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# Thrombus in transit across a patent foramen ovale in a patient with cerebrovascular accidents, pulmonary embolism, and deep vein thrombosis

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## ABSTRACT

The diagnosis of paradoxical emboli remains elusive in many cases. The causal association between the thrombotic source, the intracardiac shunt, and the final emboli location is seldom demonstrated. We present the case of a 42-year-old woman admitted to the hospital with a third stroke. The presence of a thrombus in transit through a patent foramen ovale (PFO), a deep vein thrombosis (DVT), bilateral pulmonary emboli, and an acute cerebral infarct were concurrently documented.

**Keywords:** Echocardiography, patent foramen ovale, thrombus

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## HISTORY

A 42-year-old African American woman with a medical history of hypertension, as well as a previous right basal ganglia and medial right occipital stroke. The day prior to admission, the patient had an episode of agitation, and confusion associated with generalized weakness, that resolved within 30 minutes. On awakening the next day, her husband noted her to be aphasic and with a new right-sided hemiparesis. Her physical exam revealed her prior left hemiplegia, right-sided hemiparesis, expressive aphasia, and left homonymous hemianopsia. Her vital signs were normal and the rest of the physical exam was unremarkable.

Magnetic resonance imaging of the brain revealed a new area of hypodensity within the left parietal cortex,

as well as interval evolution of the priorly noted right basal ganglia infarct [Figures 1 and 2]. Transthoracic echocardiography demonstrated a mass in both atria which appeared to cross the interatrial septum [Figure 3]. The right and left atrial sizes and the left ventricular systolic function were normal. The left atrial portion of the mass protruded during diastole into the left ventricle. Transesophageal echocardiography confirmed a large thrombus in transit through a PFO [Figure 4 and Video 1]. Duplex ultrasound evaluation of the lower extremities demonstrated a residual occlusive, acute left popliteal deep venous thrombosis [Figure 5]. A computerized tomographic angiogram of the coronaries did not reveal any significant coronary artery disease but demonstrated extensive pulmonary emboli in the right and left main pulmonary arteries and main branches [Figure 6]. She

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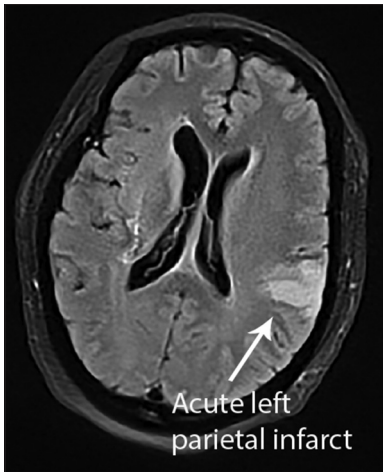
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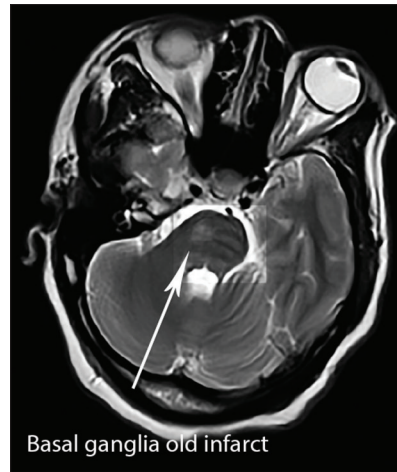
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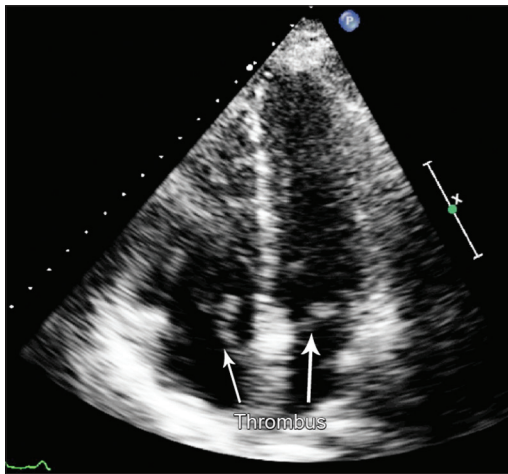
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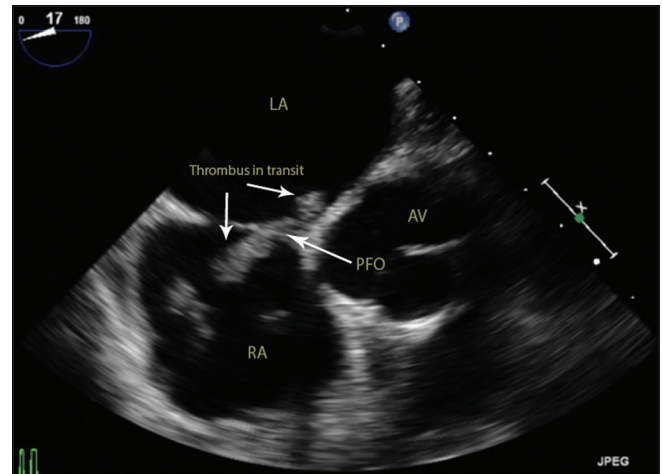
**Figure 1:** Non-contrast brain MRI with an area of FLAIR/T2 hyperintensity in the left parietal lobe consistent with an acute cortical infarct



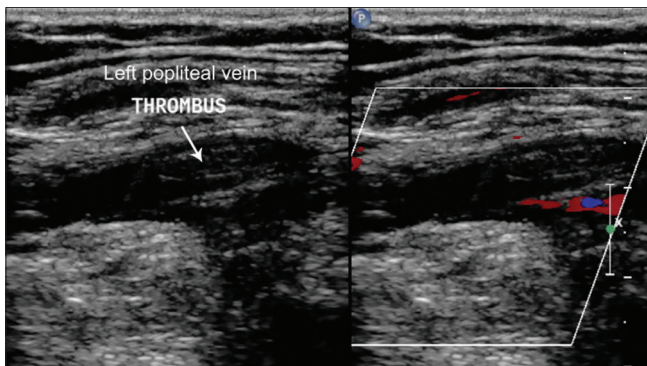
**Figure 2:** Non-contrast brain MRI with evidence of a right basal ganglia old infarct



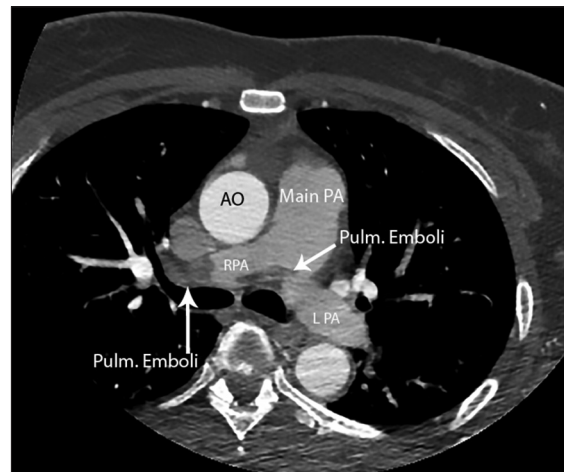
**Figure 3:** Saddle thrombus across a PFO in an apical 4 chamber view. LV: Left ventricle, LA: Left atrium, RV: right ventricle, RA: right atrium



**Figure 4:** Transesophageal echocardiogram modified mid-esophageal 4-chamber view demonstrating the presence of a thrombus across the PFO



**Figure 5:** Acute occlusive left popliteal deep vein thrombosis



**Figure 6:** Computerized tomography of the chest (arterial phase contrast study) with a main pulmonary artery embolus as well as thrombotic burden in the branch pulmonary arteries. PA: pulmonary artery, AO: aorta, RPA: right pulmonary artery, LPA: left pulmonary artery

underwent surgical embolectomy with closure of the PFO. A hypercoagulable work-up, which included measurements of Factor V Leiden, protein C, protein S, lupus anticoagulant, antithrombin activity, homocysteine level, and prothrombin gene mutation, was normal. The

patient did well post-operatively and was discharged on anticoagulation in a stable condition.

## DISCUSSION

The prevalence of a PFO is approximately 26% in the general population.<sup>[1]</sup> Although, the physiological explanation behind a paradoxical embolus provides a mechanistic understanding, and it is rare to find concomitant imaging documentation of the source: the shunt and the final emboli destination. It is even less common to document a thrombus in transit through a PFO.<sup>[2]</sup>

Our patient had evidence of a source DVT with a saddle thrombus across a PFO occluding the orifice in a manner that rendered an agitated saline contrast study normal. The presence of bilateral, and essentially asymptomatic pulmonary emboli, adds to the physiological reasoning behind the need for not only a PFO but increased right atrial pressures that could reverse the usual left to right direction of the shunt and provide a driving force to allow passage of the thrombotic burden into the left atria producing paradoxical systemic embolization.<sup>[3]</sup> Despite optimal management, a thrombus in transit across a PFO is associated with a mortality of 18%, with two-thirds of the deaths occurring within the first 24 hours after the diagnosis.<sup>[1]</sup> Considering the high mortality of a thrombus-in-transit, early diagnosis and treatment is vitally important.<sup>[4]</sup> The treatments of choice in such cases include embolectomy, thrombolysis, or anticoagulation.<sup>[5]</sup>

The current patient underwent direct thrombectomy with a positive outcome. This strategy has been favored over thrombolysis or anticoagulation in observational studies.

## Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient (s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

## Conflicts of interest

There are no conflicts of interest.

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