



Empyema diagnosed by Emergency Department Point of Care Ultrasound (POCUS)



Zaza Atanelov*, Dakota Lane, Diana Mora-Montero

University of Central Florida, North Florida Regional Medical Center, Emergency Department, Gainesville, FL, USA

ARTICLE INFO

Keywords:

Thoracic or lung ultrasound
C-profile
B-profile
Empyema
Point of Care Ultrasound (POCUS)

1. Discussion

N/A.

2. Visual case discussion

A 57-year-old male presented to the Emergency Department for left sided back pain after a fall one week prior. Pertinent physical exam findings included an oxygen saturation of 95% on room air, decreased left sided breath sounds and left CVA tenderness. Chest x-ray showed opacity of the right middle lung and pleural effusion on the left. On POCUS, the right hemithorax had prominent B-lines, while the left had areas of subpleural consolidations (C-profile) and a multi-loculated pleural effusion concerning for empyema. A CT Chest was ordered, which showed right-sided pneumonia; it further confirmed a multi-loculated pleural effusion on the left with basilar infiltrate consistent with empyema. The patient was admitted and thoracentesis with fluid analysis diagnosed a definitive empyema (Figs. 1–3).

Questions

1. What is an empyema?
 - a. Purulence in the lung parenchyma involving a para-pneumonic exudative effusion.
 - b. Purulence in the pleural cavity involving a para-pneumonic transudative effusion.
 - c. Purulence in the pleural cavity involving a para-neoplastic transudative effusion.
 - d. Purulence in the lung parenchyma involving a para-neoplastic

exudative effusion.

- e. Purulence in the pleural cavity involving a para-pneumonic exudative effusion
2. What laboratory results of pleural fluid are consistent with empyema?
 - a. Positive Light's criteria and low pH, glucose and LDH.
 - b. Positive Light's criteria, high pH, high glucose and low LDH.
 - c. Negative Light's criteria and low pH, high glucose, and high LDH.
 - d. Negative Light's criteria and high pH, high glucose and low LDH.
 - e. Positive Light's criteria and low pH, high glucose and high LDH.
 3. What is the management of an empyema?
 - a. Antibiotics
 - b. Antibiotics and thoracentesis
 - c. Antibiotics and chest tube placement
 - d. Antibiotics and CT surgery consult if a complicated empyema
 - e. All of the above are correct

Answers

1. Purulence in the pleural cavity involving a para-pneumonic exudative effusion. Explanation: Empyema is an area of purulence or pus in the pleural space that occurs with or after an inflammatory process like pneumonia, status post thoracic surgery, or trauma. The inflammation leads to an exudative pleural effusion, which then gets infected by bacteria or fungi resulting in a complicated pleural fluid infection that resembles a complicated abscess.¹
2. Negative Light's criteria and high pH, high glucose and low LDH. Explanation: Empyema is diagnosed with imaging, which includes chest X-ray, ultrasound and/or CT, with CT being most diagnostic.

* Corresponding author.

E-mail address: zaza.atanelov@hcahealthcare.com (Z. Atanelov).

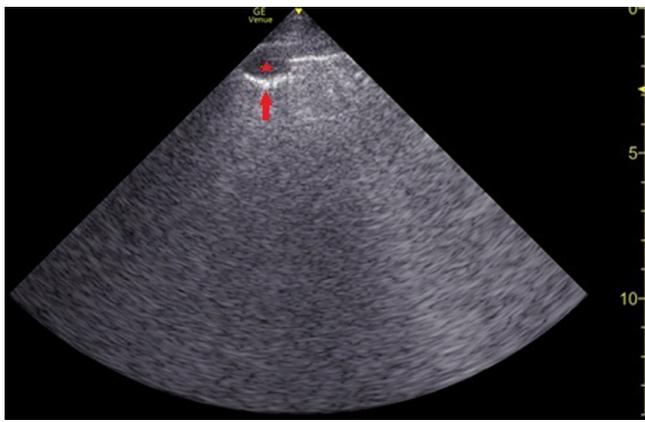


Fig. 1. Left lung ultrasound with sub-pleural consolidation (star) and C-profile (arrow) indicating a pneumonia.



Fig. 2. Left PLAPS view, demonstrating pleural effusion with a positive spine sign (arrow) and complex loculations (star) indicating an empyema.

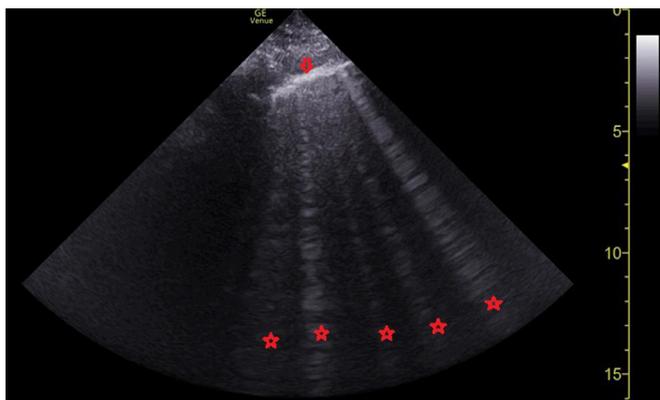


Fig. 3. Right lung ultrasound with B lines (stars) and thick pleura (arrow) consistent with a B/C profile, and therefore, a pneumonia.

exudative process and not transudative. Pleural fluid pH <7.2, glucose level <60 mg/dL, and lactate dehydrogenase (LDH) >1000 units/L indicates an exudative process or empyema that requires therapeutic drainage.¹

3. All of the above are correct. Explanation: Antibiotics are always necessary to treat empyemas. In addition, a majority of empyemas will require drainage, typically done initially via thoracentesis or chest tube placement. A small French catheter can be used for uncomplicated early stage empyemas. Sometimes the thoracostomy tube becomes clogged, 10 mg tPA or 5 mg DNase can be pushed into the tube to break-up loculations and improve drainage. Some unresolving and complicated empyemas may require a larger French tube or consultation with thoracic surgery for a Video Assisted Thoracoscopic surgery (VATs) procedure.^{1,2}

Declaration of Competing Interest

None.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at [doi:10.1016/j.visj.2019.100654](https://doi.org/10.1016/j.visj.2019.100654).

References

1. Garvia V, Paul M. *Empyema*. [Updated 2018 Nov 23]. StatPearls [Internet]. Treasure Island, FL: StatPearls Publishing; Jan 2018. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK459237/>.
2. Ahmed O, Zangan S. Emergent management of empyema. *Sem Intervent Radiol*. 2012;29(3):226–230. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3577590/>.

The light's criteria is used to determine if pleural fluid is an