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Visual Case Discussion

Orthostatic syncope as a presentation of pulmonary embolism, a not to be missed diagnosis

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A 79-year-old woman, with no relevant past medical history, was brought to the Emergency Department (ED) after a syncopal episode immediately after rising to standing from sitting, at the end of a transatlantic flight from Holland. She reported experiencing a prodrome characterized by sudden onset "black vision", followed by loss of consciousness and then postsyncopal phase with nausea, vomiting and mild non-bloody diarrhea. She reported not drinking much during the flight.

Her physical exam was unremarkable. She had a BP of 122/81 mmHg, heart rate 106 bpm, axillary temperature 36.7 °C, respiratory rate 18 and SpO2 97% (room air).

An electrocardiogram (ECG) showed sinus tachycardia with incomplete right bundle branch block (Fig. 1). Cardiac Point-of-Care Ultrasound (POCUS) was performed to assess volume status. Using a phased-array probe, providers identified signs of right ventricle (RV) strain (video 1-2) and McConnell sign (video 2), instead of the expected hyperdynamic left ventricle and flat IVC.

Laboratory workup was remarkable for WBC 10,970/μL [4,500–11,000] (87.7% neutrophils; 5.5% lymphocytes), hemoglobin 14.4 g/dL [12.0–16.0], platelet 127,000/μL [150,000–400,000], Na 140 mmol/L [135–145], BUN 16 mg/dL [8–25 mg/dL], ALT 219 IU/L [10–35], AST 414 IU/L [9–32], total bilirrubin 0.6 mg/dL [0.0–1.0], total protein 7.1 g/L [6–8.3], creatinine 0.94 mg/dL [0.6–1.5] (GFR 58 mL/mn/1.73m^2 [> 59]), Troponin T 48 ng/L [0–9], NT-proBNP 180 pg/mL [0–1800]. The rest of laboratory tests were normal.

A CT pulmonary angiography showed a bilateral submassive pulmonary embolism (PE) (Fig. 2). Abdomino-pelvic CT and Lower extremities veins duplex were unremarkable. Therefore unfractionated heparin was started and the patient was admitted to internal medicine, with a significant improvement of her condition during the following days.

The discharge diagnosis were syncope secondary to provoked PE (risk factor of a transatlantic flight and dehydration), elevated troponins in correlation with RV strain, liver enzyme abnormalities with an hepatocellular pattern in the setting of mild ischemic injury.

Syncope is responsible for 1–3% of all ED visits and 1% of all hospital admissions, with an increasing in overall cost in the recent years.[1]

In this case Cardiac POCUS changed management in a patient previously thought to have an orthostatic etiology of her syncope. She had no complaints of chest pain or dyspnea, and was not hypoxic.

This case shows how POCUS can be a powerful diagnostic tool for syncope. In retrospect, she was though to have a low pretest probability (Wells score of 1.5, for tachycardia), and a positive PERC Rule for PE (age and tachycardia), so it is possible, even likely that her workup would have included a D-dimer and eventual diagnosis of PE. However, her Cardiac POCUS expedited her evaluation for PE, changing the likely etiology of her syncope from orthostasis to venous thromboembolism.

Video 1. Phased-array probe. Parasternal short axis view at the level of mitral valve, with evidence of right ventricle strain. RV: right ventricle. LV: left ventricle.

Video 2. Phased-array probe. Apical 4 chamber view, with evidence of McConnell sign (hypokinesis of Right Ventricle free wall compared to hyperkinetic apex). RV: right ventricle. LV: left ventricle.

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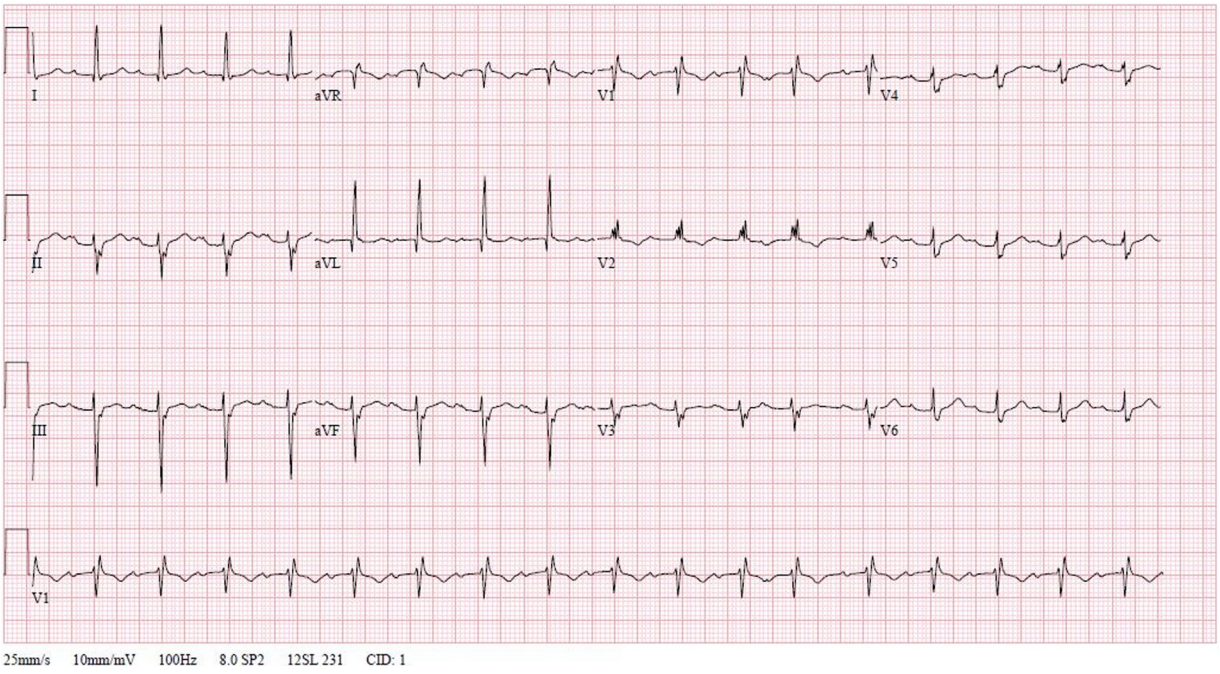

Fig. 1. ECG showing sinus tachycardia and incomplete right axis deviation.

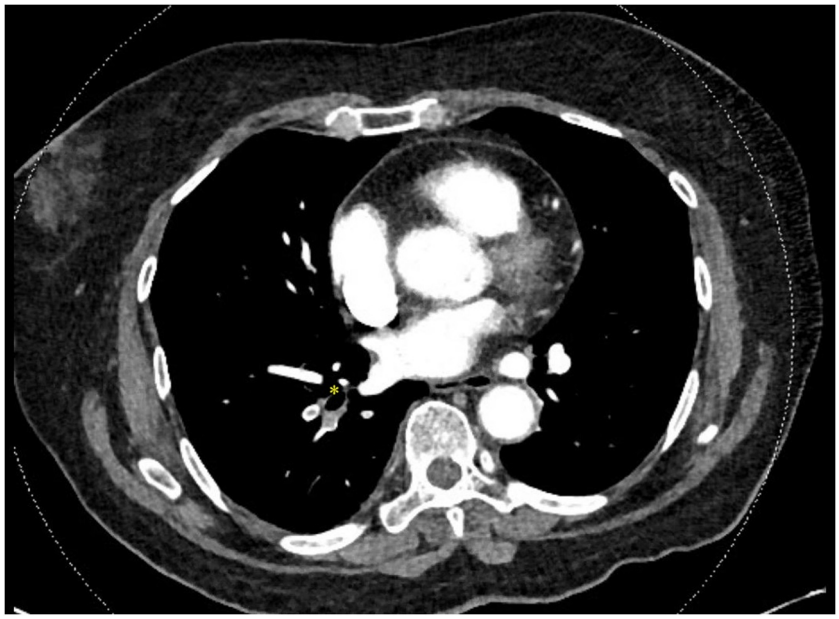

Fig. 2. CT Pulmonary angiography showing filling defects most proximally within the lobar arteries (asterisk).

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.visj.2018.11.008.

References

1. Benditt D. *Syncope in adults: epidemiology, pathogenesis, and etiologies.* Waltham, MA: UpToDate Inc; 2018 UpToDate *http://www.uptodate.com* Accessed on October 12.

Questions

1. After initial assessment of syncope, detailed history and physical exam, what should be the next exam?
   a. A resting 12-lead electrocardiogram (ECG).
   b. Routine and comprehensive laboratory testing only if vasovagal syncope is suspected.
   c. Hospital evaluation and treatment if no cause for the syncope is identified.
   d. Carotid artery imaging.

2. In the absence of pulmonary embolism (PE), what other following conditions would likely explain the above Point-of-Care (POCUS) findings?
   a. Cardiac tamponade.
   b. Heart failure.
   c. Cor pulmonale due to COPD.
   d. Septic shock.

Answers

1. A resting 12-lead electrocardiogram (ECG). Explanation: According to current guidelines, it is useful (Class I) to obtain a 12-lead ECG in the evaluation of patients with syncope. Hospital evaluation and treatment is recommended only if a serious medical condition potentially relevant to the cause of syncope is identified. Vasovagal is the most common cause for syncope, and laboratory testing is not useful. Carotid artery imaging should not be ordered unless focal neurologic deficit is suspected. Reference: Shen W-K, Sheldon RS, Benditt DG, Cohen MI, Forman DE, Goldberger ZD, et al. 2017 ACC/AHA/HRS Guideline for the Evaluation and Management of Patients With Syncope. J Am Coll Cardiol. 2017 Aug;70(5):e39–e110.

2. Cor pulmonale due to COPD. Explanation: Advanced COPD can cause RV dilatation and dysfunction. ED physicians using Cardiac POCUS performed well at detecting pericardial effusion, low ejection fraction, hyperdynamic heart or RV strain. Reference: Dresden S, Mitchell P, Rahimi L, Leo M, Rubin-Smith J, Bibi S, et al. Right ventricular dilatation on bedside echocardiography performed by emergency physicians aids in the diagnosis of pulmonary embolism. Ann Emerg Med. 2014 Jan;63(1):16–24.