Syncope Induced by Acute Pulmonary Embolism in Aged Patients: A Report of Four Cases

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Abstract

Syncope is a common presentation in the neurology clinic and emergency room. However, pulmonary embolism (PE) as a cause of syncope is not common or well recognized. Four aged patients presented to our clinic with episodic syncope, and PE was finally identified as the underlying cause. The significant clinical presentations included transient loss of consciousness and hypoxemia on admission. Syncope with hypoxia should therefore be highlighted as an important clue to the diagnosis of PE in aged patients. A negative D-dimer test will be encountered in patients with a very short history. Repeated D-dimer testing is necessary.

Key words: syncope, pulmonary embolism, D-dimer, hypoxia

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Introduction

Syncope is easy to detect, but the underlying etiology can be difficult to ascertain. The most common cause is a brief dysfunction of vasodepressor cardiovascular reflexes. Less frequent causes include cardiac disease, orthostatic hypotension, and cerebral arterial vascular disease. Syncope without a distinct etiology accounts for 14% of all cases (1). Pulmonary embolism (PE) is a potentially life-threatening disorder. The clinical presentation of PE is variable, ranging from an absence of symptoms to the “classical triad” of chest pain, dyspnea and hemoptysis.

Syncope has been reported to occur as the initial presentation of PE in approximately 10% of patients (2) and PE is the cause of syncope in 1% (1). However, a consideration of PE as the causative etiology for syncope is not common in the neurology clinic and emergency room, especially in patients without obvious risk factors for venous thrombosis. In this report, we describe the cases of four aged patients with syncope induced by PE and discuss the diagnostic clues and possible mechanisms underlying the development of this condition.

Case Reports

Case 1

A 71-year-old man lost consciousness after his daily morning exercise and was taken to the emergency room (ER) of our hospital. His medical history was significant only for hypertension, for which he took amlodipine and metoprolol. He had a smoking history of about 30 years, but had stopped several years earlier. He was assisted by a ventilator immediately on arrival because of respiratory arrest. His blood pressure (BP) was 179/115 mmHg and his heart rate (HR) was 115 beats per minute (bpm). On physical examination, the patient remained unconscious but with a preserved sensitive pupillary reflex and the limbs moved symmetrically. The complete blood count (CBC), serum glucose and tumor markers were normal. The blood homocysteine level was mildly elevated. An electrocardiogram (ECG) showed sinus tachycardia, an S1Q3T3 pattern and incomplete right bundle branch block (RBBB). A cardiac Echocardiography (ECHO), chest film and cranial computed tomography (CT) were negative. The patient gradually became alert but was somewhat confused with a diminished recall

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and incomplete orientation.

The patient suffered transient shortness of breath and brief unconsciousness 15 days after admission, which suggested the possibility of PE. The D-dimer level was 1,770 $\mu\text{g/L}$. CT pulmonary angiography (CTPA) documented scattered embolization in branches of the left lower and right middle lobar pulmonary arteries. Further questioning revealed no recent surgery, antipsychotic drug use or immobility. No deep venous thrombosis (DVT) was detected with ultrasound. The patient was discharged seven days after receiving anticoagulation therapy with stable vital signs, but poor memory and blurred vision.

Case 2

A 79-year-old man was admitted after suffering unconsciousness for about 5 min while playing mahjong with friends. His past history was significant only for hypertension and chronic bronchitis. He had smoked 30 cigarettes per day for 50 years. On admission, he was alert and denied having dyspnea, chest pain or palpitations. His BP was 161/99 mmHg, HR was 131 bpm and respiratory rate (RR) was 20 breaths/min. The results of blood tests were normal except for a mild elevation of homocysteine. An ECG revealed sinus tachycardia and peripheral low voltage. A cardiac ECHO was negative. No DVT was found with Doppler scans of the legs. The initial D-dimer level was 300 $\mu\text{g/L}$, which was in the normal range. A repeated test two days later showed that the D-dimer level had increased to 1,460 $\mu\text{g/L}$. Arterial blood gas (ABG) measurement in room air revealed hypoxemia (PaCO_2 37.7 mmHg, PaO_2 44.4 mmHg) with an elevated A-a gradient. A CTPA examination was suggested, and demonstrated occlusive clots in the upper segments of both right and left lobar pulmonary arteries. The patient was discharged after a 12-day course of standard anticoagulation treatment.

Case 3

A 64-year-old man was found lying unconscious in bed one morning and thus was taken to our ER. He recovered spontaneously soon after arrival but was extremely weak. He was in good health before this episode except for a history of hypertension and chronic bronchitis. His vital signs in the ER were: BP 119/92 mmHg, HR 131 bpm, RR 25 breaths/min. A physical examination revealed a dyspneic patient without focal neurologic findings. The brain CT was normal. An ECG revealed sinus rhythm with tachycardia and complete RBBB. Initial pulse oximetry showed 80% oxygen saturation in room air. A further ABG analysis after 5 L/min oxygen administration also revealed hypoxemia (PaO_2 69.8 mmHg).

The D-dimer value at that time was 6,450 $\mu\text{g/L}$. CTPA carried out the day after admission revealed embolization in the branches of the middle and lower lobar pulmonary arteries. No risk factors for venous thrombosis such as trauma, immobility, active tumor or previous thromboembolism were found. Bilateral lower extremity Doppler was also negative.

The patient received anticoagulation therapy and was discharged. We followed him up, and he was well when examined several months after that episode.

Case 4

A 79-year-old woman was sent to the hospital after an episode of syncope. She was completely alert and oriented on arrival. She denied dyspnea, palpitations or diaphoresis before this event. Her past history included hypertension, diabetes mellitus, and old cerebral infarction, for which she took aspirin and atorvastatin. Her BP was 157/71 mmHg, HR regular at 77 bpm, and her RR was 18 breaths/min. The oxygen saturation was 97% when she was given 3 L/min oxygen. An ECG showed normal sinus rhythm. An ECHO revealed enlargement of the left atrium and hypertrophy of the left ventricle.

PE was not considered as the cause of this syncope until the patient complained of dyspnea followed by a recurrent brief loss of consciousness one week after admission. The D-dimer level tested after the second episode was 937 $\mu\text{g/L}$. Her blood creatinine was elevated, indicating renal insufficiency. A ventilation-perfusion (V/Q) scan was carried out instead of CTPA, and demonstrated multiple unmatched perfusion defects in the right upper and middle lobar arteries, thus indicating a high probability of PE. The patient showed a good recovery after she underwent standard anticoagulation, without any evidence of recurrent syncope.

Discussion

In this report, all four patients presented with syncope as their only clinical symptom, without the classic respiratory triad. All were subsequently diagnosed with PE as the underlying etiology of syncope based on the CTPA or V/Q results. Hypoxia played an important role in the differential diagnosis of syncope. However, in cases 1 and 4, the evidence of hypoxia was initially neglected at admission. There was therefore no suspicion of PE until a recurrent loss of consciousness occurred. Transient loss of consciousness with hypoxia indicates global blood insufficiency with pulmonary V/Q disturbance, which is an important clue to the presence of PE.

Syncope in the setting of PE is explained by two possible mechanisms. First, massive PE can lead to right ventricular dysfunction, impaired left ventricular filling, and then reduced cardiac output and cerebral flow perfusion, ultimately inducing unconsciousness. Second, syncope associated with PE can lead to hemodynamically unstable arrhythmias caused by the cardiac strain induced by the PE (3). Elderly patients with PE are more prone to experience syncope than younger patients (4-6). The greater incidence of syncope in older patients is basically due to their reduced cardiopulmonary reserve and pulmonary obstruction, or the increased prevalence of concurrent heart and lung diseases with advanced age (4). In agreement with previous studies, all patients in this study were elderly.

The D-dimer level has been shown to be a sensitive screening tool for ruling out PE (7). However, the D-dimer levels are related to the duration of symptoms, the severity of PE, clot lyses, inter-individual differences in fibrinolytic activity, and even the time from the onset of PE to the D-dimer test. Mager et al. (8) showed a significant increase in the D-dimer concentration 2 h after a thromboembolic event. Goldin et al. (9) found that the D-dimer level could be false-negative one week after the onset of acute venous thromboembolism. Case 2 in our study, whose Enzyme Linked Immunosorbent Assay (ELISA) D-dimer level was in the normal range in the ER, showed a D-dimer concentration that increased to 1,460 µg/L in a repeated test performed two days later. Based on our findings, it appears that PE patients presenting with syncope tend to be easily found by onlookers and then are taken to the ER very quickly. The D-dimer level may have a lag time before the concentration increases. Therefore, it is important for physicians to know that a negative D-dimer test does not rule out the presence of PE. A repeated D-dimer test is necessary.

To date, a number of defined “typical risk factors” for PE have been well recognized. These factors include environmental, natural, and hormonal influences, recent hospitalization, immobility, cancer, estrogen exposure, previous PE or DVT, and thrombophilia from a deficiency of antithrombin III and proteins C or S. However, increasing age, cigarette smoking, obesity, chronic obstructive pulmonary disease, congestive heart failure, antipsychotic drug use, and hypertension are also suggested to increase the thrombotic risk (10). Although none of our patients showed DVT in Doppler scans, their advanced age, hypertension, smoking history, chronic bronchitis and hyperhomocysteinemia should be considered as “atypical” risk factors for PE.

In conclusion, syncope caused by PE should arouse attention in the ER or neurology clinic, especially when patients are advanced in age. Syncope with hypoxia is an important clue for making a prompt diagnosis of PE. A negative D-dimer test can be encountered in patients with a very short

history, and a repeated D-dimer test is necessary to ensure a correct diagnosis.

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