

Dyspnoeic dysphasia: A series of unfortunate events

GW Sewell, DJB Marks & C Hasford

Key Learning Points

- Patent foramen ovale (PFO) is common.
- PFO usually requires symptomatic paradoxical embolism to present clinically. Conversely, in many patients with stroke, it will be incidental.
- The decision to close a PFO in patients presenting with stroke is complex and made on a case-by-case basis.
- Timing of anticoagulation in patients with both pulmonary embolism and ischaemic stroke depends on the balance between venous thrombotic burden and extent of cerebral infarction.
- Early diagnostic contrast echocardiography involving a Valsalva manoeuvre in patients with extensive pulmonary embolism and PFO is potentially hazardous and may be appropriately deferred.
- Temporary vena cava filter placement should be considered to prevent further embolic transformation of deep vein thrombosis in patients with high pulmonary clot burden.

Abstract

We describe a case of a 56 year old man with no previous medical history who presented with sudden onset dyspnoea, expressive dysphasia, and right arm sensory loss and paresis. A diagnosis of bilateral pulmonary embolism and transient cerebral ischaemic attack was confirmed by CT pulmonary angiogram and MRI. Paradoxical embolism through an occult patent foramen ovale (PFO) was subsequently proven by contrast echocardiography. This case highlights a number of short and long-term management conundrums, that to date are incompletely addressed by clinical trials. These include timing of anticoagulation in patients with both venous thromboembolism and cerebral infarction, and the risk:benefit ratio of surgical closure of patent foramen ovale.

Keywords

Patent Foramen Ovale, Pulmonary Embolism, Stroke, Transient Ischaemic Attack.

Case History

A 56 year old right-handed man presented to the Emergency Department with sudden onset shortness of breath, without chest pain. On examination he was hypoxic and tachycardic but normotensive, with no murmurs on cardiac auscultation. He also had a new expressive dysphasia, and reduced muscle power with sensory loss in the right arm. The neurological signs resolved completely within 6 hours of onset, although the respiratory symptoms and signs persisted. He had no previous history of arteriosclerotic or venous thromboembolic disease, was a non-smoker, and was neither diabetic nor hypertensive.

A CT pulmonary angiogram (CTPA) was performed that revealed extensive bilateral pulmonary emboli affecting the majority of the lobar and segmental arteries (Figure 1A), with evidence of right

heart strain (Figure 1B). A CT head excluded acute intracranial haemorrhage, and an MRI subsequently demonstrated a high intensity lesion in the left precentral gyrus (Figure 1C) with restricted diffusion (Figure 1D), consistent with acute ischaemic infarction. The combination of simultaneous venous and arterial thrombotic events was highly suggestive of paradoxical embolism, and anticoagulation with dalteparin followed by warfarin was commenced. A CT of the abdomen and pelvis identified an underlying deep vein thrombosis extending from the right external iliac to the common femoral vein, but with no evidence of neoplastic disease; an inherited thrombophilia screen was normal. Transthoracic echocardiography with agitated saline bubble contrast was conducted later as an outpatient (Figure 1E, F), which confirmed the presence of a patent foramen ovale (PFO). This was subsequently closed electively, and the patient remains well, on long-term follow-up, with no further complications.

Discussion

Patency of the embryonic foramen ovale is a surprisingly common finding in the general population, detected in 20–35% of patients in autopsy series.¹ It is therefore usually of no clinical significance, as physiological cardiac pressures do not permit right-to-left shunting. This can nonetheless be reversed in situations where right atrial pressures are increased. This may be achieved iatrogenically by performance of a Valsalva manoeuvre, or pathologically as a consequence of pulmonary hypertension. The latter may occur acutely secondary to pulmonary embolism. Symptomatic paradoxical embolism refers to the passage of material from the venous to the arterial circulation, and often requires a series of events: the

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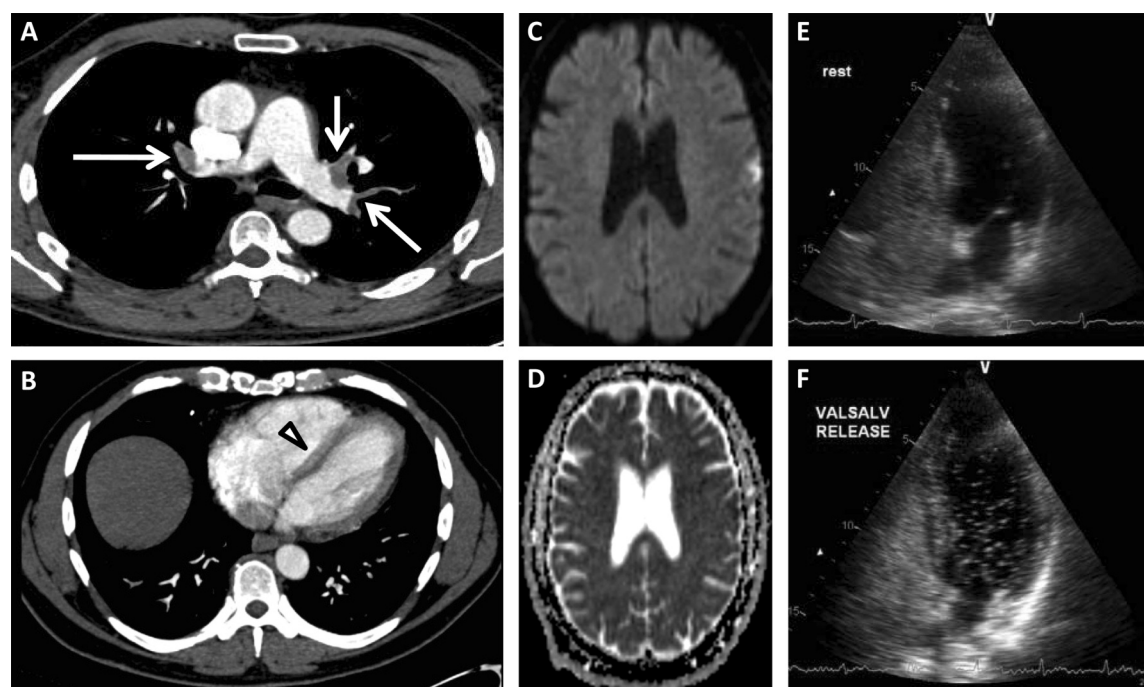


Figure 1. Imaging studies revealing bilateral pulmonary emboli, an acute ischaemic cerebral infarct, and the presence of a patent foramen ovale. Cross-sectional images from CT pulmonary angiography demonstrate (A) filling defects (arrowed) in both pulmonary arteries, and (B) bowing of the interventricular septum into the left ventricle (arrowhead), suggestive of raised right ventricular pressures. Contemporaneous MRI of the brain showed (C) high signal cortical intensity in the left precentral gyrus on diffusion imaging, and (D) restricted diffusion, highly suggestive of acute ischaemic infarction. Transthoracic echocardiography performed with agitated saline bubble contrast showed (E) a normal left ventricular cavity at rest but (F) passage of bubbles across the septum following Valsalva manoeuvre.

development of a venous thrombus, the presence of a cardiac septal defect, elevation of right heart pressures sufficient to open the shunt, and passage of the embolus to a location where its presence elicits symptoms.² Whilst many paradoxical emboli lodge in the visceral vasculature, these are usually without clinical consequence; the majority presenting to physicians do so as a cerebrovascular event.

Epidemiological studies consistently demonstrate an increased frequency of PFO in patients with “cryptogenic” stroke with no other clearly identifiable aetiology, with an odds ratio of 2.9 (2.1–4.0).³ Nonetheless, given its overall population prevalence, it is estimated that in up to 50% of such patients the PFO is an incidental finding.⁴ This presents a substantial clinical challenge for secondary prevention. Pharmacological options include anticoagulation or antiplatelet strategies, with the PFO in Cryptogenic Stroke Study (PICSS) suggesting equivalent efficacy.⁵ Data regarding the benefits of surgical PFO closure as opposed to medical management are not yet compelling. Although one systematic review suggested a trend towards reduced stroke recurrence at 1 year following PFO closure over medical management alone (0–4.9% compared to 3.8–12.0% respectively),⁶ this remains controversial with estimated numbers needed to treat ranging from 18 to 1,000 to prevent a single recurrence at 2 years.⁴ This needs to be weighed against the major complication rate of approximately 2.3%,⁷ both of open surgical closure (which necessitates thoracotomy and cardiopulmonary bypass) and percutaneous closure. A number of devices for

achieving the latter are now available,⁸ and although subsequent morbidity and mortality appear lower than for open surgery, cardiac tamponade, thrombus formation and atrial fibrillation may still occur. At present, there is therefore insufficient evidence to provide specific recommendations, and decisions must be made on a case-by-case basis until further trial data become available.^{7, 9} In our patient, it was felt that treating the pulmonary embolism would reverse the intracardiac shunt, thereby minimizing the risk of future events.

This clinical scenario raises other management dilemmas. The first is the timing of initiation of anticoagulation in a patient who has both extensive pulmonary embolic disease with risk of clot extension, and a transient ischaemic attack and potential for haemorrhagic transformation. There are no trial data to guide this decision,¹⁰ although the probability of the former was felt to represent the dominant hazard. Similarly, there was concern regarding the theoretical risk of performing a diagnostic Valsalva manoeuvre in the acute period in a patient with established widespread pulmonary thrombus causing right heart strain, in case this provoked further paradoxical embolic events. We therefore elected to defer this definitive diagnostic test, which remains important as PFO may be missed on routine echocardiography, until anticoagulation was fully established. Finally, when pulmonary clot burden is high, temporary vena cava filter placement should be considered as any further embolic transformation of the deep vein thrombosis could re-elevate right atrial pressures and cause new paradoxical

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events. This decision can be guided by the level of proximal extension and morphology of the peripheral thrombus, which correlate with risk of embolism.¹¹

This case is instructive as the symptoms and signs suggestive of simultaneous arterial and venous system thromboses were predictive of the underlying pathology of a cardiac septal defect with paradoxical embolism.

Further investigations prove the anatomical correlates of the clinical presentation. Such patients raise a number of long-term management conundrums; at present decisions on intervention have to be reached at an individual level, and require a coherent understanding of the underlying pathophysiological mechanisms at play.

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