually high T2 signal intensity at the level of the mammillary bodies, medial thalami, tectal plate, periaqueductal gray matter, and dorsal medulla, with variable contrast enhancement [13].

Extrapontine myelinolysis, due to changes in osmotic gradient, may lead to thalamic lesions (along with lesions involving the basal ganglia, cerebellum, cerebral white matter, and hippocampus), which appear hyperintense on T2/FLAIR, hypointense on T1 and hyperintense on DWI with heterogeneous signal on ADC [14].

Based on a retrospective series of 37 cases, Lazaro et al have identified 4 imaging patterns of AOP infarction: (a) with midbrain involvement, (b) without midbrain involvement, (c) with anterior thalamus and midbrain involvement and (d) with anterior thalamus but without midbrain involvement [15]. These different patterns have been shown to have prognostic value. Good outcomes (as measured by a Rankin score ≤ 2) were noted in 67% of cases without midbrain involvement, but in only 25% of patients having rostral midbrain involvement [16].

CONCLUSIONS

AOP is present in up to 33% of people and AOP infarcts are often misdiagnosed due to the unusual clinical presentation and because the initial radiological evaluation is usually normal. This case highlights the unusual presentation and diagnostic difficulty of a patient with an AOP infarct and serves as a reminder to include thalamic pathology in patients presenting with vague neurological symptoms and no obvious signs of stroke. Symptoms of AOP are different from other ischemic strokes and

vary depending on the size and distribution of the infarct. An altered sensorium of sudden onset, with behavioral manifestation and abnormal eye movements are clues suggestive of an AOP infarction. A

diffusion-weighted MRI of the brain in the early hours should be performed. A detailed evaluation of cardiac and arterial sources of embolism is recommended in all cases of AOP infarction.

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