

# Trans-Atlantic cryptogenic stroke

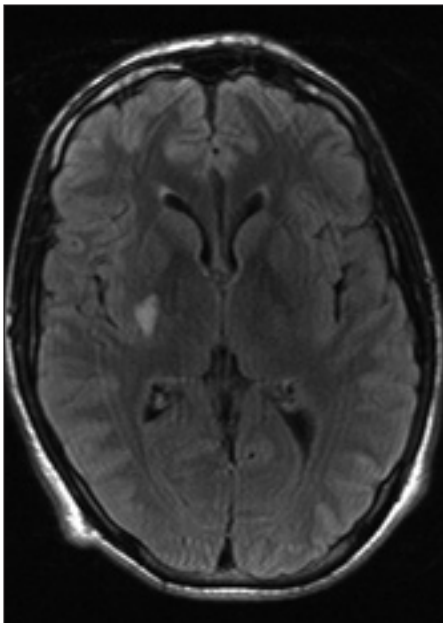
## Introduction

This article discusses a case of cryptogenic stroke caused by a paradoxical embolism through a patent foramen ovale. Cryptogenic strokes are increasingly commonly seen in secondary care and warrant careful clinical assessment and management.

## Discussion

The term cryptogenic stroke is applied to ischaemic strokes with no clear aetiology despite conventional evaluation. Cryptogenic stroke is relatively common, accounting for 40% of ischaemic strokes. It appears to be over-represented in younger patients, causing up to 55% of ischaemic strokes in those under 45 years of age (Jacobs et al, 2002).

**Figure 1. Magnetic resonance imaging axial FLAIR sequence showing high signal lacunar infarct in the posterior limb of right internal capsule encroaching upon the posterior putamen.**



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Cryptogenic stroke presents with hemispheric infarction in 75% of cases, with severity classically worse than lacunar strokes but less severe than cardio-embolic strokes.

A clinical diagnosis of cryptogenic stroke is made if large artery atherosclerosis, cardioembolism and small artery disease have been excluded as aetiological factors for the stroke (Adams et al, 1993).

The causes of cryptogenic stroke differ considerably from those of conventional ischaemic strokes. The most common cause of cryptogenic stroke is a paradoxical embolism via a patent foramen ovale. Other causes include occult embolic sources, hypercoagulable states and inflammatory disorders.

Patent foramen ovale can present in a number of ways, although cryptogenic stroke is probably the most common presentation in secondary care. It is therefore important to assess risk factors for venous thromboembolism, the use of the Valsalva manoeuvre preceding the stroke and the presence of other symptoms of patent foramen ovale when assessing a case of cryptogenic stroke.

Venous thromboembolism, and its risk factors, plays a central role in the pathophysiology by which patent foramen ovales cause cryptogenic stroke. It is thought that the ischaemic stroke is caused by a paradoxical embolism, where a venous thrombus progresses from a vein through a

patent foramen ovale to the arterial system. This case demonstrates air flight as a risk factor for venous thromboembolism in cryptogenic stroke, highlighting the importance of considering these risks in this cohort of patients.

All cases of cryptogenic stroke should have patent foramen ovale excluded by echocardiography, although the first line choice of investigation is controversial. Most centres perform a bubble contrast transthoracic echocardiography as a screening tool and progress to transoesophageal echocardiography on the basis of clinical need, as the sensitivity of the two modalities is similar (Souteyrand et al, 2006). A transoesophageal echocardiography is still performed if a transthoracic echocardiography is negative in the setting of high clinical suspicion or if the site of the shunt must be delineated more definitively.

The management of patent foramen ovale aims to reduce further thromboembolic risk, either by medical management using antiplatelets or anticoagulants, or by percutaneous closure. There are currently no randomized controlled trials to distinguish which of these strategies is more effective and therefore the choice of therapy is pragmatically based on future thromboembolic risk. **BJHM**

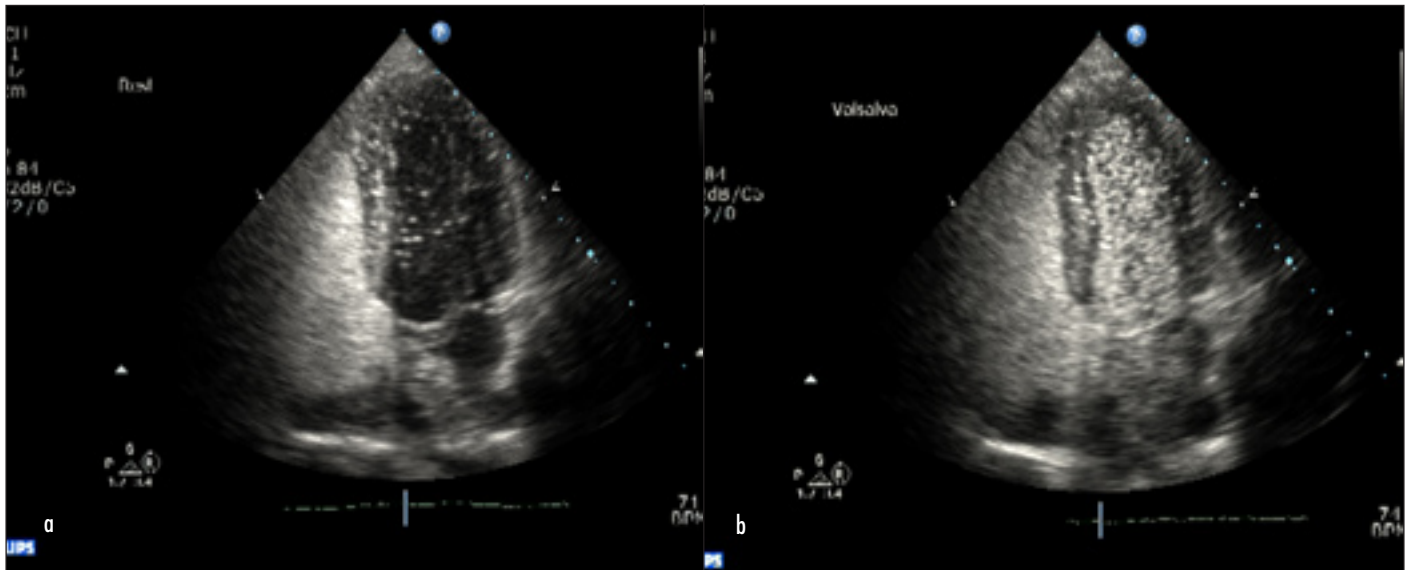
Adams HP Jr, Bendixen BH, Kappelle LJ et al (1993) Classification of subtype of acute ischemic stroke. Definitions for use in a multicenter clinical trial. TOAST. Trial of Org 10172 in Acute Stroke Treatment. *Stroke* 24: 35–41

## Case Report

A 27-year-old airline steward presented with a sudden onset of left-sided hemiparesis, which completely resolved in 48 hours. He had just completed a long-haul flight from the USA to England. He was previously fit and well, took no medications and was an occasional smoker and binge drinker. Physical examination on admission confirmed a left-sided hemiparesis and a left-sided upper motor neurone facial palsy. Cardiovascular and respiratory examinations were normal.

His admission bloods, chest radiograph and computed tomography scan of the brain were all normal. Magnetic resonance imaging of his brain (*Figure 1*) showed a small right-sided cerebral infarct in the internal capsule. Magnetic resonance angiography of his neck did not demonstrate carotid artery dissection. Venous Dopplers of the lower limbs were normal.

Standard transthoracic echocardiography was normal. A bubble contrast echocardiogram demonstrated a small right to left shunt at rest (*Figure 2a*). With release of the Valsalva manoeuvre, there was complete opacification of the left heart (*Figure 2b*) consistent with a large patent foramen ovale. The patient has now been enrolled into the Patent Foramen Ovale and Cryptogenic Embolism trial.



**Figure 2. Bubble contrast transthoracic echocardiogram demonstrating (a) a small right to left shunt at rest and (b) complete opacification of the left heart following release of the Valsalva manoeuvre.**

Jacobs BS, Boden-Albala B, Lin IF, Sacco RL (2002)  
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stroke study. *Stroke* 33: 2789–93

Souteyrand G, Motreff P, Luson JR et al (2006)  
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using second harmonic imaging, transcranial

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