



# DIZZINESS, LIGHT-HEADEDNESS OR A CLOT-IN-TRANSIT: OBTAINING A HISTORY AND PHYSICAL EXAMINATION IS BOTH A SCIENCE AND AN ART

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## ABSTRACT

**Introduction:** Venous thromboembolism (VTE) rarely presents with dizziness as the primary complaint, which can delay diagnosis. We report a rare case of dizziness as the chief complaint for a clot-in-transit and extensive bilateral pulmonary emboli.

**Case description:** A 70-year-old woman presented to the emergency room (ER) with dizziness and a fall, without reporting loss of consciousness. Her symptoms included positional dizziness, tinnitus and visual darkness, alongside prior exertional fatigue and dull chest pressure. Despite a history of left leg oedema and inconsistent use of medications for hypertension and diabetes, initial examinations suggested vestibular neuritis and decompensated heart failure, confirmed by echocardiogram findings and response to prednisone. While hospitalised, she experienced pre-syncope after showering, initially deemed vasovagal. However, exertional hypotension led to further investigation, revealing right heart strain. Ultrasound identified a left popliteal deep vein thrombosis, and a computed tomography (CT) angiogram confirmed extensive bilateral pulmonary emboli with right heart strain. Cardiology discovered large, mobile thrombi in transit in the heart, necessitating an urgent mechanical thrombectomy. Following treatment, her pulmonary pressure improved, and she was discharged on anticoagulation medicine. One month later, an echocardiogram showed normalised heart function.

**Conclusion:** This case highlights the importance of differentiating dizziness from pre-syncope, as exertional pre-syncope can indicate an obstructive physiology such as VTE. Cognitive bias can obscure diagnosis in atypical presentations. A pulmonary embolism response team could improve management of these cases, where prompt diagnosis and treatment are essential for favourable outcomes.

## KEYWORDS

Dizziness, clot-in-transit, pulmonary embolism



## LEARNING POINTS

- Cognitive bias should be consistently challenged while ruling out pulmonary emboli based on the absence of typical signs.
- It is essential to differentiate vertigo from light-headedness or pre-syncope in patients presenting with a complaint of dizziness.
- Pre-syncope can be an important presenting complaint of haemodynamically significant pulmonary emboli and clots in transit.

## INTRODUCTION

While it is not common for venous thromboembolism (VTE) to present as syncope or pre-syncope, it is unusual and rare for dizziness to be the chief presenting complaint<sup>[1,2]</sup>. A clot-in-transit (CIT) is a rare but serious form of VTE where the thrombus is transiently in the right heart before entering the pulmonary arterial tree<sup>[3]</sup>. We report an unusual case of bilateral pulmonary emboli and a large CIT presenting as dizziness, nearly mistaken for vestibular neuritis. In an era of medical practice dominated by dependence on lab testing and imaging, this reiterates the importance of careful history-taking to dissect the complaint of “dizziness” and correctly identify the underlying aetiology.

## CASE DESCRIPTION

A 70-year-old female with a past medical history of hypertension, diabetes and obesity presented to the ER for dizziness with ambulation, and a fall without loss of consciousness. She endorsed these dizzy spells with positional changes accompanied by visual darkness and tinnitus. The week preceding her presentation, she complained of a sore throat, cough and decreased appetite intermittently associated with dull chest pressure and exertional fatigue; those symptoms had resolved before she presented. She also reported chronic intermittent left leg swelling for many years. She fixated and led the provider to link all symptoms to dizziness, the recent viral illness and intermittent non-adherence to home medications: lisinopril, hydrochlorothiazide, metformin and pioglitazone.

Her physical examination in the emergency room (ER) was unremarkable except for horizontal nystagmus on the left side with the Dix Hallpike manoeuvre. Her vitals on presentation were heart rate 89, blood pressure 120/82, respiratory rate 13 and SpO<sub>2</sub> 92% on room air. She received diazepam and meclizine for presumed vertigo with no response. She failed a trial of ambulation in the ER and was admitted. Abnormal lab results were platelets 128, troponins 99–79, BNP 654, pH 7.43 and pCO<sub>2</sub> 29. Remaining blood counts, electrolytes and a computed tomography (CT) of the head without contrast was unremarkable. An echocardiogram showed left ventricular ejection fraction of 45% and moderate right ventricular dysfunction.

During hospital days one to three, Neurology was consulted, and treatment was begun for presumed post-viral vestibular neuritis with prednisone, and for decompensated heart failure with IV furosemide. She reported some improvement

of her dizziness with the prednisone. A myocardial perfusion positron emission tomography CT ruled out ischaemia, and further neurological work-up including an MRI brain and electroencephalography were both unrevealing. She intermittently required nasal cannula oxygen for transient hypoxaemia that often occurred overnight. A sleep study revealed mild obstructive sleep apnoea to which the right ventricular dysfunction was linked. Care was transitioned to a new provider with planned discharge on prednisone and an oral diuretic, pending improvement in the acute kidney injury caused by prior intravenous diuresis.

On review, the echocardiogram showed systolic and diastolic flattening of the interventricular septum, right ventricular dilation and systolic dysfunction, suggestive of acute pressure overload. A repeat episode of pre-syncope after a shower had occurred overnight. It was deemed vasovagal, but an exertional drop in blood pressure was noted. All data increased concern for an obstructive phenomenon. A lower extremity ultrasound undertaken at that time revealed a left popliteal deep vein thrombosis. A CT angiogram revealed extensive bilateral pulmonary emboli with right heart strain (*Fig. 1*). Cardiology was consulted urgently, and a repeat echocardiogram showed large mobile CITs in the right atrium and ventricle (*Fig. 2, Video 1 and 2*). The patient was transferred to a step-down unit, and an emergent mechanical thrombectomy was then performed with an improvement of >10 mmHg in pulmonary artery systolic pressure (*Fig. 3*). She was discharged home on oral anticoagulation medicine. A limited hypercoagulability work-up was performed and was negative. A follow-up echocardiogram after one month showed normalisation of the biventricular function. Part of the manuscript was presented as a poster abstract at CHEST 2024<sup>[4]</sup>.

## DISCUSSION

Dizziness is often used by patients interchangeably to refer to both vertigo – a sensation of “room spinning”, and “light-headedness” – a pre-syncope prodrome. As many as 14% of patients presenting to the ER with a complaint of dizziness may have pre-syncope<sup>[5]</sup>. This makes it essential to differentiate dizziness and disequilibrium from pre-syncope, since it would need to be managed differently. Syncope is a syndrome marked by transient loss of consciousness due to inadequate cerebral blood flow and hence oxygenation, most often caused by an abrupt self-limited drop in systemic blood pressure. Pre-syncope is a suggestion of impending

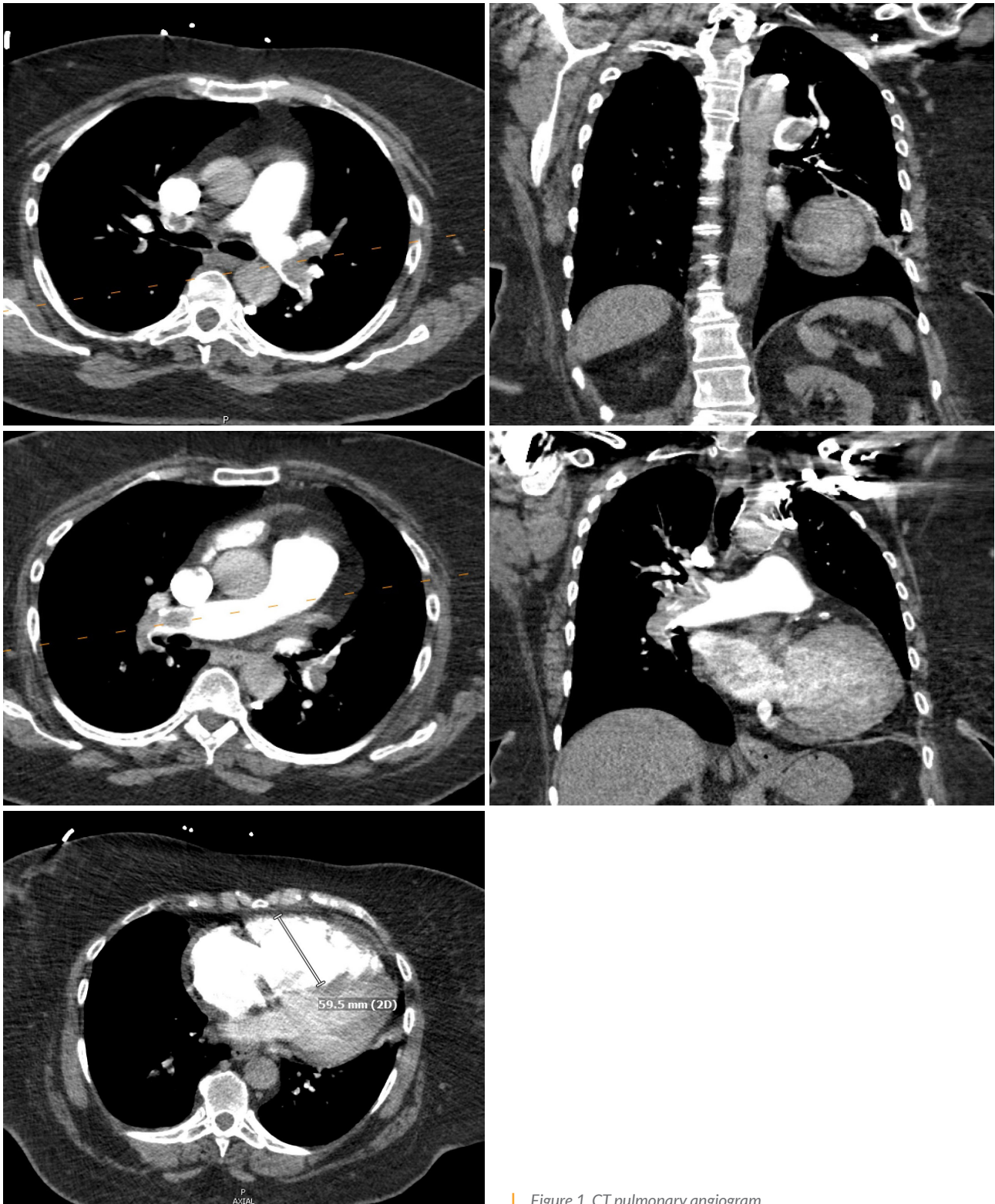


Figure 1. CT pulmonary angiogram.

syncope, usually with a prodrome. Pre-syncope after exertion has been described well in cardiomyopathies, arrhythmias and left ventricular outflow tract obstructions as ominous signs<sup>[6]</sup>. However, this could also occur in right-sided obstructive physiology such as VTE, with about 10% of pulmonary emboli presenting as syncope<sup>[4]</sup>. Clots-in-transit (CITs) are mobile serpiginous masses embolised from deep-vein clots, which can either float freely or have delicate attachments in the right heart. They can easily embolise into the pulmonary circulation, leading to

catastrophic consequences. A CIT complicates about 2-5% of all pulmonary embolism (PE) cases and 18% of patients with massive PE<sup>[3,7]</sup>. Mortality rates of CITs range from 19 to 38% and are as high as 80 to 100% if left untreated<sup>[7,8]</sup>, making it not only challenging but a critical diagnosis. Jamil et al. describe a case of bilateral pulmonary emboli incidentally noted on a CT angiography of the neck, while evaluating dizziness<sup>[2]</sup>. The patient was 47-year-old female who had COVID-19 about six months prior; COVID-19 was thought to be the procoagulant risk factor<sup>[2]</sup>. In contrast, our

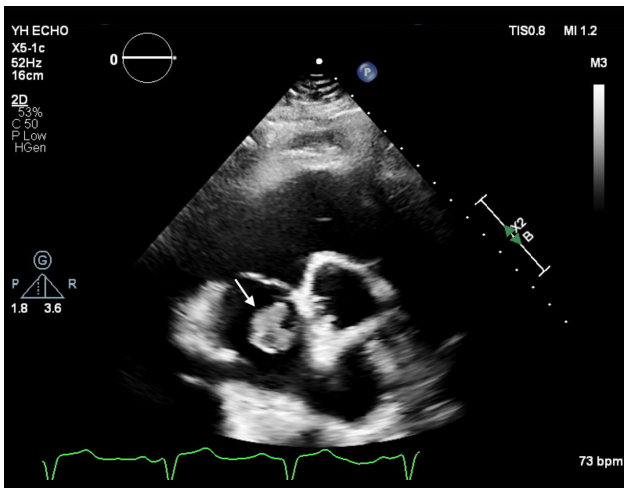
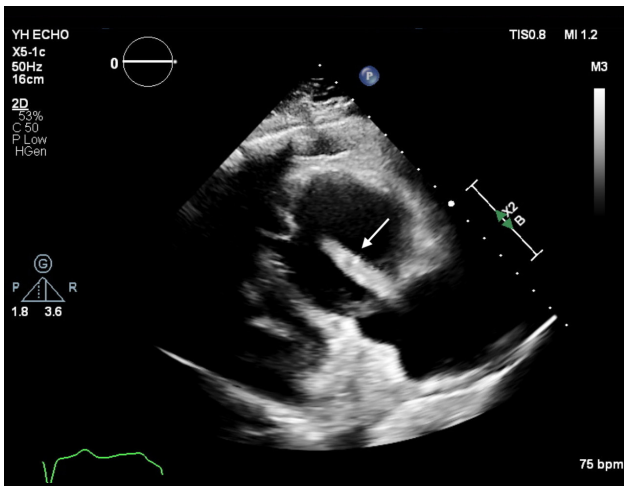


Figure 2. Clot-in-transit seen on an echocardiogram.

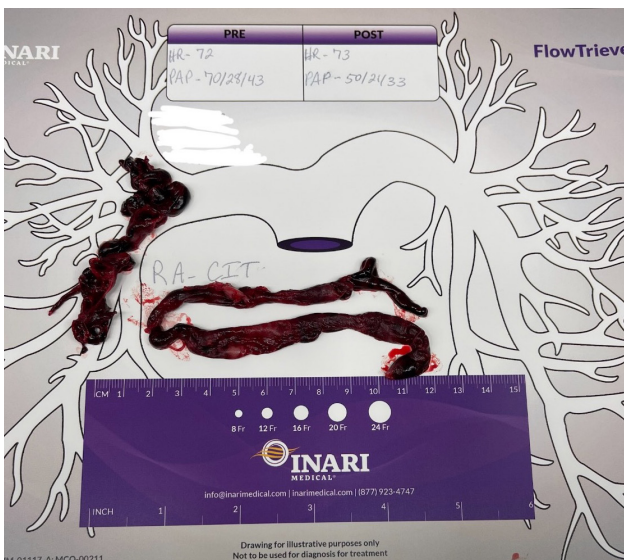
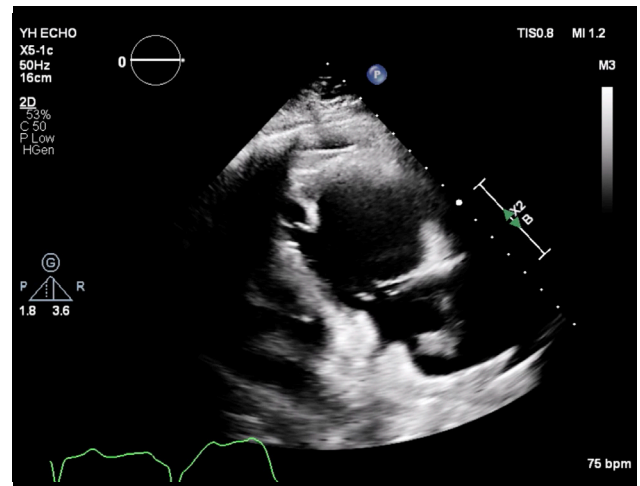


Figure 3. Thrombectomy specimen of right atrial and right ventricular clot-in-transit and pulmonary embolism.

patient was elderly and had unprovoked PE without obvious risk factors other than a sedentary lifestyle. Two cases of PE with CITs are described by Igwilo et al<sup>[9]</sup>. Both elderly patients presented with typical PE risk factors and signs, eventually having serious consequences with embolisation of the right heart thrombi into the pulmonary vasculature, before embolectomies could be performed.

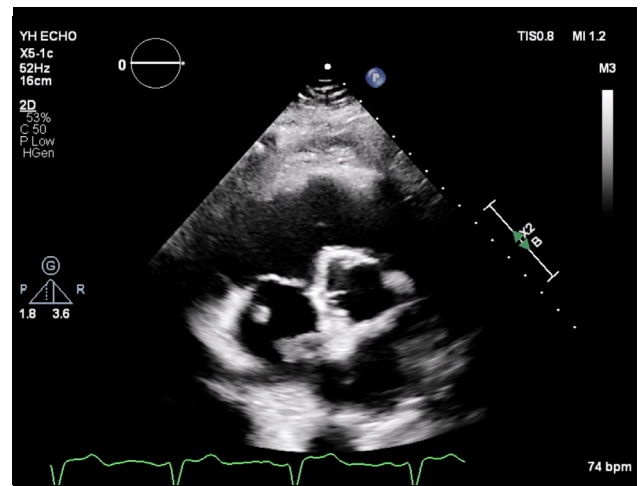
One ended in death within hours and the other required an ICU stay for respiratory failure<sup>[9]</sup>. In comparison, despite our patient not having any typical PE signs or risk factors, fortunately it was diagnosed in time and had an excellent outcome.

Treatment options for CITs include systemic anticoagulation alone, systemic thrombolysis, definitive surgical embolectomy, endovascular catheter-guided therapies or a combination<sup>[10]</sup>. Due to the lack of clearly established guidelines or definitive agreement on the matter, it poses a quandary for medical professionals. While the availability of advanced therapies may be limited by institutional resources, some hospitals have established pulmonary embolism response teams similar to existing teams such as rapid response teams, to quickly and reliably respond to a PE. A multidisciplinary virtual 24/7 consultancy service comprised of cardiology, interventional radiology, cardiothoracic surgery and critical care may be considered to develop a real-time treatment plan tailored to the patient and consistent with the capabilities of the institution.



Video 1. View of the right ventricular inflow showing the thrombus in transit in right ventricle and atrium. Right ventricle is dilated and hypokinetic.

<https://youtu.be/D9TFDMUH62Y>



Video 2. View of the short axis showing the thrombus in right atrium.

<https://youtu.be/Y77h2OV709M>

## CONCLUSION

Dizziness may be an unusual presentation of a PE. Cognitive bias while ruling out pulmonary emboli based on the absence of typical signs of chest pain, tachycardia and shortness of breath must be challenged. The presenting complaints must be carefully revisited, differentiated from other mimickers and differentials broadened. Establishing a multidisciplinary team may further assist in efficiently managing these time-sensitive diagnoses.

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