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Ultrasound in Emergency Medicine

EMPYEMA NECESSITANS DIAGNOSED BY POINT-OF-CARE ULTRASOUND

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☐ **Abstract—Background: Empyema necessitans is a rare complication of pleural empyema characterized by the dissection of pus through the soft tissues of the chest wall and eventually through the skin. The skin manifestation may appear as a superficial abscess. Case Report: A 63-year-old woman presented to the Emergency Department (ED) with a chief complaint of dyspnea, dry cough, and a cutaneous nodule on her right chest wall. Three weeks prior to her ED visit, she underwent an exploratory thoracotomy and chest tube placement. The chest tube was removed 2 weeks later. Her physical examination was significant for decreased breath sounds over her right lung fields and a painful, fluctuant, and erythematous nodule on the right chest wall where the chest tube had previously been inserted. Externally, the dermal findings appeared to be a superficial abscess. A chest X-ray study showed a large pleural effusion in her right hemithorax. Point-of-care ultrasound (POCUS) performed by an emergency physician showed evidence of a tract extending from the nodule toward the pleural space that led to the correct diagnosis and treatment of empyema necessitans. Why Should an Emergency Physician Be Aware of This?: It is important to distinguish between a superficial abscess, which requires local drainage, and empyema necessitans, which requires either chest tube drainage, open drainage, or even decortication in specific cases. In such cases, POCUS can facilitate a rapid, accurate diagnosis, and lead to the correct treatment.** © **2020 Elsevier Inc. All rights reserved.**

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☐ **Keywords—POCUS; empyema necessitans; empyema necessitates**

INTRODUCTION

Pleural empyema refers to an infected, purulent, and often loculated pleural effusion (1). It is usually secondary to underlying pneumonia but may result from an infection at other sites (2). The presentation and microbiologic etiology may vary in cases of trauma, local surgery, or medical conditions such as malignancies, collagen-vascular disease, immunodeficiency disorders, and adjacent infection (3).

Empyema necessitans, also known as empyema necessitates, is a rare complication of pleural empyema, characterized by the dissection of pus through the soft tissues of the chest wall and eventually through the skin (4).

Point-of-care ultrasound (POCUS) is now often used in the hands of the emergency physician (EP) to diagnose musculoskeletal and cutaneous conditions (5). It has been shown to change physician management in approximately half of emergency department (ED) patients with a soft tissue infection (6). POCUS has also been used to diagnose empyema secondary to pneumonia (7).

CASE REPORT

This case report describes empyema necessitans that was diagnosed and managed in the ED by POCUS.

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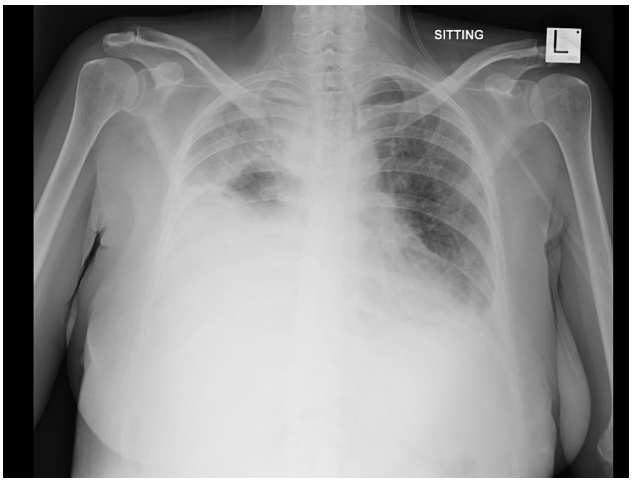

Figure 1. Chest radiography—anteroposterior view demonstrating a pleural effusion and possible lung consolidation (atelectasis/pneumonia) in the right hemithorax. A small left pleural effusion is also demonstrated.

A 63-year-old woman with a history of hypertension, scleroderma, and a recent diagnosis of adenocarcinoma of probable pleural origin, presented to the ED with a chief complaint of dyspnea, dry cough, and a cutaneous nodule on her right chest wall. She denied fever or chills.

Three weeks prior to her ED visit, she underwent an exploratory thoracotomy and chest tube placement. The chest tube was removed 2 weeks later.

She had a heart rate of 118 beats/min, blood pressure of 113/50 mm Hg, respiratory rate of 20 breaths/min, a temperature of 36.7°C (98.1°F), and room air oxygen saturation of 95%.

Her physical examination was significant for decreased breath sounds over her right lung fields and a painful, fluctuant, and erythematous nodule on the right chest wall where the chest tube had previously been inserted. Externally, the dermal findings appeared to be a superficial abscess. Her laboratory tests included an elevated C-reactive protein of 11.35 mg/dL and normal white blood cell count of 8500 cells/μL.

A chest X-ray study showed a large pleural effusion in her right hemithorax (Figure 1). POCUS performed by an EP showed evidence of a tract extending from the nodule toward the pleural space (Figure 2; Video 1). Pleural collections in her right hemithorax were also seen. A computed tomography (CT) scan of the chest with contrast was performed (Figure 3) verifying the diagnosis of empyema necessitans. A chest tube was inserted, which drained only a minimal amount of fluid and therefore, was removed. Due to her advanced malignancy, she was not a candidate for further surgical intervention. After hospitalization for 1 week with intravenous antibiotics

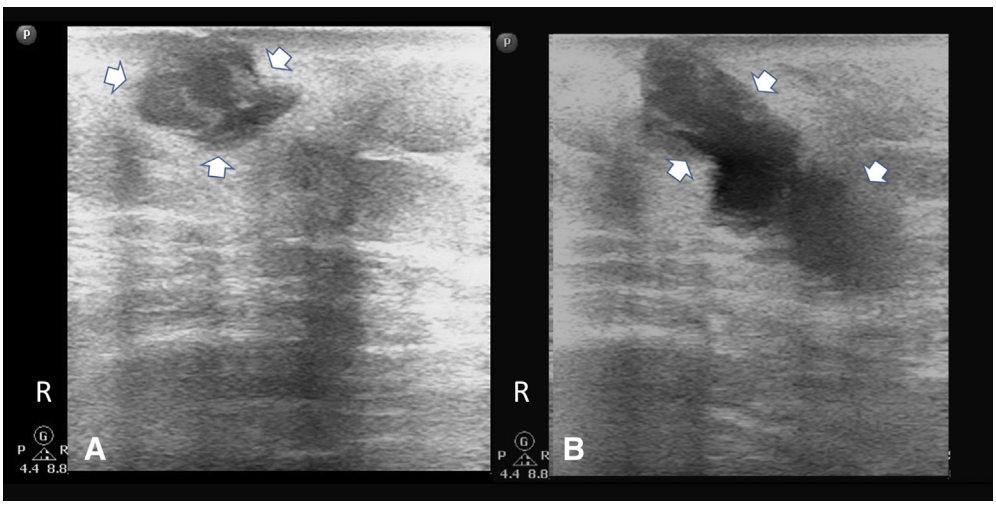

Figure 2. (A) Point-of-care ultrasound of the right chest wall with a linear probe demonstrating in short axis a subcutaneous hypoechoic heterogenic round structure (arrowheads) suspected for a superficial abscess. (B) A longitudinal view of the structure which is described in (A), demonstrating a continuous tract/fistula from the skin (arrowheads) towards the pleura.

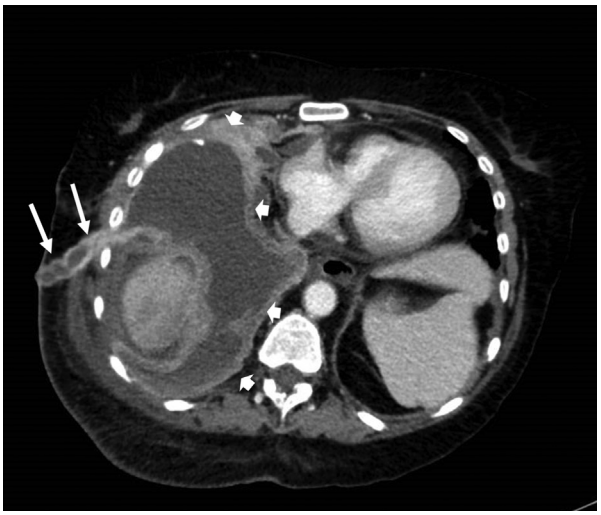

Figure 3. Chest computed tomography scan with contrast-axial view, demonstrating the right hemithorax with collections of pleural fluid, peripheral thickening, and enhancement of the pleura- suspicious of empyema (arrowheads). In the lateral right chest wall, a tract with fluid content is seen leading from a collection of pleural fluid, through the pleura to the skin (large arrow).

and partial clinical improvement, she was discharged home.

DISCUSSION

Empyema necessitans is a rare pathological condition consisting of communication between an empyema in the pleural space and subcutaneous tissue. The entity was first described by Gullan De Baillon in 1640. The majority of cases are caused by mycobacterium tuberculosis, although many other organisms have also been implicated (8). Treatment options of empyema necessitans may include antibiotic therapy, chest tube drainage, open drainage, and decortication (9). Case reports have described the diagnosis of this entity by CT imaging (4,10). Only one case report from 1984 described the role of ultrasound in the diagnosis of empyema necessitans, but this was performed by a radiologist (11). This is the first case that describes POCUS by an EP to diagnose empyema necessitans.

In this case, POCUS was used to distinguish between a superficial abscess, which requires local drainage, and empyema necessitans, which requires either chest tube drainage, open drainage, or even decortication in specific cases.

In conclusion, this case highlights an interesting and unique finding of POCUS—empyema necessitans. POCUS facilitated a rapid, accurate diagnosis that led to the correct treatment.

WHY SHOULD AN EMERGENCY PHYSICIAN BE AWARE OF THIS?

It is important to distinguish between a superficial abscess, which requires local drainage, and empyema necessitans, which requires either chest tube drainage, open drainage, or even decortication in specific cases. In such cases, POCUS can facilitate a rapid, accurate diagnosis, and lead to the correct treatment.

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SUPPLEMENTARY DATA

Supplementary data related to this article can be found at https://doi.org/10.1016/j.jemermed.2020.09.020.

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