

Ultrasound in Emergency Medicine



POINT OF CARE ULTRASOUND DIAGNOSIS OF EMPYEMA

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Abstract—Background: Emergency ultrasonography is an efficient and cost effective tool for patients who are in respiratory distress. Chest radiographs can yield limited information for these patients. Computed tomography scans have long been the criterion standard for advanced imaging in patients with respiratory complaints, but point of care ultrasound (POCUS) can be performed at bedside, does not expose the patient to radiation, and at times may provide more information than a computed tomography scan. **Case Report:** A 60-year-old man with a medical history of hypertension presented to the emergency department complaining of a productive cough associated with fever, weakness, and progressively worsening dyspnea on exertion over the previous 1 to 2 weeks. The physical examination was remarkable for rhonchi in the right upper lobe and diminished breath sounds throughout the right lung. POCUS was performed, and the results revealed severe atelectasis and hepatization of the right lung parenchyma with visualized air bronchograms. Complex hypoechoic material with a posterior spine sign was noted, which increased concern for complex consolidation and effusion. The diagnosis of pneumonia with empyema was made. **Why Should an Emergency Physician be Aware of This?** POCUS has become a much more commonly used imaging modality within many emergency departments. Ultrasound is more sensitive than chest radiographs for identifying pathologies such as pneumothorax and simple effusions. This case shows how well POCUS can diagnose empyema even in the setting of diagnostic uncertainty of computed tomographic imaging. © 2016 Elsevier Inc. All rights reserved.

Keywords—empyema; ultrasound

INTRODUCTION

Emergency bedside point of care ultrasound (POCUS) is an efficient and cost effective tool for patients who are in respiratory distress. Chest radiographs, while commonly used, can often yield limited information for the patient presenting in respiratory distress. One such example is a case of a patient who presents with one side of the chest radiograph with complete opacification or “white out.” Complete unilateral opacification on a chest radiograph offers a wide differential diagnosis for the emergency physician, including massive consolidations, pulmonary edema, masses, and large effusions. Other advanced imaging modalities need to be used to help narrow the differential on these patients. While computed tomography (CT) scans may add important diagnostic information, time is often critical in cases of respiratory distress and the use of ultrasound can be quite beneficial (1).

CASE REPORT

A 60-year-old with a medical history of hypertension, chronic back pain, and depression presented to the emergency department complaining of a cough productive of yellow-sputum associated with fever, rigors, weakness, diaphoresis, and progressively worsening dyspnea on

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exertion over the previous 1 to 2 weeks. His primary doctor sent him to the emergency department after his outpatient laboratory workup revealed leukocytosis with 12% bandemia. The patient denied chest pain, headache, neck stiffness, recent hospitalization, recent travel, or any history of malignancy. He appeared in mild respiratory distress with oxygen saturation of 93% to 94% on room air, tachypnea, and mild tachycardia of 105 beats/min while maintaining normal blood pressure. Triage temperature was noted as 98.9°F. The physical examination was remarkable for diaphoresis, rhonchi in the right upper lobe, and diminished breath sounds throughout the right lung.

An electrocardiogram revealed normal sinus tachycardia and no ST changes. An anteroposterior radiograph of the chest revealed almost complete opacification of the right hemithorax without tracheal deviation (Figure 1). Significant laboratory findings included leukocytosis of 18.4 K/uL with 8% bands and a lactate of 4.3 mmol/L. Focused bedside ultrasonography was performed by the emergency physician using a phased array P-4 probe on the Zonare ultrasound system (Mountain View, CA). Findings included severe atelectasis and hepatization of the right lung parenchyma with visualized air bronchograms. Hepatization describes the appearance by which a consolidated lung appears similar to the echo texture of the liver. Complex hypoechoic material with a posterior spine sign was noted, which increased concern for complex consolidation and pleural effusion (Figure 2). The diagnosis of pneumonia with empyema was made. The diagnosis of empyema was made at the bedside and early treatment was initiated. The patient was given broad-spectrum antibiotics and intravenous fluid resuscitation. A CT scan of the chest with contrast revealed a large right loculated complex pleural effusion suspicious for empyema with near complete collapse of the right

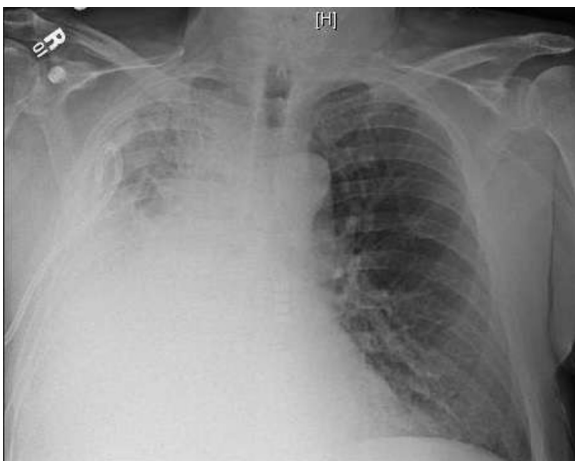


Figure 1. Chest radiograph. Note the right hemithorax opacification without tracheal deviation.

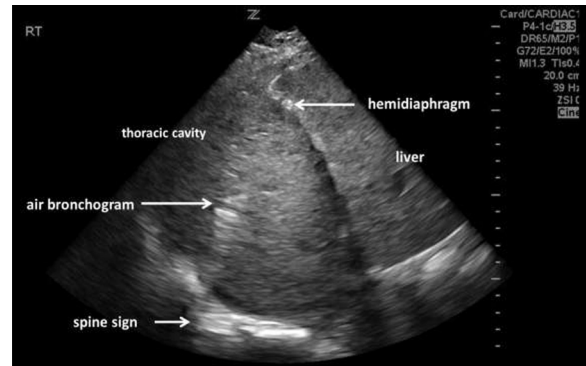


Figure 2. Point of care ultrasound of the right lung. Note the empyema compressing the liver and the spine sign seen in the deep area.

lung (Figure 3). A right-sided chest tube was placed while the patient was in intensive care, draining frank pus, thereby confirming the diagnosis of empyema.

Bacterial culture of the right pleural specimen grew few to moderate *Streptococcus intermedius*. The patient underwent right-sided video-assisted thoracoscopy and total pulmonary decortications during hospitalization. On hospital day 11, the patient was discharged on a 4-week course of oral antibiotics.

DISCUSSION

Empyemas are collections of pus within the thoracic cavity that are most commonly caused by untreated pneumonia. Empyema is an uncommon complication, occurring in 0.7% of patients with community-acquired pneumonia (2). The pleural space is normally sterile; however, it can quickly become colonized with exudative effusions from untreated infections (Figure 4A) (3). This



Figure 3. Computed tomography scan, coronal view. Note the large right loculated complex pleural effusion.

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