

Using POC-US to Evaluate Pleural Effusions Before Thoracentesis

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PGY-3

Case of IG, 83 YO F

- 84 YO F PMHx of diverticulitis, breast CA s/p lumpectomy now NED, CAD, aortic aneurysm s/p repair and pAVR who p/w fevers to 39.1 from SAR
- Was discharged from NYP to SAR 10 days before after an admission for abdominal pain where she was found to have diverticulitis c/b sigmoid perforation managed with 14-day course of Zosyn
- At SAR, had low-grade fevers x 1 week associated and C. diff negative diarrhea in addition to worsening productive cough
- Sent to ED given worsening fever and new oxygen requirement of 2 L

Exam

- VSS: T38.5, RR20, BP125/78, SaO2 96% on 4 L NC
- Gen: chronically ill appearing, NAD
- HEENT: anicteric sclera, dry mucous membranes
- CV: S1 S2, no murmurs, no JVD
- Lungs: decreased BS at bases R > L, crackles in higher lung fields, coughing and mildly tachypneic
- Abdomen: soft, mildly TTP generally, hyperactive sounds
- Ext: +2 pitting edema to thighs

Labs

128 | 94 | 8

-----< 191

>-----<

3.8 | 27 | 0.68

Tprotein: 3.6

Albumin: < 1

AST: 26

ALT: 16

AlkP: 70

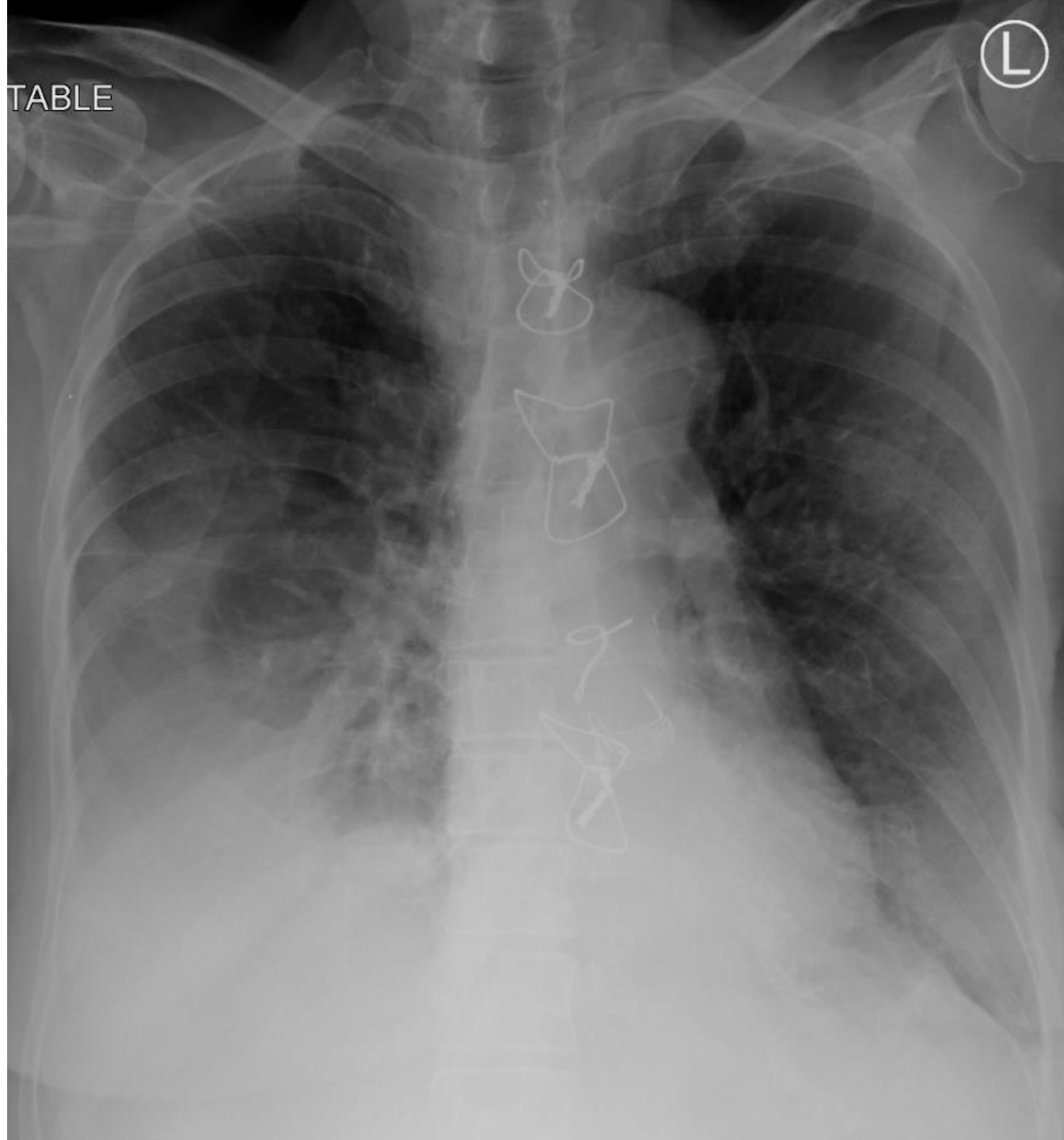
Tbili: 0.5

Dbili: 0.2

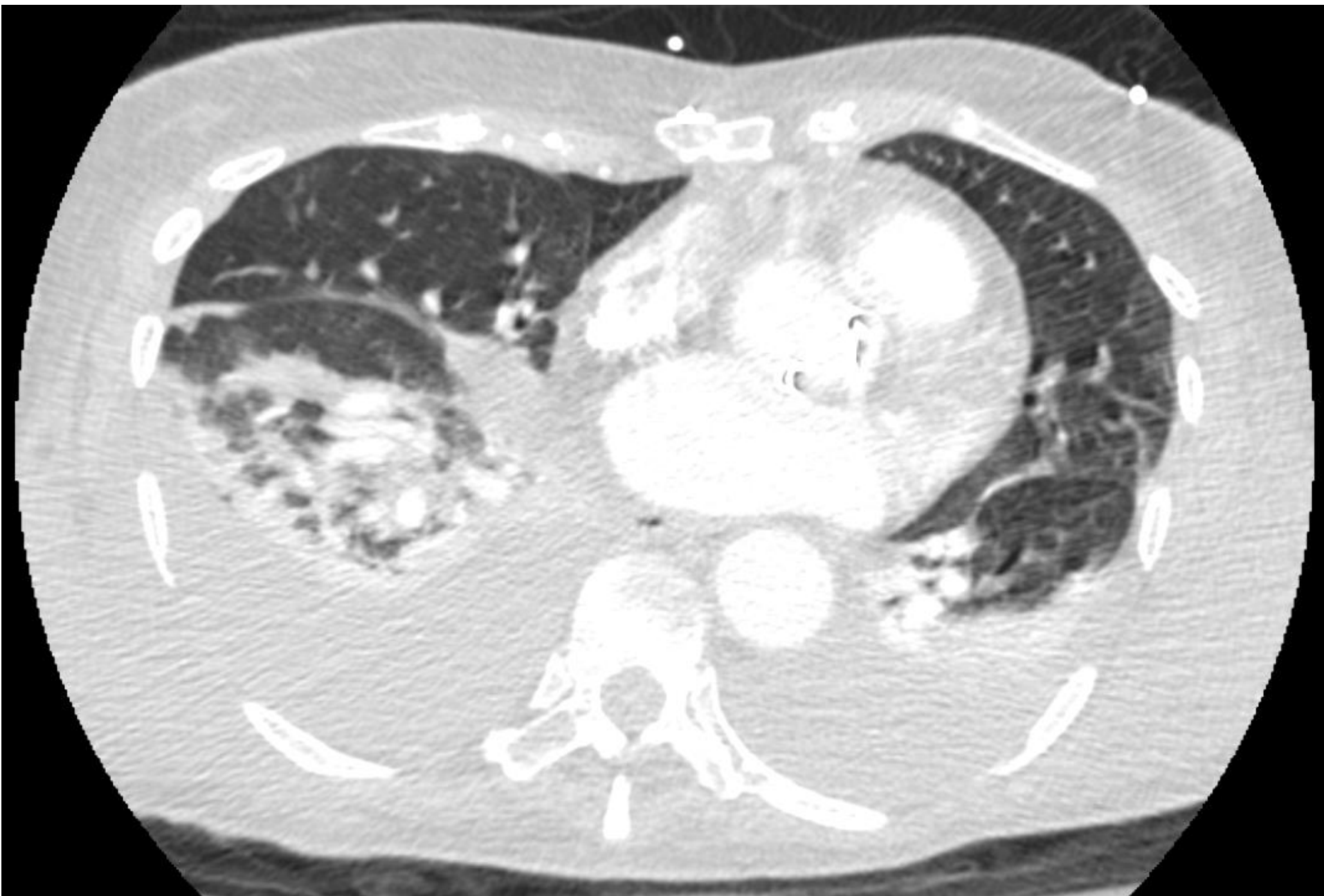
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TABLE

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Hospital Course

- Patient started on Vanc/Pip-Taz/Azithro for HCAP given CT/CXR findings
- Patient continued to be intermittently febrile even after Abx started
- B/o continued fevers and moderate respiratory distress decision made for R sided thora

12/01/16 04:58:57AM ADM dvt class, 113016-103300PM

3Sc Abdomen MI 1.2 TIs 0.3





Pleural Fluid

- Cloudy, Yellow without odor
- 220 RBCs with 60 nucleated cells (majority Lymphs 47%)
- Gram Stain Negative
- LDH: 36 ($36/204 < 0.6$)
- Protein: < 1 ($<1/3.6 < 0.5$)
- pH 7.86
- Glucose 128



Clinical Question

- How accurate is POC-US in predicting whether a pleural effusion is simple versus complex?
- How often do transudative pleural effusions appear more than just anechoic by POC-US?

- Pleural Effusions can be described as anechoic, complex non-septated, complex septated, or homogeneously echogenic by POC-US
- The usual teaching is that transudative effusions are usually anechoic on ultrasound
- However, as in our patient, transudative effusions can often have a more complex appearance by POC-US

Ultrasound as an Alternative to Aspiration for Determining the Nature of Pleural Effusion, Especially in Older People

HAMIDREZA SAJADIEH, FARZAD AFZALI, VAHAB SAJADIEH,
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- 80 patients with pleural effusions in major Iranian hospital underwent lung sono followed by diagnostic thora
- Images were examined for septations, internal echogenicity, or pleural thickening (> 3 mm)
- Transudate vs Exudate based on lab analysis of fluid

	Number of patients	Pleural effusion				
		Without separation, pleural thickening, echo	With separation or pleural thickening, and without echo	Pleural effusion with internal echo	With separation	With pleural thickening
<i>Exudate</i>						
Infectious disease	17	2	6	9	4	4
Malignancy	26	4	6	16	7	11
Collagen disease	8	1	3	4	2	3
Total	51	7	15	29	13	18
<i>Transudate</i>						
Cardiac disease	11	1	10	0	0	1
Renal disease	15	1	14	0	0	1
Hepatic disease	3	0	3	0	0	0
Total	29	2	27	0	0	2
sensitivity		0.14	0.29	0.57	0.25	0.35
specificity		0.93	0.07	1.00	1.00	0.93
LR(+)		2.0	0.32	inf	inf	5
LR(-)		0.93	10	0.43	0.75	0.69

SONOGRAPHIC APPEARANCES IN TRANSUDATIVE PLEURAL EFFUSIONS: NOT ALWAYS AN ANECHOIC PATTERN

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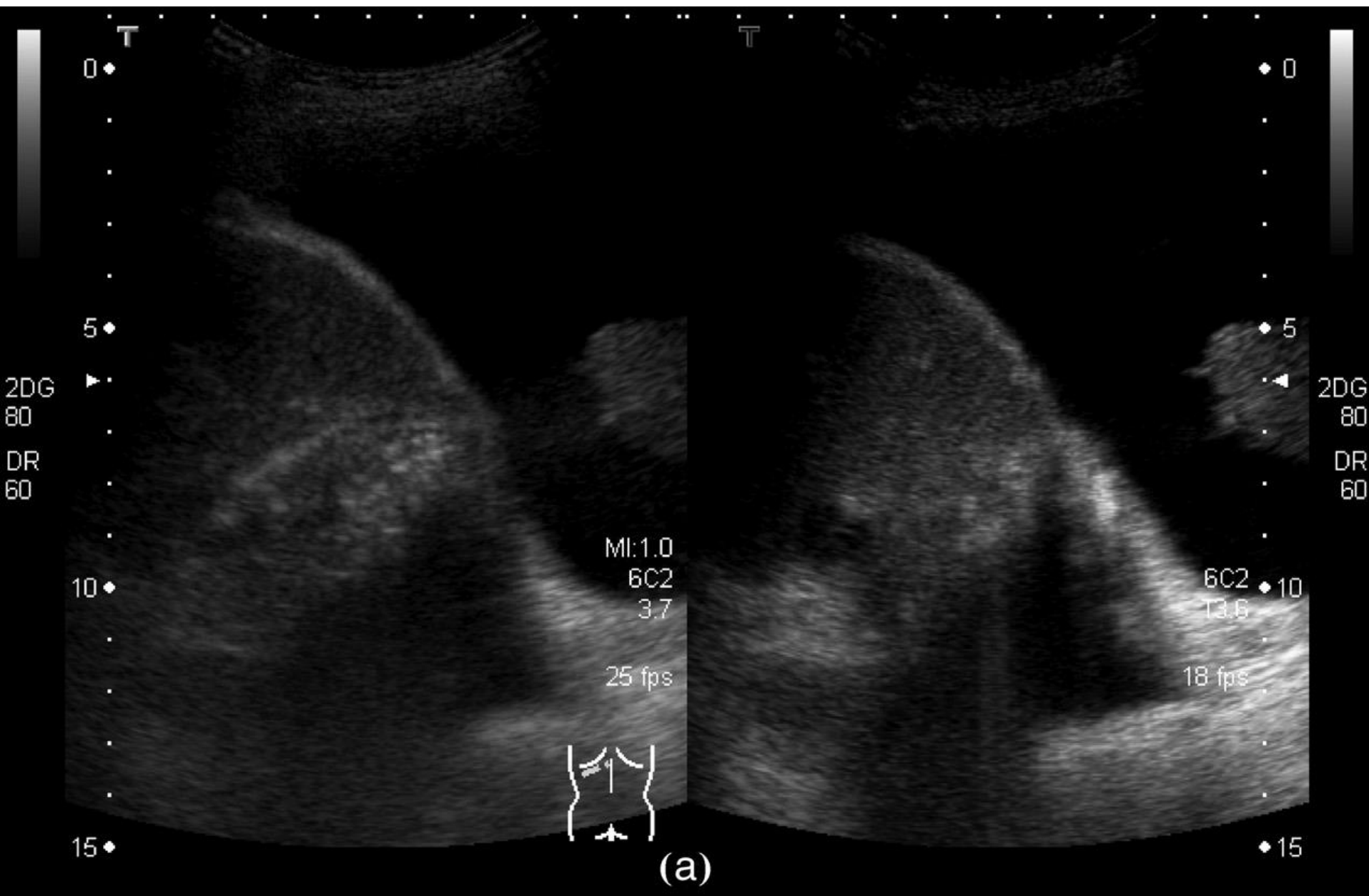
- Retrospective study
- 127 patients w/ transudative PLEFFs (by Light's) who had US prior to thora
- Etiology: CHF, renal disease, cirrhosis, or hypoalbuminemia
- Pts w/ obvious infection/malignancy/rheum disease – excluded
- US patterns predefined:
 - Anechoic
 - complex non-septated
 - complex septated
 - homogeneously echogenic
- All images reviewed by 3 different pulmonologists

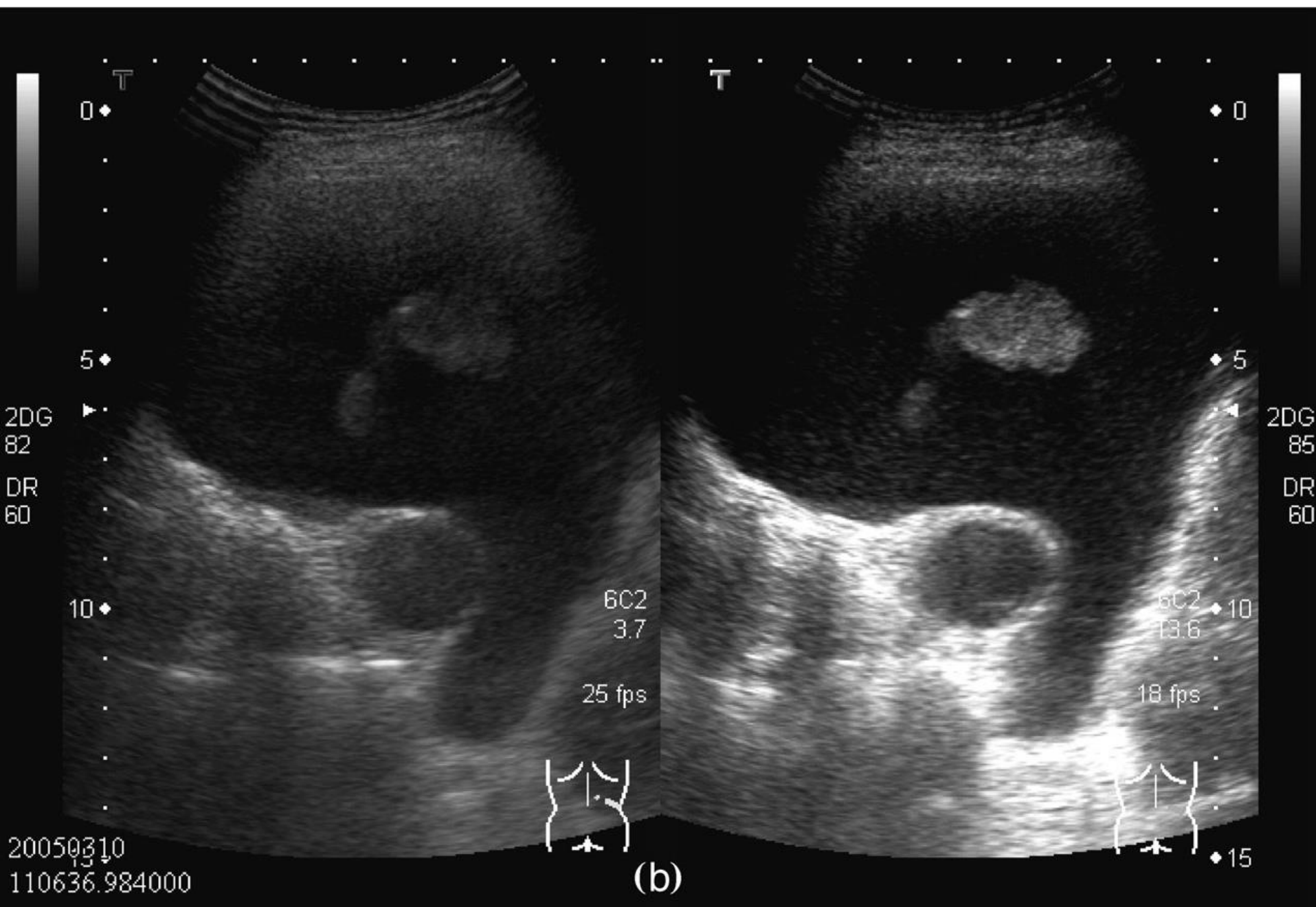
Results

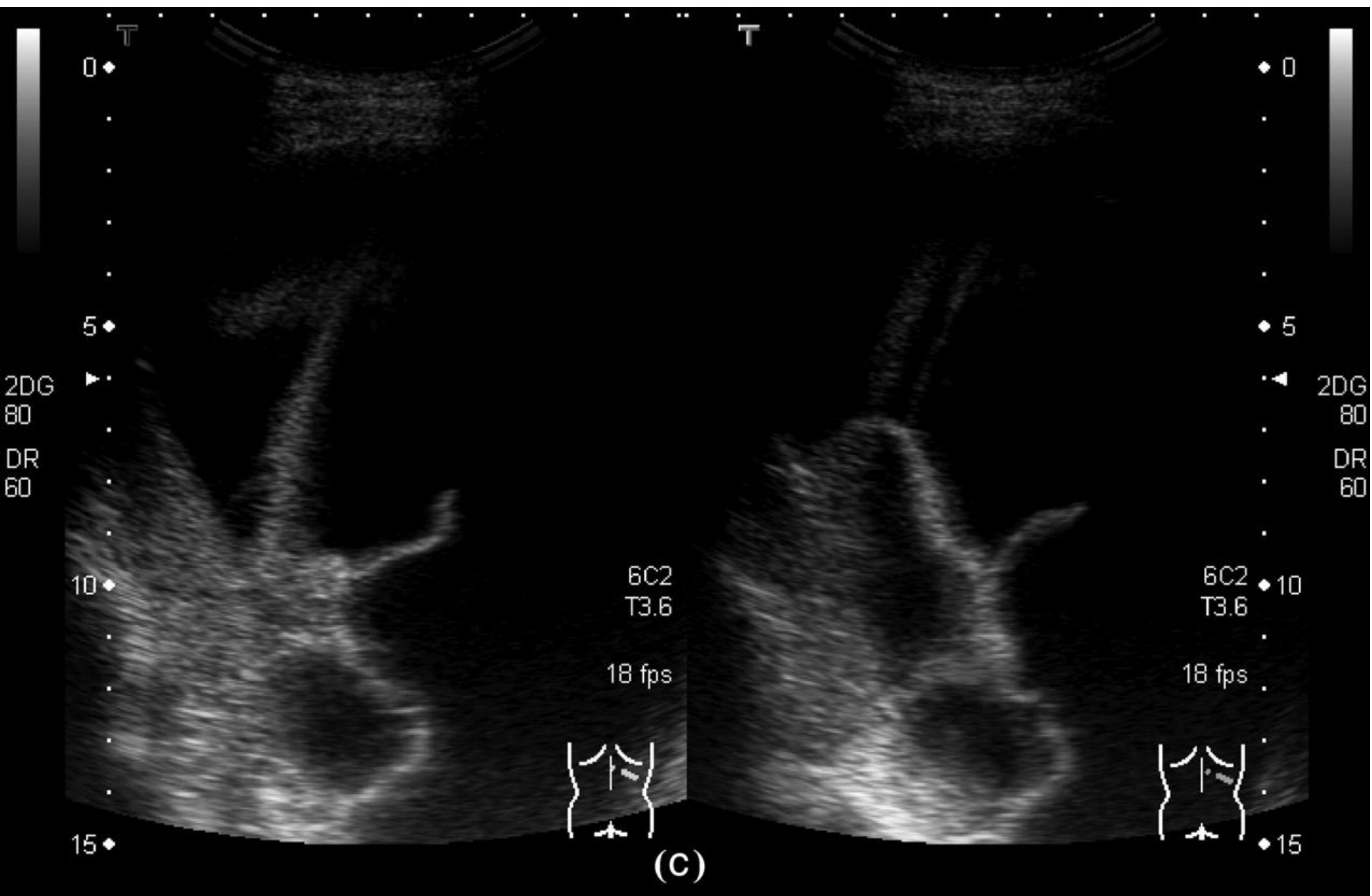
- No patients had septated or homogeneously echogenic effusions
- More than half (55%) of patients had complex effusions
- Majority of effusions thought 2/2 CHF

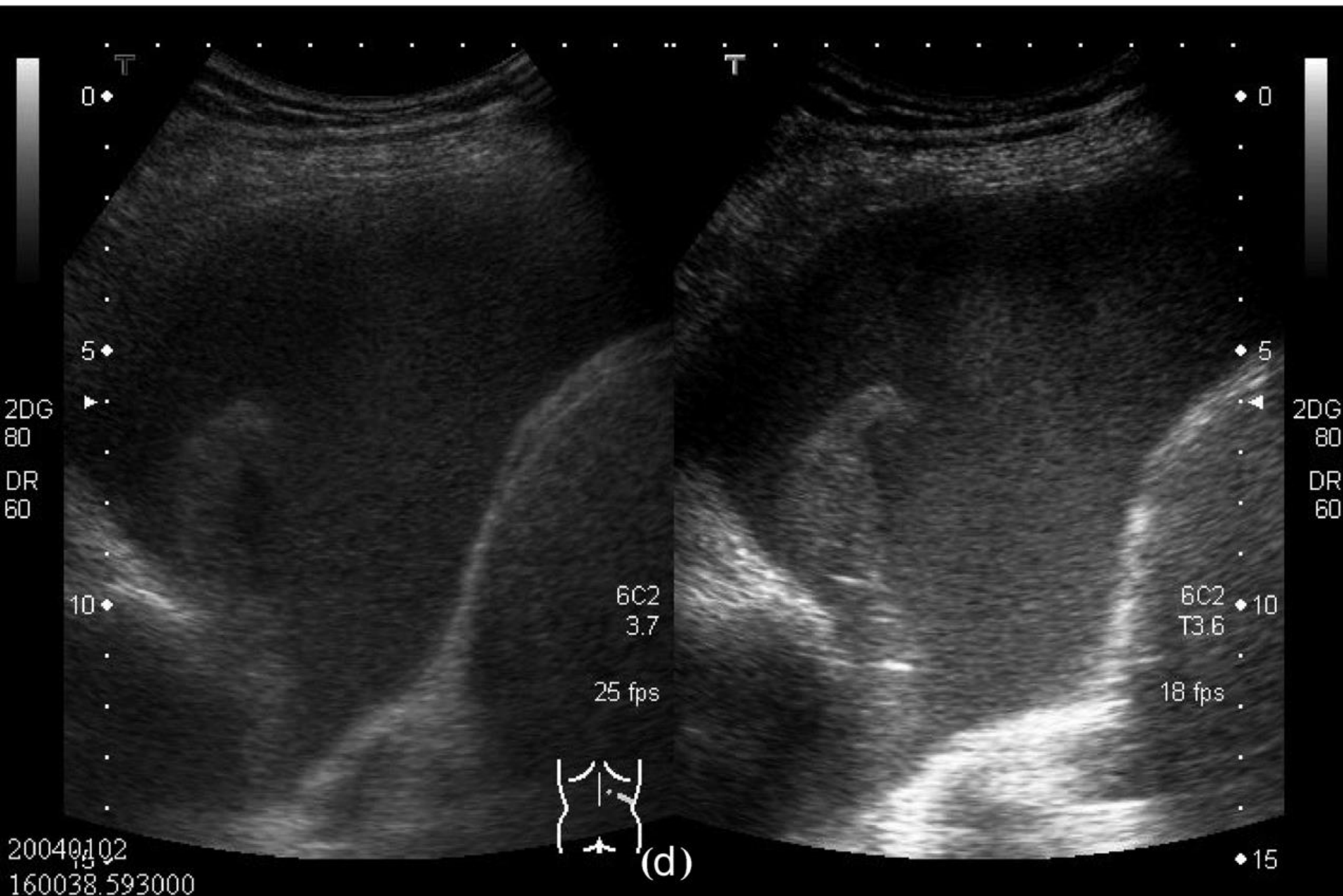
Table 1. Demographic features and sonographic appearances in 127 transudative pleural effusions

Item	Entire study population
Age, y (mean)	69 (35–93)
Sex (male/female), <i>n</i>	64/63
Side of effusions, <i>n</i> (%)	
Right side	34 (27)
Left side	7 (6)
Bilateral sides	86 (68)
Amount of pleural effusion seen in the chest radiograph, <i>n</i> (%)	
Massive	8 (6)
Moderate	49 (39)
Mild	70 (55)
Underlying problems, <i>n</i> (%)	
Congestive heart failure	75 (59)
Chronic kidney disease	44 (35)
Liver cirrhosis	31 (24)
Hypoalbuminemia	7 (6)
Sonographic appearances, <i>n</i> (%)	
I. Anechoic	57 (45)
II. Complex nonseptated	70 (55)
III. Complex septated	0
IV. Homogeneously echogenic	0









Back to Our Patient

- Although complex, non-septated effusion on ultrasound, fluid analysis showed transudative simple effusion
- Given transudate, thought more likely secondary to volume overload or hypoalbuminemia as opposed to PNA
- Results possibly confounded by low serum protein levels

Conclusions

- POC-US is useful in characterizing both size and characteristics of pleural effusions
- While transudative effusions are usually thought to appear anechoic, they can have complex appearance on ultrasound
- If any question as to the cause of an effusion, gold standard is always aspiration