

Is My Patient's Pleural Effusion Simple or Complicated?

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2/7/2017



Clinical case

- 90 year old woman with HTN, dementia, MDS and frequent falls at home
- Admitted with weakness, found to have femoral neck fracture and UTI
- Underwent repair of fracture
- Post-op respiratory failure requiring 10L O2 via NC, was diuresed with improvement
- However, began worsening again, with increasing dyspnea/orthopnea, rising leukocytosis and AMS



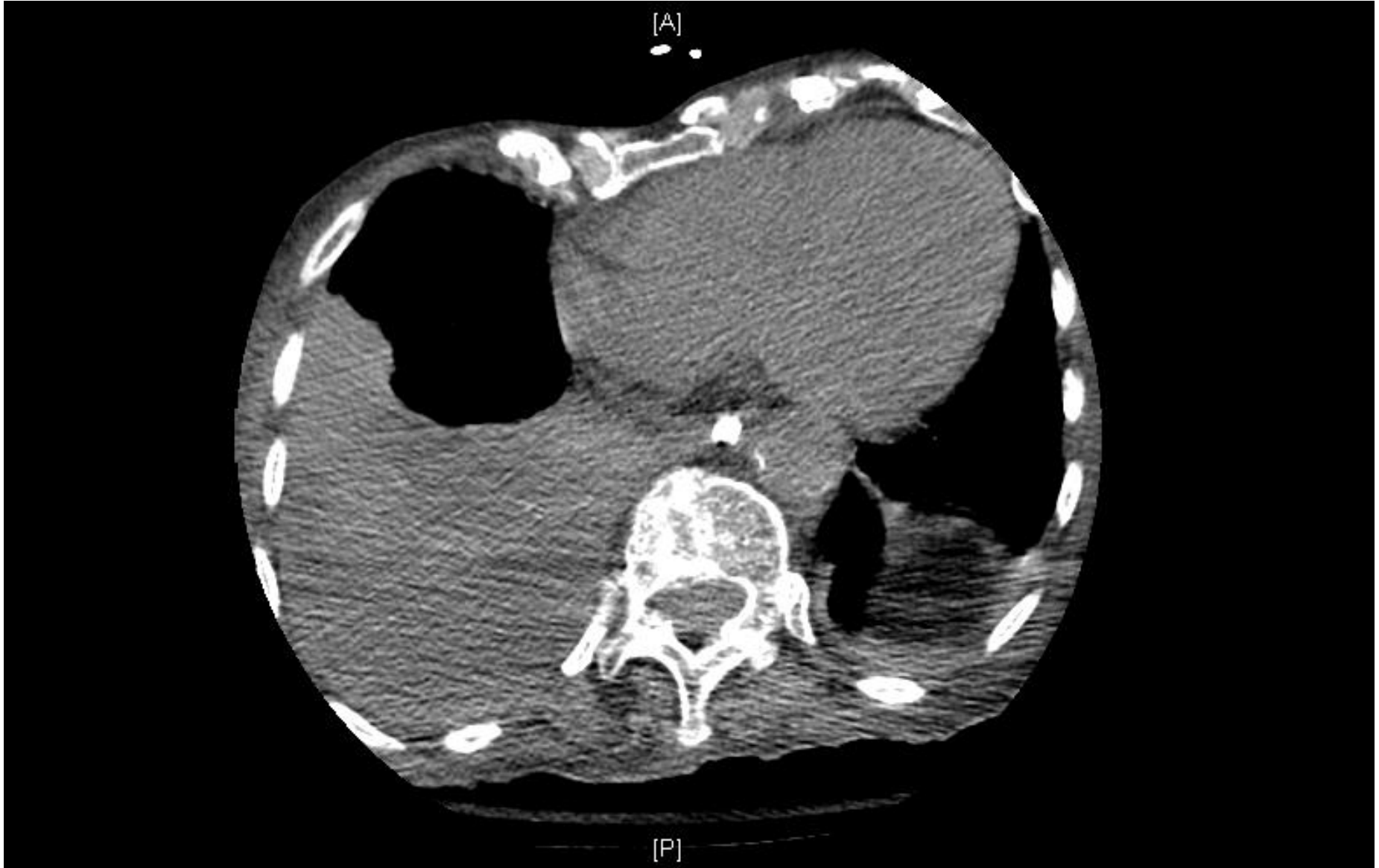
Physical Exam

- Temp 36.3C, HR 93, BP 125/62, RR 22, 100% 4L
 - Appeared frail and dyspnic, with use of accessory muscles, speaking in 1 word phrases
 - HEENT- MM dry, anicteric, PERRL
 - Neck- no LAN, trachea midline
 - Lungs- reduced BS on R side 2/3 way up on back and laterally, L side clear
 - Heart- RRR, clear s1/s2, no m/r/g
 - Abd- thin, ntnd, no masses
 - Extremities- wwp, 2+ pulses, scattered ecchymoses
 - Neuro- delirious, nonfocal otherwise
 - MSK- hip surgery dressing clean
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- Labs notable for WBC count 21.6, creatinine 2.4





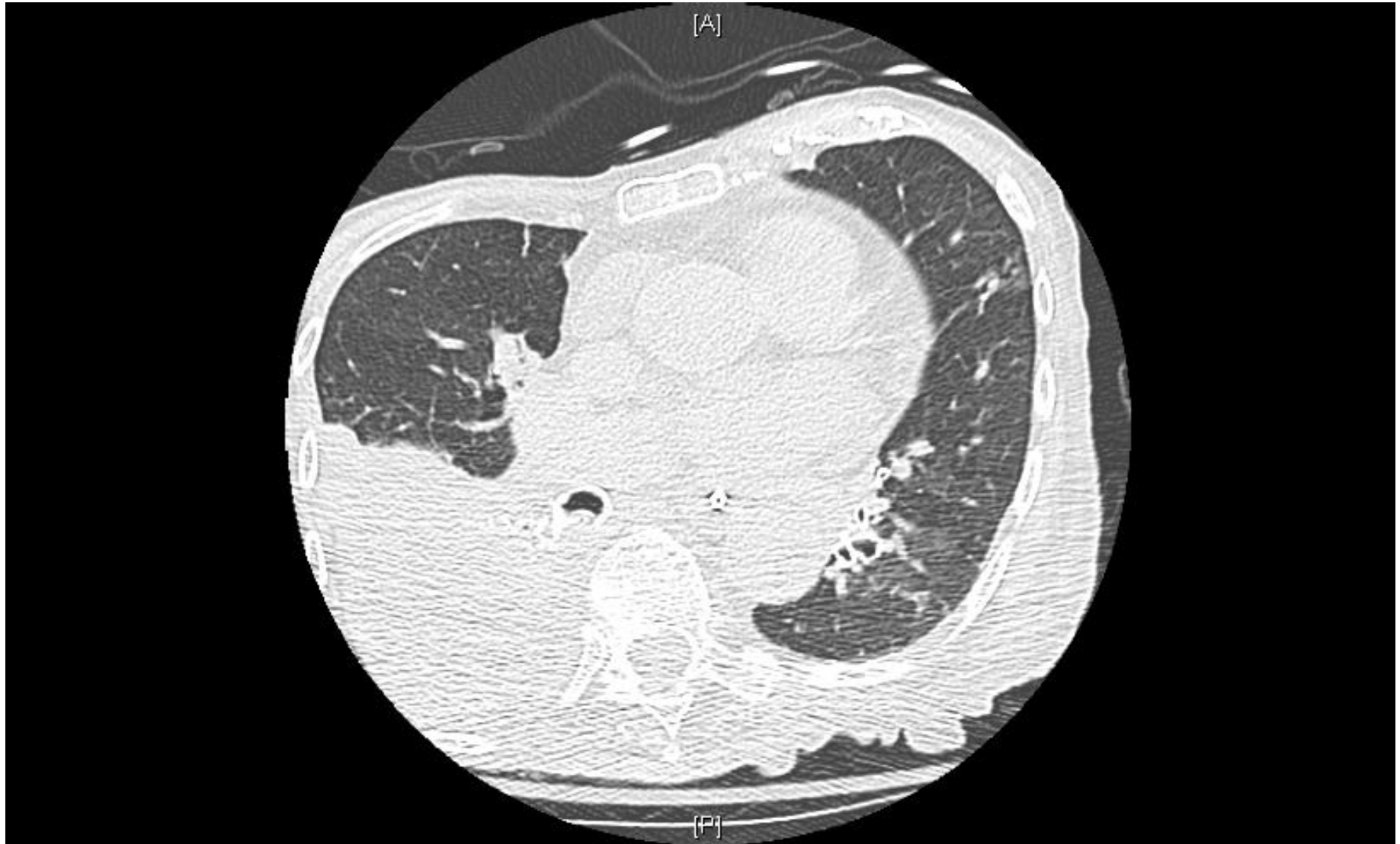
Chest CT



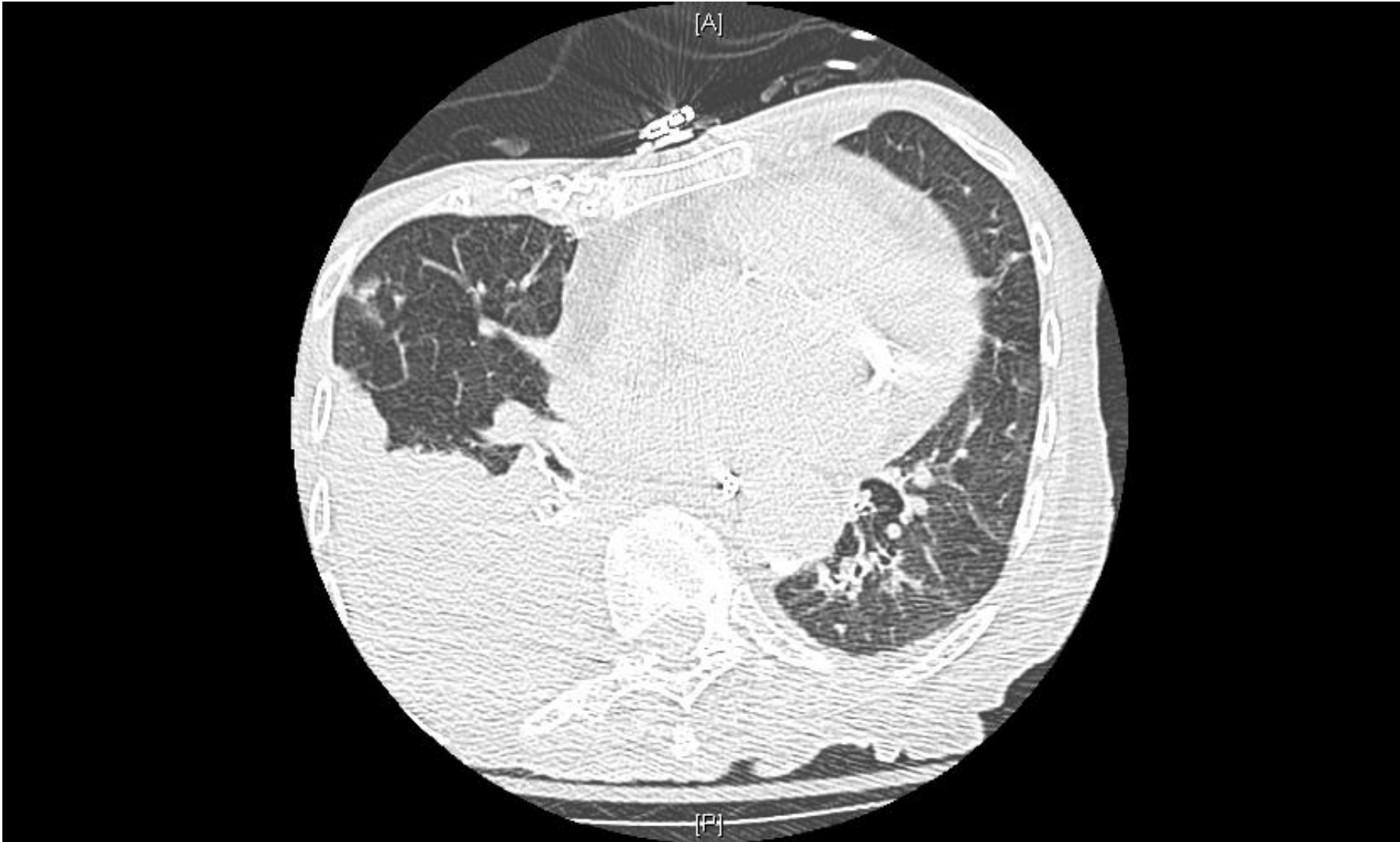
Chest CT



Chest CT



Chest CT



Chest CT



Clinical Questions

- 1) Does ultrasound define pleural effusions as simple vs complicated better than chest CT?
- 2) Is my patient's pleural effusion 2/2 CHF or parapneumonic?

Ultrasound



Ultrasound



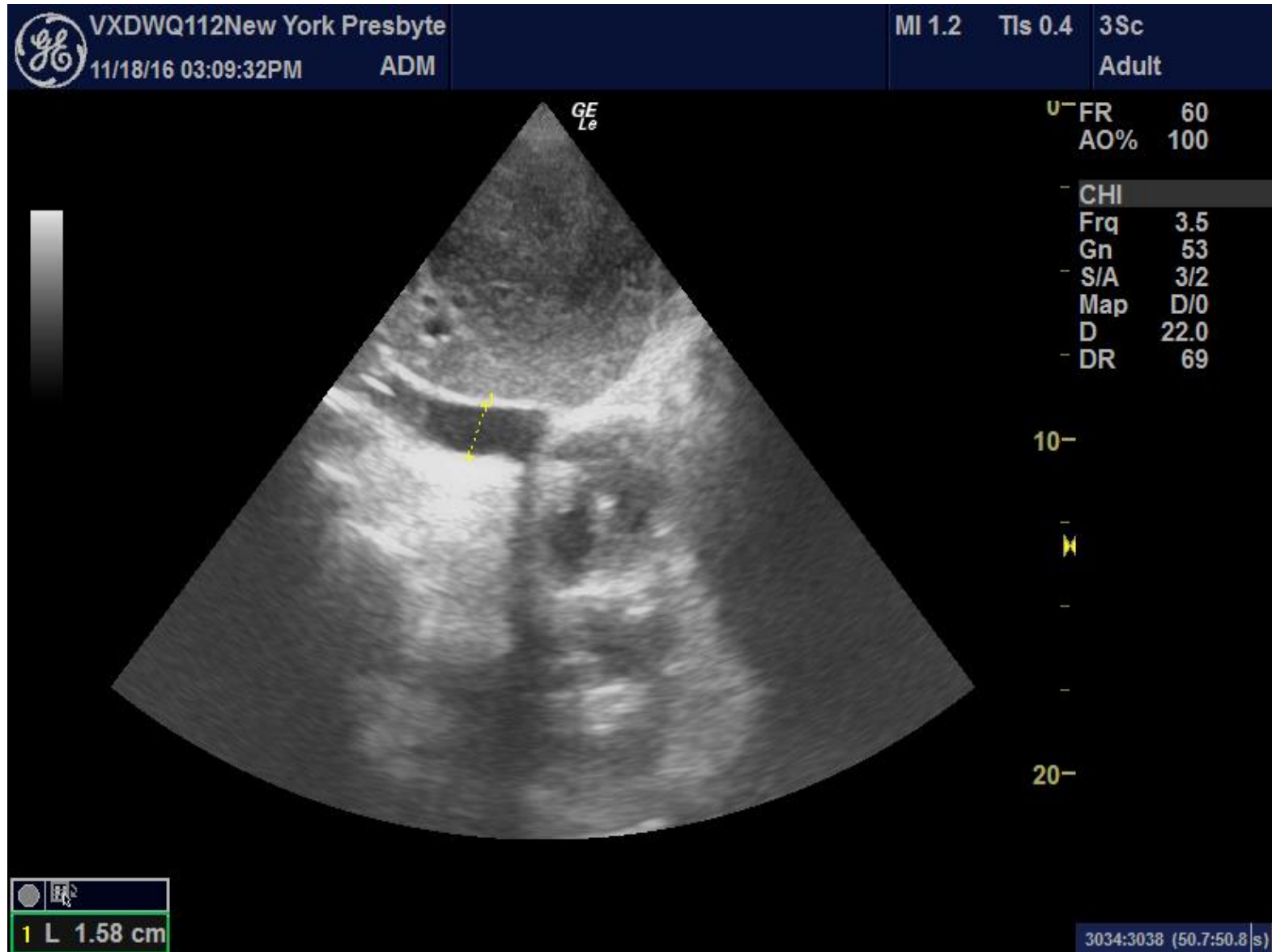
Ultrasound



Ultrasound



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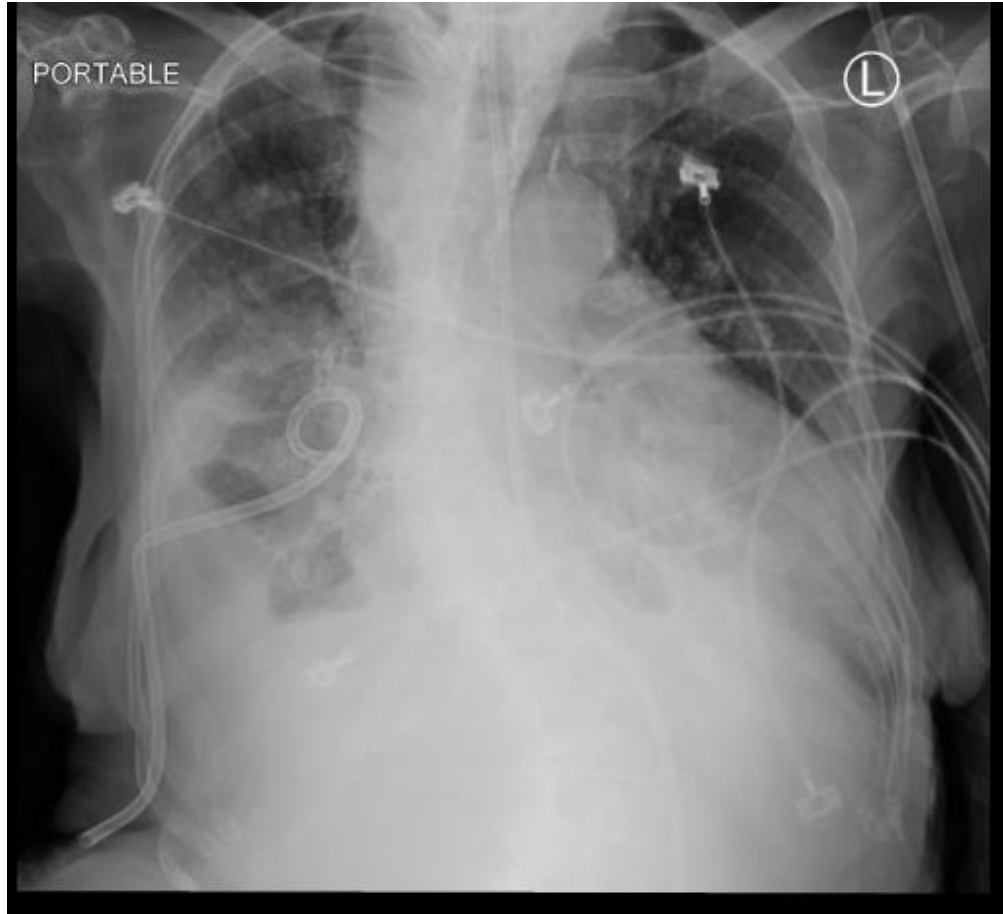
Ultrasound



Ultrasound



Patient case



Patient case

- Patient underwent chest tube placement after finding of complicated parapneumonic effusion (septations seen on ultrasound)
- Unfortunately, despite removal of pleural fluid, patient condition declined and she passed away 2 days later

Question:

Does ultrasound define pleural effusions as simple vs complicated better than chest CT?

Literature

- **“Computed Tomography and Ultrasound in Parapneumonic Effusions and Empyema”**
 - **2000 study in Clinical Radiology**
 - **Retrospective review of patients with parapneumonic effusion and exudative by Light’s criteria**
 - **Assessed CT and US characteristics of fluid and if they were predictive of clinical outcome and management of the effusion**
 - **CT findings available on 50 patients; US on 36 patients**
 - **Ultrasound clearly demonstrated septations in 22 patients, while CT demonstrated visible septae in only 3 patients**
- **The only significant correlation was increase in average pleural thickness on CT and presence of purulent fluid on drainage**



Literature cont'd...

- **“Computed Tomography and Ultrasound in Parapneumonic Effusions and Empyema”**
 - **24/36 patients had hyperechoic fluid with septae**
 - **5/36 patients had hyperechoic fluid without septae**
 - **7/36 patients had anechoic pleural effusions, despite exudative by Light’s criteria**

 - **No relationship between US appearance and Light’s stage**
 - **In fact anechoic fluid was visualized despite frank pus on aspiration**



Literature

- **“Imaging the Pleura: Sonography, CT, and MR Imaging”**
 - **1991 review article in American Journal of Roentgenology**
 - **Compared characteristics of sonography to CT**
 - **Regarding tissue density characteristics:**
 - **“CT is rarely helpful in differentiating transudates from exudates”**
 - **Rarely, septations or loculations can be seen as lenticular opacities of fixed position**
 - **Ultrasound, however, easily images even very thin septations, that are thin, mobile linear structures.**
 - **When septations are more profuse/thickened, this can suggest complicated effusion or even empyema that may be better drained via chest tube rather than simple thoracentesis**



Literature

- **“Ultrasound in the Diagnosis & Management of Pleural Effusions”**
 - **2015 review article in Journal of Hospital Medicine**
 - **Reviewed literature regarding characteristics of pleural fluid as seen on CT and ultrasound**
 - **In regards to simple vs complicated effusions:**
 - **Fibrinous stranding, septations, and loculations more readily identified on lung ultrasound than CT scan**



Literature

- **‘Multiloculated Pleural Effusion Detected by Ultrasound Only in a Critically-ill Patient’**
 - **2013 Case report and literature review in American Journal of Case Reports**
 - **Described 55 year old patient who had complete opacification of R hemithorax and failed initial attempt at drainage via chest tube**
 - **CT only showed pleural effusion and collapsed lung**
 - **POCUS showed multiple collections separated by thick septations, suggesting complex pleural effusion**



Literature limitations

- **No good literature on presence of septations or hyperechoic fluid suggesting failure of thoracentesis of chest tube placement, or need for fibrinolytics**
- **But clearly, ultrasound has advantages to chest CT for defining a pleural effusion as simple or complex:**
 - ease of obtaining images
 - no radiation
 - cost lower
 - visualizations of early thin septae that would favor tube drainage vs thoracentesis
 - serial exams to show resolution

