

# Ischaemic stroke of unknown etiology in a young woman

JOSÉ MARÍA CALVO-ROMERO,\* ESTHER MARÍA LIMA-RODRÍGUEZ\*\*

## ABSTRACT

*Ischaemic stroke (IS) in young adults is relatively infrequent. However, approximately 10% of first IS may occur in patients 45 years old or younger. Principal causes of IS in young adults are cardiogenic or noncardiogenic embolism, atherosclerosis, arterial dissection, drugs abuse (cocaine and amphetamine), vasculitis, hypercoagulable states, dural sinus thrombosis and migraine. About a third of cases of IS in young adults may not have an identified cause. We describe a 39-year old female with an IS of unknown etiology.*

**Key Words:** Stroke; ischaemic stroke; etiology; young.

## INTRODUCTION

**I**schaemic stroke (IS) in young adults is relatively infrequent. However, approximately 10% of first IS may occur in patients 45 years old or younger<sup>1</sup>. In a large study, about a third of cases of IS in young adults had no identified cause<sup>1</sup>. As early stroke intervention becomes a practical reality in many medical centers, an identification of the various causes of stroke becomes increasingly important in making a correct diagnosis and in promptly initiating appropriate treatment. We describe a 39-year old female with an IS of unknown etiology, and we review the principal causes of IS in young adults.

## CASE REPORT

A 39-year old female presented diplopia and right-sided hemiparesis of abrupt onset. The patient had suffered a fracture of the left ankle 14 days earlier, which needed orthopaedic treatment without surgery. She was receiving enoxaparin (40 mg/day subcutaneously). She had

no history of hypertension, diabetes mellitus, hyperlipidemia, smoking or drugs abuse. Her mother had an IS when she was 41-year-old. There were no other known family members with cerebrovascular disease. On admission, the patient was sleepy but was easily aroused and able to follow commands. Her speech was good. Pupils and fundus were normal. She had a right sixth cranial nerve palsy, without other cranial nerve palsies. There was a 2/5 paresis in the right arm, a 3/5 paresis in the right leg and a right Babinski reflex. Pinprick and vibratory sensitivity in face and all the extremities was intact. The finger-to-nose and heel-to-shin tests revealed right dysmetria. The gait was not explored. Her pulse was constant at 80 beats per minute; respirations, 10 per minute; blood pressure, 140/75 mm Hg; and axillary temperature, 36.4°C. The lungs were clear to auscultation, and hearts sounds were normal with no extra sounds or murmurs. The carotid and femoral pulses were also normal without bruits.

Blood chemical and hematologic laboratory values were: glucose of 101 mg/dL, creatinine of 0.7 mg/dL, total cholesterol of 231 mg/dL, LDL-cholesterol of 145 mg/dL, HDL-cholesterol of 41 mg/dL, triglycerides of 140 mg/dL, fibrinogen of 325 mg/dL, hemoglobin of 12.4 mg/dL, platelet count of 447,000/mm<sup>3</sup>, and white-count cell of 9,100/mm<sup>3</sup>. Prothrombin time and partial-thromboplastin time were normal. An

\*Internal Medicine. Hospital de Zafra. Zafra. Badajoz. España.

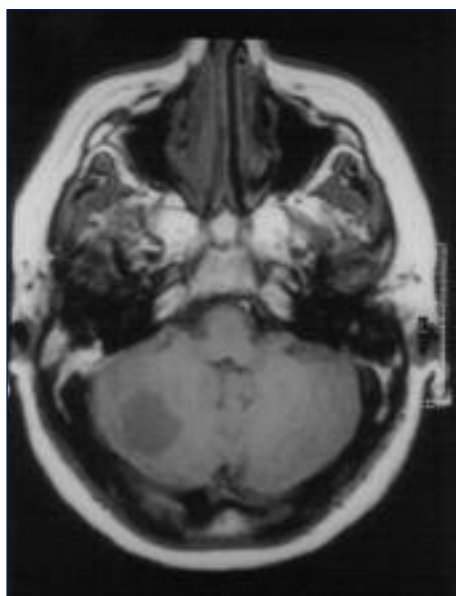
\*\*Family Medicine. Hospital Perpetuo Socorro. Badajoz. España.

electrocardiogram revealed sinus rhythm. A chest radiograph was unremarkable. At entry, cranial computed tomography (CT) with contrast was normal. A lumbar puncture yielded a normal cerebrospinal fluid. Twenty-four hours after entry, magnetic resonance imaging (MRI) of the brain (Figs. 1 and 2) demonstrated three lesions located in right cerebellum, left thalamus and right pontine, hypointense in T1-weighted and hyperintense in T2-weighted images consistent with ischaemic infarcts. MRI of the brain seven days later was similar. Carotid and vertebral duplex ultrasonography was normal. Six days after admission, cranial and magnetic resonance angiography and x-ray angiography revealed no abnormalities. Transthoracic and transesophageal echocardiography and doppler echocardiography were normal. A 24-hour electrocardiographic Holter monitoring did not reveal abnormalities. Duplex venous ultrasonography and phlebography of the lower extremities did not

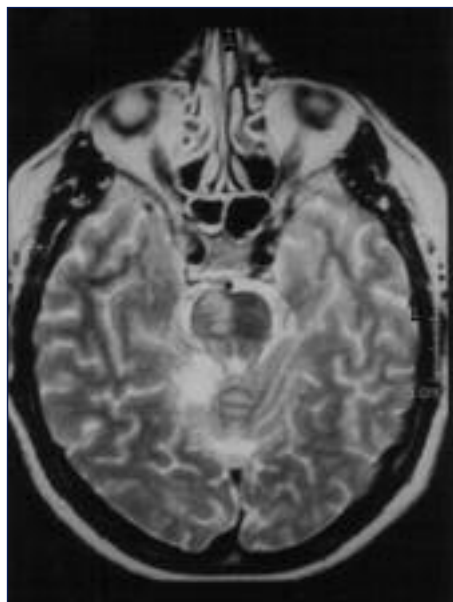
demonstrate deep venous thrombosis. Antinuclear antibodies and serology for *Brucella*, *Borrelia* and syphilis were negative. Basal and after oral methionine load plasma homocysteine levels were normal. Antithrombin, protein C, protein S, activated protein C resistance, factor VIII, IgG and IgM anticardiolipin antibodies, anti-beta2-glycoprotein I antibodies and lupus anticoagulant were normal or negative. Identification of factor V Leiden and prothrombin G20210A mutation were negative. The patient was treated with sodium heparin intravenously during 6 days and subsequently with acenocoumarol (INR 2-3). Three weeks later, hemiparesis and diplopia resolved, but minor right dysmetria remained.

### DISCUSSION

Principal causes of IS in young adults are cardiogenic or noncardiogenic em-



**Figure 1.** Magnetic resonance imaging of the brain revealing a lesion located in right cerebellum hypointense in T1-weighted image consistent with ischaemic infarct.



**Figure 2.** Magnetic resonance imaging of the brain revealing two lesions located in left thalamus and right pontine hyperintense in T2-weighted image consistent with ischaemic infarcts.

bolism, atherosclerosis, arterial dissection, drugs abuse (cocaine and amphetamine), vasculitis, hypercoagulable states, dural sinus thrombosis and migraine<sup>1-3</sup>. About a third of cases of IS in young adults may not have an identified cause<sup>1-3</sup>. The major causes of cardiogenic embolism include aseptic or infective endocarditis, left ventricular thrombus, paradoxical embolism and atrial myxomas<sup>1-3</sup>. In our case there was no evidence of endocarditis, left ventricular thrombus or atrial myxoma. Paradoxical embolism is an increasingly recognized cause of IS that occurs in the setting of venous thromboembolic disease in combination with intracardiac (ie, the frequent patent foramen ovale) or noncardiac right-to-left shunt<sup>4,5</sup>. Our patient suffered a fracture of the left ankle 14 days earlier, but venous duplex ultrasonography did not demonstrate deep venous thrombosis in lower extremities and transthoracic and transesophageal echocardiography was normal. Embolic infarctions, unlike nonembolic infarctions, are often found within multiple arterial distributions like in our case. In patients with cryptogenic IS, atrial vulnerability (which potential occurrence of paroxysmal atrial arrhythmias) is associated with atrial septal abnormalities, and it has been hypothesized as a possible mechanism of IS<sup>6</sup>.

Hypercholesterolemia was the unique risk factor for atherosclerotic disease identified in our patient, and imaging techniques did not show atherosclerotic cerebrovascular lesions. Hypercoagulable states are well-recognized causes of IS especially in young adults<sup>7-10</sup>. Antiphospholipid antibody syndrome is prevalent in young patients with IS<sup>7</sup>. Antithrombin, protein C and protein S deficiencies are rare in youngsters with IS<sup>8</sup>. Factor V Leiden and G20210A prothrombin gene variant are mutations associated with a thrombotic risk and may be a risk factor for IS in youngsters<sup>9</sup>. Hyperhomocysteinemia is an

independent risk factor for IS<sup>10</sup>. We were able to demonstrate no hypercoagulable state in our case. We exclude arterial dissection, drugs abuse, vasculitis, dural sinus thrombosis and migraine by means of the clinical and imaging evaluation.

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### Address:

José María Calvo-Romero.  
Sergio Luna 15, 2ºA. 06010 Badajoz. España  
jmcromero@eresmas.com

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### **AVC ISQUÊMICO DE ETIOLOGIA DESCONHECIDA NUMA MULHER JOVEM**

#### **RESUMO**

*O acidente vascular cerebral (AVC) isquêmico é relativamente incomum em adultos jovens. Contudo, cerca de 10% dos primeiros AVCs ocorrem em pacientes com 45 ou menos anos. As principais causas de AVC isquêmico no adulto jovem incluem a embolia cardiogênica ou não cardiogênica, aterosclerose, dissecação arterial, abuso de drogas (cocaína e anfetaminas) vasculite, estados de hipercoagulação, trombose do seio dural e enxaqueca. Cerca de um terço dos casos de AVC em adultos jovens não têm uma causa identificável. Neste trabalho descreve-se o caso de uma mulher de 39 anos que sofreu um AVC de etiologia desconhecida.*

**Palavras Chave:** *Acidente vascular cerebral; isquemia cerebral; etiologia; jovem.*