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Pulmonary Embolism: Emergency Physician's Nightmare

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ABSTRACT
Pulmonary Embolism is a life threatening emergency presenting to the emergency department. Recognizing one and treating in a timely manner can change the outcome and prognosis of the patient drastically. Here we present a case of Acute Massive Pulmonary Embolism in a patient with a background history of Chronic Obstructive Pulmonary Disease. We also outline the use of Echocardiogram as an important diagnostic modality with a brief reference of the scoring systems developed to recognise pulmonary embolism in the ED.

INTRODUCTION

Pulmonary Embolism is a life threatening emergency and has even led to cardiac arrest. This emergency can be divided into three groups for channelized care in the emergency department.

Massive pulmonary embolism in emergency department is recognised with signs of hemodynamic compromise. This is an indication for thrombolysis as soon as possible. [1]. Our case was recognised as pulmonary embolism by an echocardiogram. There is a very short interval from the onset of symptoms to death in these patients with massive pulmonary embolism, 50% die within 30 minutes, 70% die within 1 hour, and more than 85% die within 6 hours of the onset of symptoms.[8] Thus time is of major essence in the emergency department as timely thrombolysis can save patients life and lead to a more favourable progrnosis.

The presence of a right ventricular intracardiac clot is seen in approximately 18% of cases with massive pulmonary embolism [2,3] and thrombo-lytic treatment has shown to improve survival in such patients in comparison to the control group receiving anticoagulation alone. [4 5 6]

We aim to look at the close association of COPD and PE in the emergency department. There have been many studies with some still ongoing exploring the relationship of pulmonary embolus in the setting of COPD. The standardized scoring systems for pulmonary embolus don't list COPD as a risk factor for PE.

CASE REPORT

A 54-year-old male came to our emergency department with complaints of shortness of breath for 5 days. He was been treated for a COPD exacerbation at an outside hospital setting and was

referred to us. He was on medications for chronic obstructive lung disease emperically. He denied having regular or recent hospital visits but in this visit 5 days ago he was admitting to a sudden increase in shortness of breath since morning.

Clinical examination revealed a well nourished 70 kg male, temperature of 98.6 F, pulse was 106 /min, respiratory rate was 30/min and B.P. was 78/60, Jugular veins of the right side were significantly distended, there was no pedal edema. Auscultation of the chest revealed bilateral wheeze. There was no cyanosis or dependent edema and there was clubbing. There was no flap tremor and other systemic examination was within normal limits.

Skiagram of chest was done at an outside hospital on the same day and revealed hyperinflated chest. ABG was showing respiratory alkalosis a pH of 7.5 pco2 of 20 and rest other values were within normal limits. Serum electrolytes were also normal. Trop I, CKMB were within normal limits.

With the distended jugular veins and sudden haemodynamic compromise a diagnosis of pneumothorax and pulmonary embolism was kept in mind and resuscitation began. An echocardiogram was ordered and this revealed a large intracardiac clot in the right ventricle.

Echocardiogram done in the emergency department revealed a large intracardiac thrombi in the right ventricle with reduced right ventricular motion.

The patient was treated with 100 mg of tissue plasminogen activator (tPA), given as an initial dose of 10 mg bolus and 90 mg over two hours, without side effects. There were no embolic or bleeding complications. Shortly after thrombolysis the patient reported significant relief in shortness of breath, O_2 saturation on room air improved and heart rate slowed.

The patient was thrombolysed with alteplase in the Emergency Department and there was successful resolution of the thrombi with patient being clinically improved in the next 24 hours.

DISCUSSION

This patient has an unusual presentation of a frequent diagnosis, with a challenging therapeutic decision. Our patient presented with massive PE, as he was hemodynamically unstable and had echocardiographic evidence of RV dysfunction and a large clot burden. Therefore, thrombolysis was considered. Several previous case reports have shown improved survival in patients with right sided thrombus administered thrombolytic treatment [6]

Prevalence of sudden decompensation in patients with a background history of COPD should raise suspicion of a pulmonary embolism. Our patient was being treated for COPD exacerbation for 5 days including getting care at another tertiary care hospital outside. He had a sudden episode of decompensation in the emergency department where he also developed jugular venous distension during his 30 mins stay in the emergency department. This not only highlights the importance of a detailed clinical examination but raises the discussion of the prevalence of pulmonary embolism in patients being treated for COPD.

The study done by Tillie-Leblond I showed a 25% prevalence of PE in patients with COPD hospitalized for severe exacerbation of unknown origin. [9]

Another study By Rizkallah J[1] showed somewhat similar results. One of four COPD patients who require hospitalization for an acute exacerbation

may have PE. A diagnosis of PE should be considered in patients with exacerbation severe enough to warrant hospitalization, especially in those with an intermediate-to-high pretest probability of PE.[10]

This make pulmonary embolism a major emergency to consider in all COPD patients presenting to the emergency department. The major scoring systems of PE like Wells and Geneva scoring systems do not have COPD as a risk factor for PE and this also remains a field to be explored as in the emergency department timely decisions can help in not only recognising the emboli but also initiating timely thrombolysis to improve outcome. [11 12]

Our patient had a Wells Score of 1.5 which would categorize the patient as a low probability for PE. The application of this could have led to waste of invaluable time in ED.

Another important consideration to discuss about is the application of Echocardiogram in the emergency department as a means of diagnosing pulmonary embolism in haemodynamically unstable patients.

In studies done recently by Fields JM show a consistently high specificity and low sensitivity for echocardiography in the diagnosis of PE, making it potentially adequate as a rule-in test at the bedside in critical care settings such as the emergency department and intensive care unit for patients with a suspicion of PE, especially those unable to get other confirmatory studies. In the hands of an experienced emergency physician ultrasonographer, ED focused bedside echocardiography provides a safe, rapid, and non-invasive diagnostic adjunct for evaluation of the patient suspected of having massive PE.

Echocardiography has been extensively investigated in PE patients 2. It is a valuable prognostic tool for stratifying PE patients with or without right ventricular dysfunction, in particular if combined with clinical assessment, i.e., the Pulmonary Embolism Severity Index (PESI), and blood tests, i.e., troponin and natriuretic peptide. Besides, it is really useful in patients with shock or persistent hypotension with clinical signs of acute right heart failure, e.g., jugular vein dilatation. Indeed, echocardiography rarely may directly visualize emboli in right cavities and in the pulmonary artery. Therefore, echocardio-graphy is usually recommended in those cases of suspected high-risk PE in which the patient's conditions are so critical that only bedside diagnostic tests are allowed [13,14,18,19].

Free-floating right heart thrombi are rare and usually represent travelling clots from venous system to the lung. Almost exclusively, they are associated with pulmonary embolism.

They are seen in 4-18% of patients presenting with acute massive pulmonary embolism. 15 16

Free-floating thrombi in the right heart are rare and usually represent travelling clots from the legs to the lungs. They present a therapeutic emergency due to high mortality rate. Echocardiography is an essential investigation that can be performed at bedside to directly visualize the thrombi, assess and monitor RV function, and help in making treatment decisions.[17]

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