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# Diaphragmatic Adjacencies: Pulmonary Embolism Presenting as Abdominal Pain

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# Diaphragmatic Adjacencies: Pulmonary Embolism Presenting as Abdominal Pain

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## Introduction:

Pulmonary embolism is a common yet potentially life-threatening diagnosis that should not be missed in the Emergency Department. Common presenting symptoms include dyspnea, pleuritic chest pain, cough, hemoptysis, syncope or pre-syncope [1]. Less often however, presenting symptoms can include abdominal pain. A clinician should recognize that pain adjacent to the diaphragm (including the lower chest and upper abdomen), can be secondary to underlying pathology either above or below the diaphragm. Here we describe an unusual case of pleuritic, post-prandial, right upper quadrant abdominal pain that was a result of pulmonary embolism.

## Case Presentation:

A 34-year-old male presented to the ED with complaint of right-sided abdominal pain which began early in the morning, initially mild, later becoming severe at 10 pm shortly prior to arrival. Patient described the pain as dull, localized to the right upper quadrant and right flank, worse with deep breath. He also stated he was at a picnic that afternoon, and the pain had become worse after eating. The patient denied nausea or vomiting. He had no diarrhea, no constipation, no fever or chills, no chest pain, no palpitations, no cough, no shortness of breath, and no urinary symptoms. He denied any medical conditions or prior surgeries, and was not taking any medications daily. Social history was negative for tobacco, alcohol, and drug use.

On presentation, his vital signs were blood pressure 118/77 mm Hg, heart rate of 87 beats per minute (bpm), respiratory rate of 18 breaths per minute, temperature 97.9 degrees Fahrenheit orally, and a pulse oximetry of 97% on room air. His body mass index (BMI) was 31.01 kg/m<sup>2</sup>.

Physical examination revealed a non-toxic appearing male in no acute distress. On auscultation, heart was regular rate and rhythm without murmur, with clear breath sounds bilaterally, no wheeze or rhonchi, no respiratory distress. The patient had mild tenderness to palpation of the right upper quadrant abdomen without guarding or rigidity. There was no tenderness to the chest wall, and no costovertebral angle tenderness. Otherwise, exam was unremarkable.

Lab work was completed revealing total bilirubin of 1.6, and an elevated D-dimer of 0.82. Complete blood count and basic metabolic panel were unremarkable, as were high-sensitivity troponin and brain-type natriuretic peptide (BNP). An electrocardiogram showed normal sinus rhythm at 88 beats per minute, normal axis, with no acute ST or T-wave changes. Ultrasound of the right upper quadrant revealed gallstones with wall thickness of 3 mm, and negative Murphy's sign reported. CT abdomen pelvis with contrast revealed appendiceal tip thickening measuring 0.9 cm with appendicolith, without significant inflammation. This study was otherwise unremarkable. CTA chest pulmonary angiography with contrast demonstrated right main pulmonary artery and right lower lobe pulmonary artery embolus, with infiltration of the right lower lobe suspicious for pulmonary infarct. After consultation with general surgery, the appendicolith and gallstones were determined to not require further intervention. The patient was started on heparin and admitted. After 2 days in the hospital, patient was medically stable for discharge home on Eliquis.

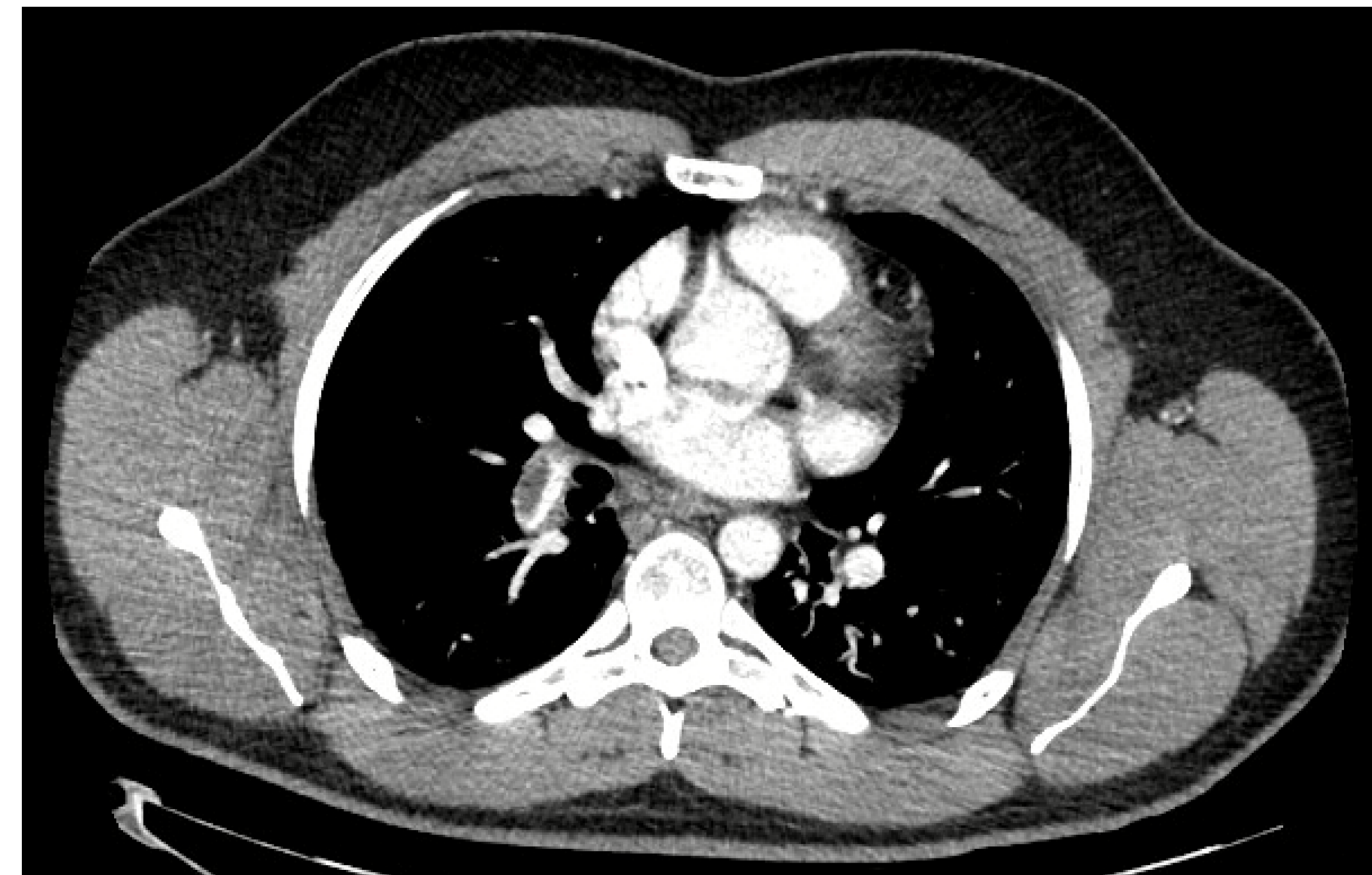


Figure 1: Computed tomography pulmonary angiography showing a pulmonary embolism in the right pulmonary artery.

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## Discussions:

Pulmonary embolism is a potentially fatal form of venous thromboembolism. It is the third most common cause of death from cardiovascular disease, after heart attack and stroke [2]. The incidence of pulmonary embolism has been reported to be 39 to 115 cases per 100,000 population annually [3] with a highly variable yet potentially high mortality rate. Many genetic and acquired risk factors exist for pulmonary embolism but will not be reviewed in this case report.

Venous thromboembolism can have a variable presentation depending on where the embolus resides. Most pulmonary emboli originate as thrombi in the deep veins of the lower extremities, traveling through the right side of the heart to the pulmonary circulation. Physiologic and clinical consequences vary depending on the size of the clot burden and its location, often leading to gas exchange abnormalities and hypoxemia. It is the hemodynamic consequences of pulmonary emboli, including right ventricular heart failure and ischemia, that are often responsible for increased morbidity and mortality [4].

The D-dimer is a common screening tool for venous thromboembolism in general. However, results are nonspecific, and more sophisticated imaging studies are required to make the diagnosis. Imaging modalities include Computed Tomography Pulmonary Angiography (CTPA), Ventilation Perfusion (V/Q) scan, as well as bedside Transthoracic Echocardiography (TTE). CTPA and V/Q scans in cases of pulmonary embolism may show contrast filling defects and perfusion defects, respectively, with TTE potentially demonstrating right heart strain, depending on the size and burden of the embolus [5]. The CTPA is often the diagnostic modality of choice for patients with suspected PE, with a sensitivity of 83% and specificity of 96% according to the PIOPE (Prospective Investigation On Pulmonary Embolism Diagnosis) II study [6].

The mainstay of treatment for pulmonary embolism is anticoagulation. Often this comes in the form of heparin, but for cases of larger clot burden and hemodynamic compromise, thrombolytic therapy can also be used [7]. For patients in whom thrombolysis is contraindicated, or in whom thrombolysis has failed, surgical embolectomy can be performed [8]. Chronic treatment and prevention of recurrence comes in the form of further anticoagulation. The optimal duration of therapy varies on a case-by-case basis, but a minimum of 3 months is usually recommended [9].

## Conclusions:

Pulmonary embolism can be a lethal condition, with a high level of morbidity and mortality, and a potentially high-stakes diagnostic challenge for the clinician. Here we describe a case of a 34-year-old male with right upper quadrant abdominal pain and subsequent diagnosis of pulmonary embolism. The clinician should consider pathology both above and below the diaphragm in patients presenting with symptoms in the lower chest and upper abdomen.