

Multiple Ways To Take Your Breath Away: PE, Multiple Infections and Cancer

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Introduction

Acute hypoxic respiratory failure can result from diverse pulmonary pathologies, and concurrent etiologies can complicate diagnosis and management. Pulmonary embolism (PE), respiratory infections, and malignancy are major causes of morbidity and mortality, particularly among elderly patients with chronic comorbidities and limited healthcare access. We present a complex case of respiratory failure due to multiple simultaneous conditions in a socially vulnerable patient.

Case Description

- Patient Overview:**
- **Age/Gender:** 80-year-old male
 - **Medical History:** Asthma and Type 2 diabetes mellitus
 - **Social History:** Living in Vehicle
- Presenting Symptoms:**
- Productive cough, shortness of breath, and malaise
 - Indicating more frequent use of rescue inhaler with no relief
- Emergency Room Findings:**
- Respiratory Difficulties: Requiring 5L of NC saturating 93%
 - Coarse breath sounds with decreased air movement
- **Vital Signs:**
- Respiratory rate: 25 breaths/min
 - Heart rate: 100 bpm
 - Oxygen saturation: 92% on 5L NC
- **Laboratory Results:**
- White blood cells: 12.4x10³/uL
 - Hemoglobin: 12.5 g/dL
 - Elevated lactic acid: 3.3 mmol/L
 - BNP 16
 - Troponin negative
 - Hyponatremia 131 mmol/L
- Initial Management:**
- **Fluids:** 1 liter of normal saline
 - **Medications:** 1 gram of ceftriaxone and Methylprednisolone 125mg
- Infectious Workup:**
- **Urinalysis:** Negative
 - **Chest X-ray:** Mild interstitial prominence, trace pleural effusions, bibasilar opacities right greater than left
 - **Influenza Test:** Positive Influenza A
 - **Streptococcus Pneumoniae:** Positive
- Further Findings:**
- **CT-Angiogram:** Revealed bilateral upper lobe pulmonary embolisms, with moderate emphysema, as well as interstitial infiltrates and small basilar consolidations bilaterally. As well as 13 mm left upper lobe nodule
- Treatment and Outcome:**
- **Antibiotics:** Ceftriaxone (1 grams daily) and Tamiflu 75mg BID
 - **Anti-coagulation:** Started on Enoxaparin 80mg BID and transitioned to Apixiban 10 mg bid, and then Apixiban 5 mg BID
 - **Follow-up:** Discharged after completion of Oseltamivir and Ceftriaxone on Apixiban 5mg BID with a 30-day supply from our volunteers to follow up with VA for support and further workup of nodule and anti-coagulation, as well as follow up with PCP.
- Re-presenting Symptoms:**
- 1-month later with chest pain, worsening with deep inspiration, requiring 3L NC saturation 94%
 - Tachycardic to 105 beats/minute, Tachypneic 20 breaths/minute
 - **CT-Angiogram:** Indicated pulmonary embolism in the segmental branches of the left upper and lower lobes, new compared to prior studies. As well as PE in the segmental branches of the right upper and middle lobes being new. The previously noted spiculated nodule which was 13mm in size now was measuring 17mm, as well as a new noted subpleural nodule in the lateral left lower lobe as well as inferior left upper lobe, with mildly enlarged bilateral hilar lymph nodes and subcarinal lymph nodes, concerns for metastasis
 - Later noted patient did not follow up with the VA and did not reach out to PCP for anticoagulation
- Treatment and Management:**
- **Anti-coagulation:** Heparin drip which was transitioned to Warfarin
 - **CT-Guided biopsy:** New invasive squamous cell carcinoma
 - **Follow-up:** Oncology determined patient to be discharged to VA medical center and follow up with pulmonology outpatient at county.

Discussion

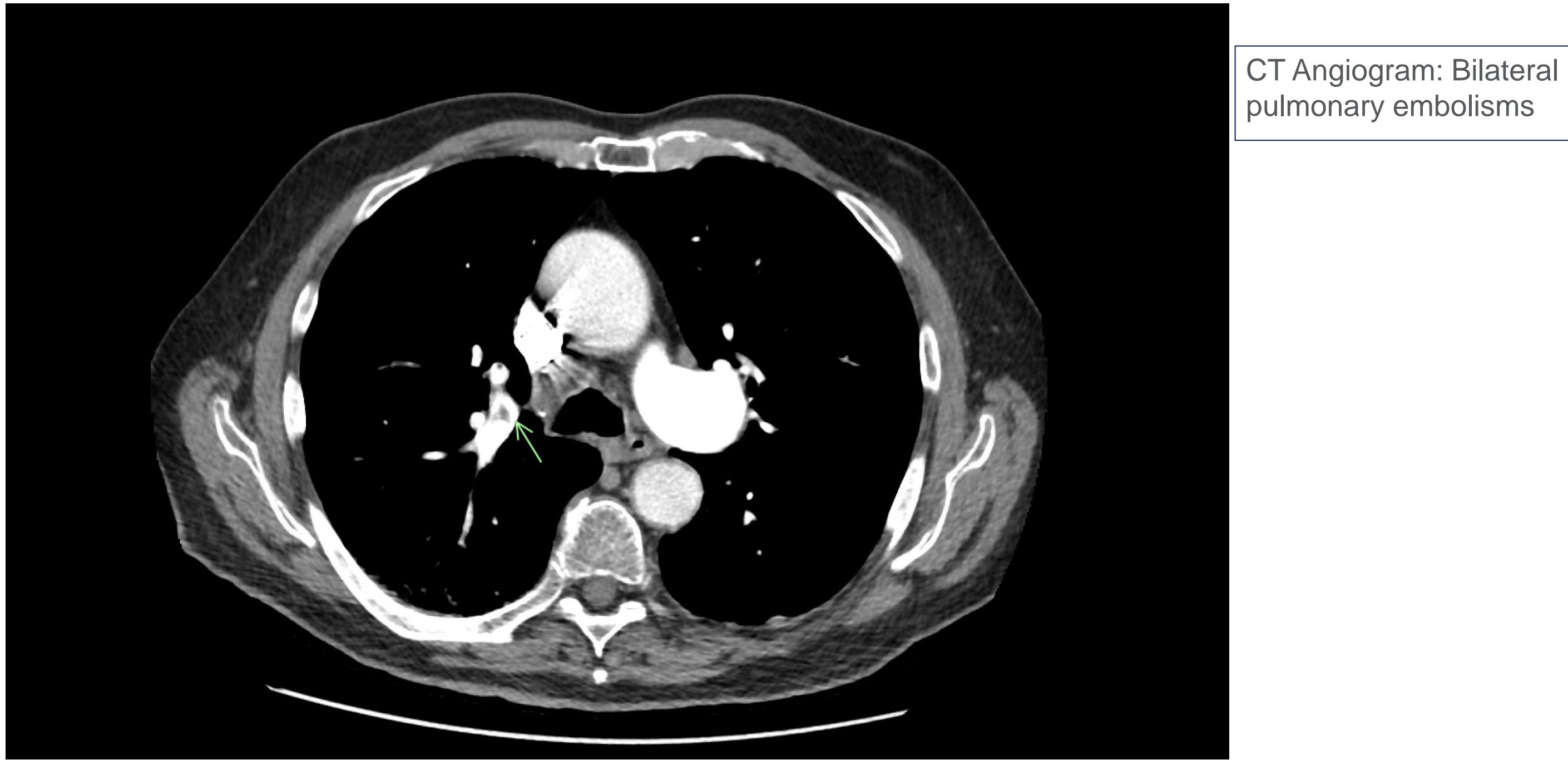
- Pulmonary embolism remains a leading cause of acute morbidity and mortality, particularly in hospitalized and elderly populations. Studies have demonstrated that cancer increases the risk of venous thromboembolism (VTE) approximately four-fold, with lung cancer being among the most thrombogenic malignancies (1). In our patient, the presence of pulmonary emboli at initial presentation, followed by the discovery of a spiculated lung nodule and eventual diagnosis of invasive squamous cell carcinoma, suggests that malignancy-associated hypercoagulability was likely an underlying contributor to his thrombotic events.
- The identification of a spiculated pulmonary nodule on imaging raised immediate concerns for malignancy. Spiculated margins are highly predictive of malignancy, with one study reporting a positive predictive value of 90% for cancer in nodules >8mm (4). Rapid interval growth of the nodule, from 13mm to 17mm within one month, further increased suspicion. Ultimately, CT-guided biopsy confirmed invasive squamous cell carcinoma. Squamous cell carcinoma, a subtype of non-small cell lung cancer (NSCLC), remains strongly associated with smoking history and chronic lung inflammation, though our patient's risk factors were compounded by environmental exposure and poor living conditions (5).
- Another critical aspect of this case is the patient's inability to maintain anticoagulation therapy due to financial constraints. Nonadherence to anticoagulation significantly increases the risk of recurrent venous thromboembolism (VTE), with studies showing up to a 5-fold increased risk after treatment discontinuation (1). Transitioning the patient to warfarin, a more affordable anticoagulant, was an appropriate adjustment, although warfarin management requires regular monitoring, which can be challenging in resource-limited settings.
- Finally, the patient's homelessness underscores the broader public health issue of disparities in access to care. Social determinants of health, including housing instability and financial insecurity, are independently associated with worse outcomes in chronic disease management, including cancer and cardiovascular disease (7).

Conclusion

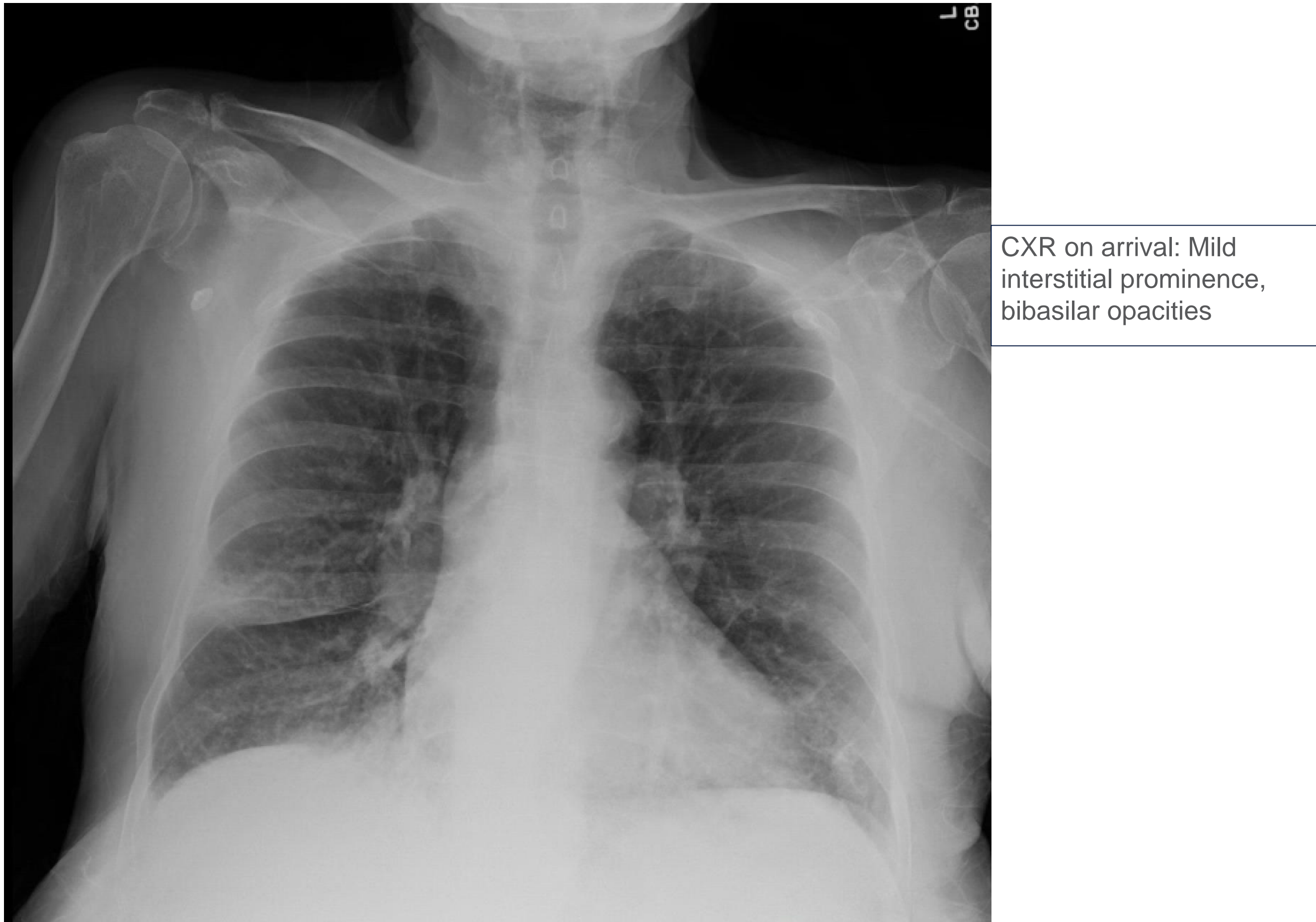
This case illustrates the diagnostic and management challenges posed by multiple simultaneous pulmonary pathologies in a medically and socially vulnerable patient. The coexistence of pulmonary embolism, concurrent viral and bacterial pneumonia, and newly diagnosed invasive squamous cell carcinoma highlights the importance of maintaining a broad differential diagnosis in patients presenting with respiratory failure. Additionally, this case underscores the significant impact of social determinants of health, such as homelessness and financial barriers, on disease progression, treatment adherence, and clinical outcomes. Early recognition, comprehensive management, and robust outpatient follow-up are critical to improving health outcomes in vulnerable populations.

References

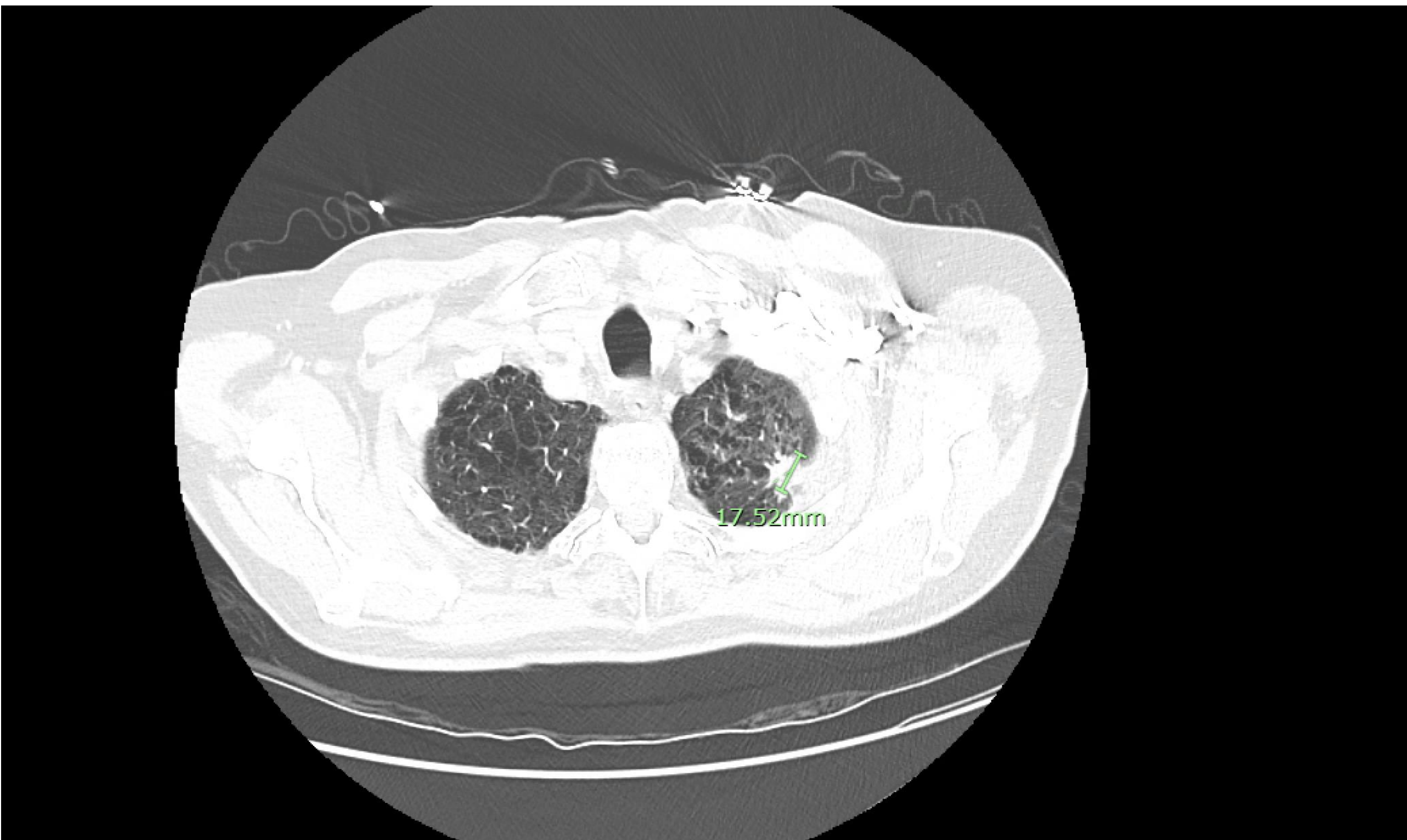
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CT Angiogram: Bilateral pulmonary embolisms



CXR on arrival: Mild interstitial prominence, bibasilar opacities



CT Angiogram: 17.52 mm spiculated nodule

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