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Ultrasound in Emergency Medicine

EMERGENCY DEPARTMENT DIAGNOSIS OF SEPTIC PULMONARY EMBOLISM DUE TO INFECTIOUS ENDOCARDITIS USING BEDSIDE ULTRASOUND

Jason Arthur, MD, MPH, Juvenal Havyarimana, MD, and Ashley Booth Norse, MD

Department of Emergency Medicine, University of Florida College of Medicine – Jacksonville, Jacksonville, Florida

Reprint Address: Jason Arthur, MD, MPH, Department of Emergency Medicine, University of Florida College of Medicine – Jacksonville, 655 W. 8th Street C506, Jacksonville, FL 32209

Abstract—Background: Septic pulmonary embolism (SPE) is a rare disorder caused by metastasis of infectious thrombi to the lungs. Most commonly, this occurs as a result of infectious endocarditis. This clinical entity may easily be confused for more common and less mortal diagnoses such as pneumonia, bronchitis, or pulmonary embolism. **Case Report:** A 47-year-old woman presented in respiratory distress with a complaint of cough productive of rusty sputum, shortness of breath, and pleuritic chest pain. A bedside ultrasound suggested endocarditis and SPE. She was resuscitated and admitted to the hospital for surgical source control and continued i.v. antibiotics. **Why Should an Emergency Physician Be Aware of This?:** SPE is a rare disorder that may be easily missed but carries a high mortality rate. Additionally, the presence of the embolic phenomena makes the diagnosis of infectious endocarditis more attainable in the emergency department (ED). To our knowledge, this case is the first in which ED bedside ultrasound was used to make the diagnosis of SPE due to infectious endocarditis. © 2018 Elsevier Inc. All rights reserved.

Keywords—endocarditis; septic emboli; pulmonary infarct; ultrasound; echo; point-of-care ultrasound; emergency ultrasound; POCUS; triple scan; lung ultrasound

INTRODUCTION

Infectious endocarditis is a rare, difficult to diagnose, and life-threatening disorder. Although advancements in

antimicrobial therapy have reduced its mortality rate, it continues to be a challenge to diagnose in the emergency department (ED). Septic embolism is a feared complication of infectious endocarditis (IE). Septic pulmonary embolism (SPE) is an uncommon form of embolic phenomena that may be easily mistaken for more benign disorders. Emergency physicians' familiarity with chest imaging, however, lowers the diagnostic threshold and presents an opportunity for emergency providers to identify the disease.

The following case report describes use of bedside ultrasound to rapidly and accurately diagnose this rare disorder in an unstable patient. To our knowledge, this is the first report of the use of ED bedside ultrasound to diagnose SPE due to IE.

CASE REPORT

A 47-year-old woman with a past medical history of i.v. heroin use, endocarditis, hepatitis C, and chronic obstructive pulmonary disease presented to the ED via Emergency Medical Services with a 3-day history of pleuritic right-sided chest pain, shortness of breath, cough productive of rusty sputum, fever, and fatigue. She reported no exacerbating or alleviating factors. She had most recently used heroin 4 days prior to presentation.

In the field she was tachycardic, tachypnic, and hypoxic to the mid 80s and was provided oxygen via nonrebreather. Initial vital signs in the ED were heart rate

104 beats/min, respiratory rate 22 breaths/min, blood pressure 105/66 mm Hg, temperature 38.17°C (98.9°F), and SpO₂ 100%. On examination the patient was ill appearing. Pulmonary examination was remarkable for respiratory distress, tachypnea, accessory muscle use, and ronchi in the right lung base. Cardiovascular examination was remarkable for tachycardia. The remainder of the examination was normal. Due to the patient's respiratory distress, a point-of-care ultrasound (POCUS) of the heart, lungs, and inferior vena cava were performed. The echocardiogram was remarkable for a pericardial effusion without tamponade physiology, a large tricuspid valve vegetation (Videos 1 & 2, available online), tricuspid regurgitation (Video 3, available online), and an inferior vena cava with > 50% respiratory variation. Lung ultrasound was remarkable for scattered b-line pattern, left-sided pulmonary infarct (Video 4, available online), right anterior pleural effusion, bilateral dependent pleural effusions, and a right-sided complex effusion with septations suggestive of an empyema or abscess (Video 5, available online). At that point a diagnosis of septic pulmonary emboli due to endocarditis was presumed. The patient was resuscitated with a 30-mL/kg isotonic fluid bolus, three sets of blood cultures were drawn, and broad-spectrum antibiotics were started. Laboratory values were remarkable for leukocytosis of 24K with 25% bandemia, hemoglobin of 7.4 g/dL (previously 8.3 g/dL), lactic acid of 2.9 mmol/L, potassium of 3.0 mmol/L, bicarbonate of 30 mmol/L, and procalcitonin of 1.00 ng/mL. A urinalysis was remarkable for 10 white blood cells/high power field, 2 red blood cells/high power field, 4+ bacteria, and an absence of casts. An electrocardiogram was remarkable for sinus tachycardia. A chest x-ray study showed right-sided opacities thought to represent multifocal pneumonia and a right pleural effusion

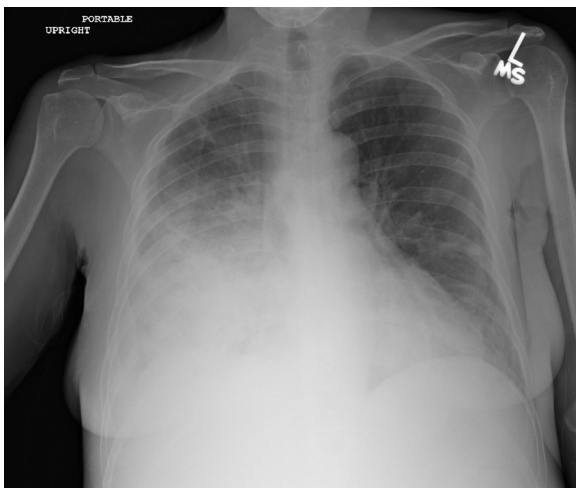


Figure 1. Anteroposterior chest x-ray study demonstrating multifocal pneumonia and a right pleural effusion.

(Figure 1). Due to the patient's clinical condition, a computed tomography (CT) pulmonary embolism protocol was ordered. While the patient was undergoing CT, and after her initial resuscitation, her chart was reviewed and we discovered that she had previously had multiple episodes of endocarditis. Two months prior to her presentation she had left against medical advice after being admitted for septic arthritis and septic pulmonary emboli due to methicillin-resistant *Staphylococcus aureus*. The CT showed multifocal cavity lesions, a right apical empyema, and multiple masses limiting vascular flow to several areas of the parenchyma. Compared with the previous CT of the chest, there was significant worsening of the embolic phenomena (Figure 2).

The patient was admitted to the Internal Medicine service, with Infectious Disease, Cardiothoracic Surgery, and Palliative Care consulting. Blood and urine cultures sent from the ED grew *Klebsiella pneumoniae*. A complete transthoracic echocardiogram on hospital day 2 showed a 2 × 1.6-cm mobile mass on the tricuspid valve. The mass previously had measured 1.2 × 0.7-cm during her most recent previous admission for endocarditis. The patient underwent a right thoracotomy and decortication of her empyema on hospital day 3. Cultures from the empyema grew *Pseudomonas aeruginosa* and *Klebsiella pneumoniae*. Despite this, she continued to be febrile and for this reason underwent a transesophageal echocardiogram on hospital day 11, which showed an abscess within the posterior leaflet of the tricuspid valve. Because the patient continued to actively use i.v. heroin, Cardiothoracic Surgery preferred to pursue antibiotic therapy and treatment of her underlying addiction prior to consideration of further surgical intervention. Blood cultures from hospital day 24 and 25 grew *Candida albicans*, and for this reason she was begun on caspofungin, which was

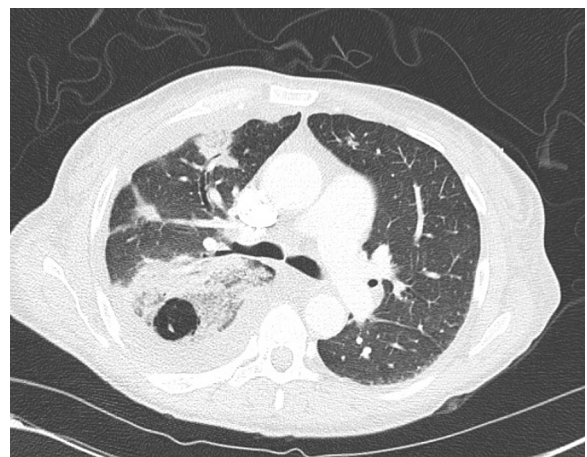


Figure 2. Axial section computed tomography scan of the chest with lung windows demonstrating pulmonary emboli, a cavity lesion, and pleural effusions.

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