Unusual presentation of more common disease/injury

An unusual presentation of pulmonary embolism

Deacon Zhao Jun Lee, Marzena Whittaker, Abdallah Al-Mohammad

Department of Cardiology, Sheffield Teaching Hospitals, Sheffield, South Yorkshire, UK

Correspondence to Dr Deacon Zhao Jun Lee, deacon.lee.04@aberdeen.ac.uk, leedeacon59@gmail.com

Summary

Pulmonary embolism (PE) is a common cardiovascular emergency, by which occlusion of a part of the pulmonary arterial bed may lead to acute life threatening but potentially reversible right ventricular failure. Early diagnosis is fundamental to implement immediate effective treatment to reduce mortality. However, the diagnosis can be easily missed due to non-specific clinical presentation. We wish to present an unusual case whereby a patient with no risk factors for PE, symptoms suggestive of acute pericarditis and an ECG showing concave ST segment elevation was found to have multiple pulmonary emboli.

BACKGROUND

Pulmonary embolism (PE) occurs as a complication of venous thrombosis. The risk factors for venous thrombosis include endothelial injury, hypercoagulability of blood and stasis.^{1 2} Evaluating the likelihood of PE in a patient according to their clinical presentation is most important when selecting appropriate diagnostic tests and interpreting the significance of their results.^{3 4} In the majority of cases, PE presents with symptoms such as pleuritic chest pain, shortness of breath, haemoptysis and syncope. Typical clinical signs include tachycardia, tachypnoea, hypoxia and cyanosis.^{1 3} ECG findings associated with PE are variable and range from the classical S_I Q_{III} T_{III} pattern to non-specific changes such as sinus tachycardia and signs of right ventricular strain.^{3 5 6} ST segment elevation mimicking the ECG pattern produced with an antero-septal myocardial infarction is a rare but previously reported manifestation of PE;⁷ however, the occurrence of concave ST segment elevation is not a recognised feature of PE. This case illustrates that rare manifestations of common pathology can often be challenging to diagnose especially when both symptoms and investigation findings are the classical features of a completely different condition.

CASE PRESENTATION

A 63-year-old woman presented to the cardiology department with a 1-day history of central chest pain and recent antibiotic treatment for a productive cough. The pain was described as tightness in the chest exacerbated on deep inspiration and on lying down in a supine position and relieved on sitting up and leaning forwards. She had a body mass index of 25, never smoked and led an active lifestyle. She had a background of asthma but was otherwise fit and well with no history of malignancy, venous thromboembolism, surgery or hormone-replacement therapy. There was also no history of shortness of breath or any recent foreign or long-distance travel. On examination she was afebrile and her blood pressure and heart rate were 105/65 mm Hg and 75 beats/min, respectively. Her jugular venous pressure was

measured at 2 cm above the sternal angle and heart sounds were normal, with no added sounds. Her respiratory rate was 16/min and oxygen saturations were 98% on air. Her chest was clinically clear on auscultation and chest x-ray showed evidence of a small left pleural effusion with mild pulmonary congestion. Initial blood results revealed elevated inflammatory markers with a white cell count of 13×10^9 /litre and neutrophil count of 9×10^9 /litre, C reactive protein of 106 mg/l and erythrocyte sedimentation rate of 17 mm/h. Her estimated creatinine clearance was 83.9 ml/min. ECG showed progressive concave ST elevation in the anterior leads (figures 1 and 2). Based on the history and the results of the diagnostic tests, a diagnosis of pericarditis was suspected and she was planned for discharge the next morning with anti-inflammatory medication.

The following morning, she was symptom-free but was found to have fluctuating oxygen saturations between 92% and 98%. Subsequent arterial blood gas testing on air revealed a PO₂ of 9.29 kPa, PCO₂ of 5.43 kPa, HCO₃⁻ of 20.1 mmol/l, lactate level of 1.7 mmol/l, pH of 7.315 and anion gap of 12.1 mmol/l. Her Well's score was calculated and being -3, indicated a low probability of PE. However, a D-dimer assay was taken and found to be raised at 1003. Hence, CT pulmonary angiography (CTPA) was carried out and showed confirmatory evidence of acute multiple right-sided pulmonary emboli (figure 3).

OUTCOME AND FOLLOW-UP

She was started on anticoagulant therapy with warfarin and discharged a few days later following resolution of her symptoms.

DISCUSSION

It is well recognised that a careful assessment based on good history, clinical examination and use of simple tests such as an ECG, chest x-ray and arterial blood gas sampling play a significant role in identifying the risk of PE in patients presenting with chest pain.⁸

The electrocardiographic findings associated with PE have been well described in the medical literature for over

Figure 1 Initial ECG showing concave ST segment elevation in the anterior leads.

50 years, and these features include changes in rhythm, axis and morphology of the QRS complexes and T waves.⁹ It has been suggested that typical abnormalities include (a) an $S_I Q_{III}$ or $S_I Q_{III} T_{III}$ pattern, (b) rightward QRS axis shift, (c) transient, complete or incomplete RBBB, (d) T wave inversion in the right precordial leads and (e) sinus tachycardia.¹⁰ Findings of ST segment elevation in the precordial leads mimicking an anterior myocardial infarction, although uncommon, have been previously reported.¹¹

The chest radiograph is generally non-diagnostic, although it is useful for excluding alternative diagnoses¹² such as pneumonia or pneumothorax.

Echocardiography is generally not recommended as a routine imaging test in the diagnosis of PE although it can be particularly helpful in emergency management decisions when the patient is haemodynamically compromised.³ As the patient in our case was systemically well with no clinical signs of right ventricular overload or dysfunction, echocardiography was not performed.

Figure 2 Repeat ECG 40 min later showing progressive concave ST segment elevation in the anterior leads.

Figure 3 CT pulmonary angiography demonstrating multiple right-sided pulmonary emboli.

In our case, there were several factors relating to the patient's presentation that on initial assessment, were inconsistent with the typical features of PE and instead mimicking a diagnosis of pericarditis. This included a lack of risk factors for PE as well as the nature and onset of the pain, which was preceded by a recent productive cough and described as tightness worse when lying flat and better when sitting up and leaning forwards. This was followed by radiological findings on the chest x-ray consistent with a lower respiratory tract infection. There was also a lack of dyspnoea, tachypnoea and tachycardia throughout the admission, which tends to be unusual with PE.¹³ The most interesting and unique abnormality was the progressive concave ST segment elevation in the precordial leads, which is a classical electrocardiographic feature of pericarditis^{14 15} and has not been previously associated with PE. However, the metabolic acidosis revealed in the arterial blood gas analysis was of unknown

origin and may have temporarily contributed to temporary alterations of the electrographic patterns. The only findings that raised suspicion towards an alternative diagnosis were the intermittent fluctuation of oxygen saturations down to 92% and arterial PO₂ of 9.29 kPa in room air, both of which in the context of her background of asthma, could be of questionable significance. Fortunately, these results were not dismissed and she was further investigated to reach the correct diagnosis.

Learning points

- ▶ In pulmonary embolism (PE) concave ST segment elevation is rare, and this case demonstrates how a patient with a PE can present with misleading features mimicking those of pericarditis.
- ▶ Physicians should maintain a high level of suspicion of PE even when complaints and signs are neither suggestive nor specific.
- ▶ Diagnosis of PE is often based on a systematic approach, which should be triggered when there are suggestive or unresolved symptoms or signs as the potential consequences of missed diagnosis could be catastrophic.
- ▶ PE continues to present a diagnostic challenge for the clinician and good clinical judgement combined with appropriate investigations can help reduce mortality from this condition.

Competing interests None.

Patient consent Obtained.

REFERENCES

1. Kline JA, Runyon MS. Pulmonary embolism and deep venous thrombosis. In: Marx JA, Hockenberger RS, Walls RM, eds. *Rosen's emergency medicine concepts and clinical practice*. Vol. 2. 6th edn. 2006:1368–82.
2. Anderson FA Jr, Spencer FA. Risk factors for venous thromboembolism. *Circulation* 2003;**107**(23 Suppl. 1):19–16.
3. Torbicki A, Perrier A, Konstantinides S, et al. Guidelines on the diagnosis and management of acute pulmonary embolism. *Eur Heart J* 2008;**29**:2276–315.
4. Roy PM, Meyer G, Vielle B, et al. Appropriateness of diagnostic management and outcomes of suspected pulmonary embolism. *Ann Intern Med* 2006;**144**:157–64.
5. Falterman TJ, Martinez JA, Daberkow D, et al. Pulmonary embolism with ST segment elevation in leads v1 to V4: case report and review of the literature regarding electrocardiographic changes in acute pulmonary embolism. *J Emerg Med* 2001;**21**:255–61.
6. Sreeram N, Cheriex EC, Smeets JL, et al. Value of the 12-lead electrocardiogram at hospital admission in the diagnosis of pulmonary embolism. *Am J Cardiol* 1994;**73**:298–303.
7. Wang K, Asinger RV, Marriott HJL. ST-segment elevation in conditions other than acute myocardial infarction. *N Engl J Med* 2003;**349**:2128–35.
8. Stein PD, Willis PW III, DeMets DL. History and physical examination in acute pulmonary embolism without pre-existing cardiac or pulmonary disease. *Am J Cardiol* 1981;**47**:218–23.
9. Chan TC, Vilke GM, Pollack M, et al. Electrocardiographic manifestations: pulmonary embolism. *J Emerg Med* 2001;**21**:263–70.
10. Chou T. *Electrocardiography in Clinical Practice*. 2nd edn. Orlando: Grune Stratton, 1986:309–17.
11. Falterman TJ, Martinez JA, Daberkow D, et al. Pulmonary embolism with ST segment elevation in leads V1 to V4: case report and review of the literature regarding electrocardiographic changes in acute pulmonary embolism. *J Emerg Med* 2001;**21**(3):255–61.
12. Tapson VF. Acute pulmonary embolism. *N Engl J Med* 2008;**358**:1037–52.
13. Stein PD, Saltzman HA, Weg JG. Clinical characteristics of patients with acute pulmonary embolism. *Am J Cardiol* 1991;**68**:1723–4.

14. **Spodick DH.** Diagnostic electrocardiographic sequences in acute pericarditis: significance of PR segment and PR vector changes. *Circulation* 1973;**48**:575–80.
15. **Ginzton LE,** Laks MM. The differential diagnosis of acute pericarditis from the normal variant: new electrocardiographic criteria. *Circulation* 1982;**65**:1004–9.

This pdf has been created automatically from the final edited text and images.

Copyright 2012 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.

BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Please cite this article as follows (you will need to access the article online to obtain the date of publication).

Lee DZJ, Whittaker M, Al-Mohammad A. An unusual presentation of pulmonary embolism. *BMJ Case Reports* 2012;10.1136/bcr-2012-006210, Published XXX

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow