Hemopericardium diagnosed by POCUS

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Brief HPI:

H.C. is a 63y/o M with HTN, HLD, DM, HCV, remote IVDU on methadone, type B aortic dissection s/p TAA repair 2001, recent admission to CT ICU for widening aneurysm and new AI, for which he underwent TAA repair and AVR. Course was c/b new onset Afib, and he was started on coumadin. He presented 3 weeks after AVR with severe exertional dyspnea, fatigue, 5 pillow orthopnea, and LE edema x 3 weeks.

Physical Exam:

Temp 36.4
HR 112
BP 147/104
RR 24
SpO2 97% on RA

GEN: middle-aged man sitting in chair, NAD
Neck: ++JVD
CV: Irregularly irregular, no murmur or rub appreciated
RESP: bibasilar crackles, decreased breath sounds at right base
ABD: distended, soft, NT/ND
EXT: WWP, 2+ LE edema to knees

Labs

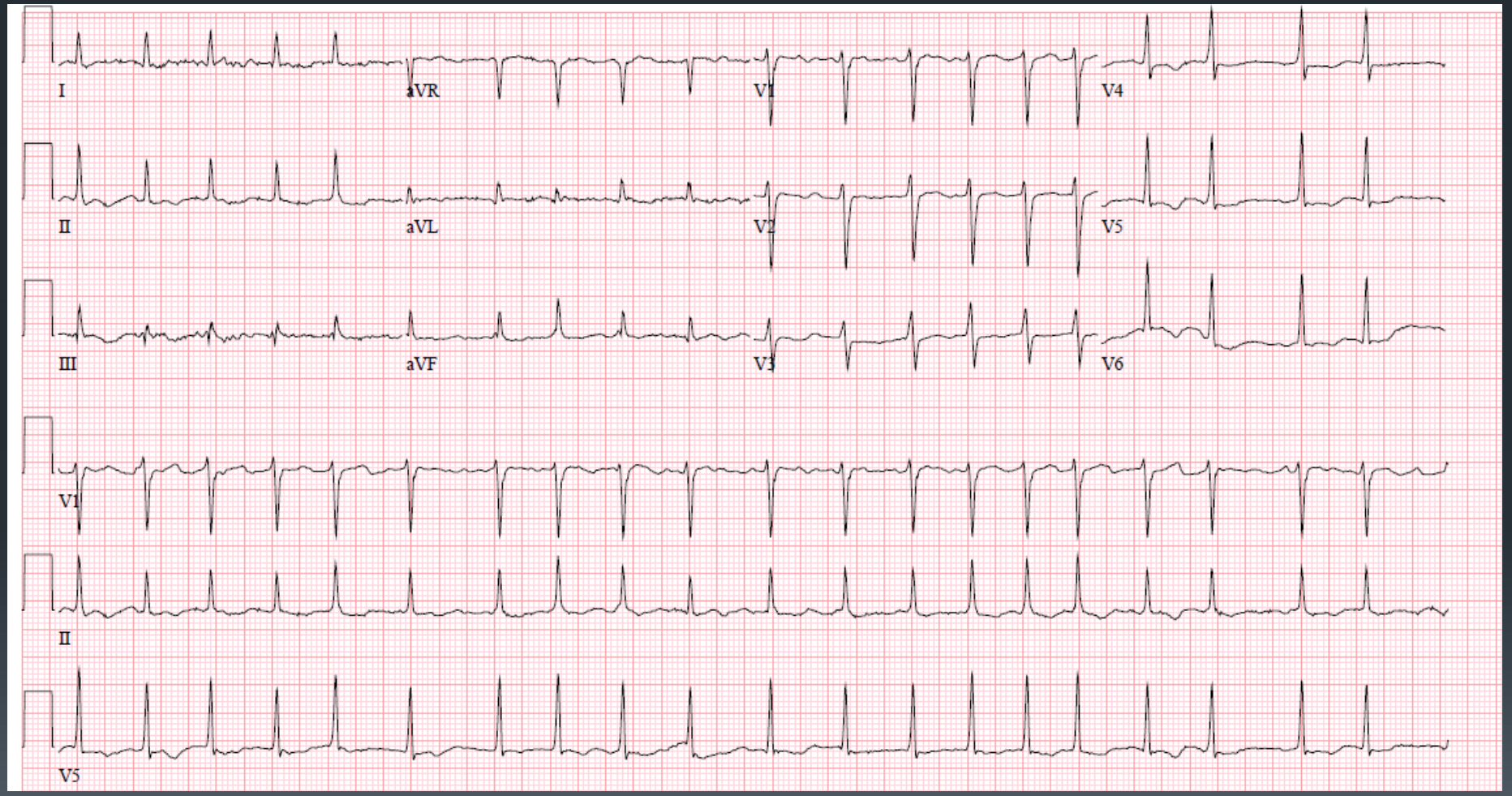
137 | 103 | 20
----------< 272 Ca: 8.6 Mg: 1.8
5.2 | 22 | 1.24

WBC: 9.5 / Hb: 9.1 (MCV: 89.7) / Hct: 28.5 / Plt: 174
-- Diff: N:68.3% L:23.1% Mo:7.6% Eo:0.7% Baso:0.3%

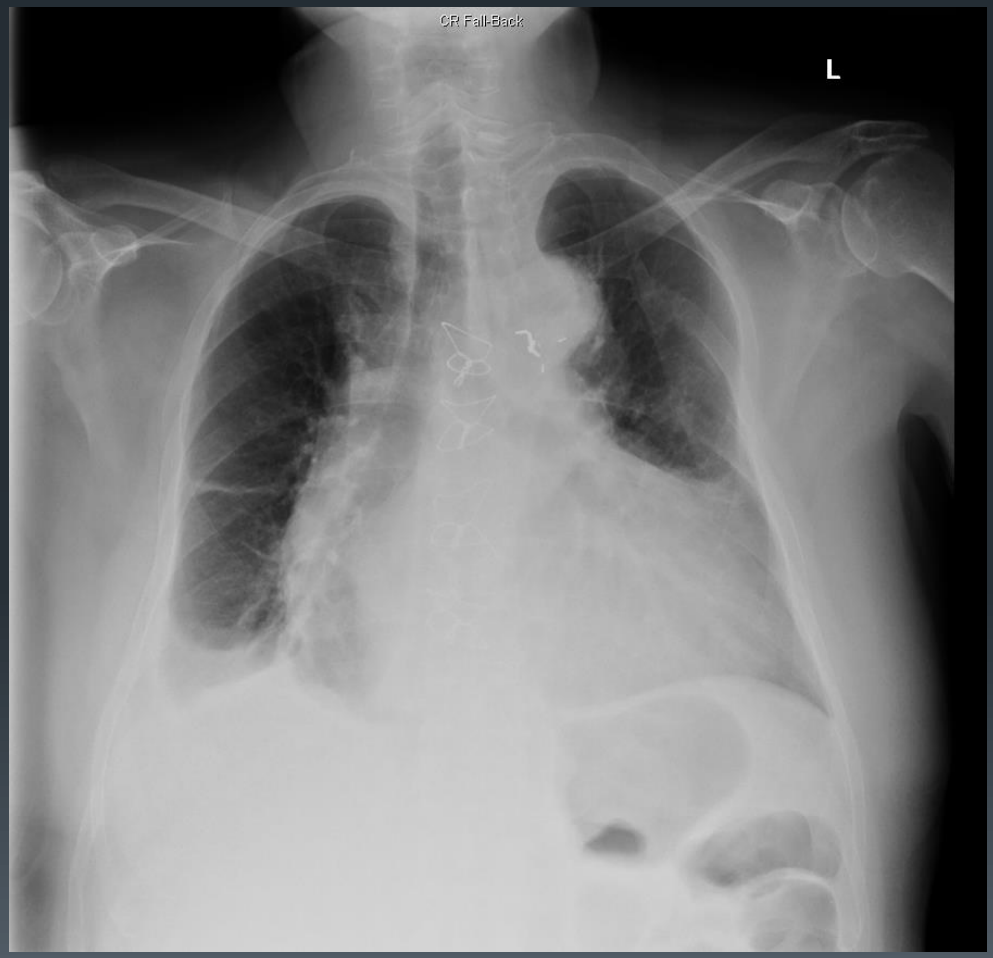
PT: 29.2 / PTT: 30.7 / INR: 2.5

Prot: 7.2 / Alb: 3.4 / Bili: 0.6 / Dir: 0.3 / AST: 34 / ALT: 33 / AlkPhos: 158

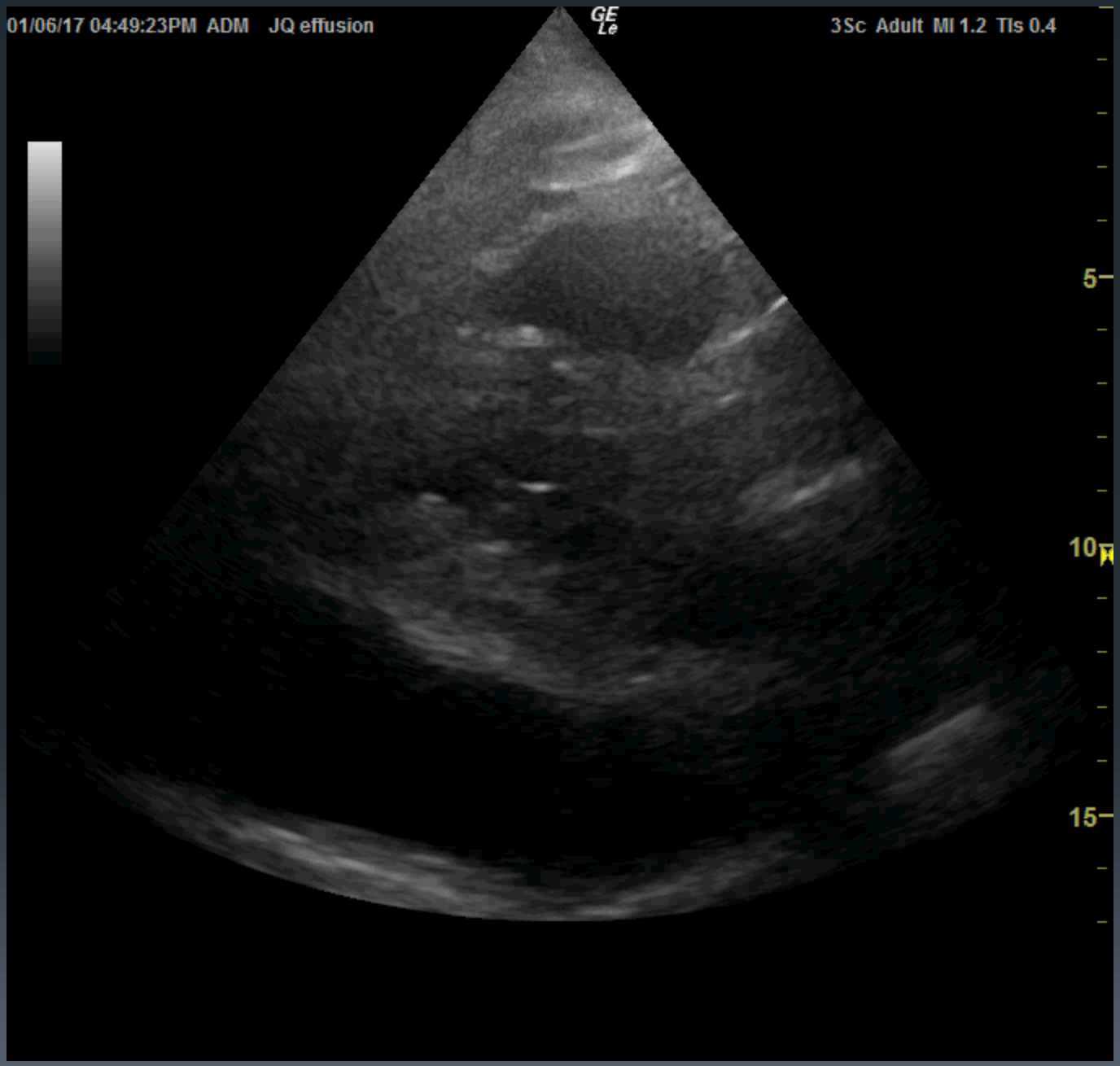
ECG



CXR



The ED submitted a general medicine bed request. The admitting resident felt that the leading diagnosis was CHF exacerbation 2/2 either uncontrolled Afib or valvular issue. He recommended diuresis, TTE, CTA to evaluate the TAA, and re-triage to 4N Cardiology stepdown, which prompted a critical care consult. The CCT resident performed a bedside ultrasound that revealed the diagnosis…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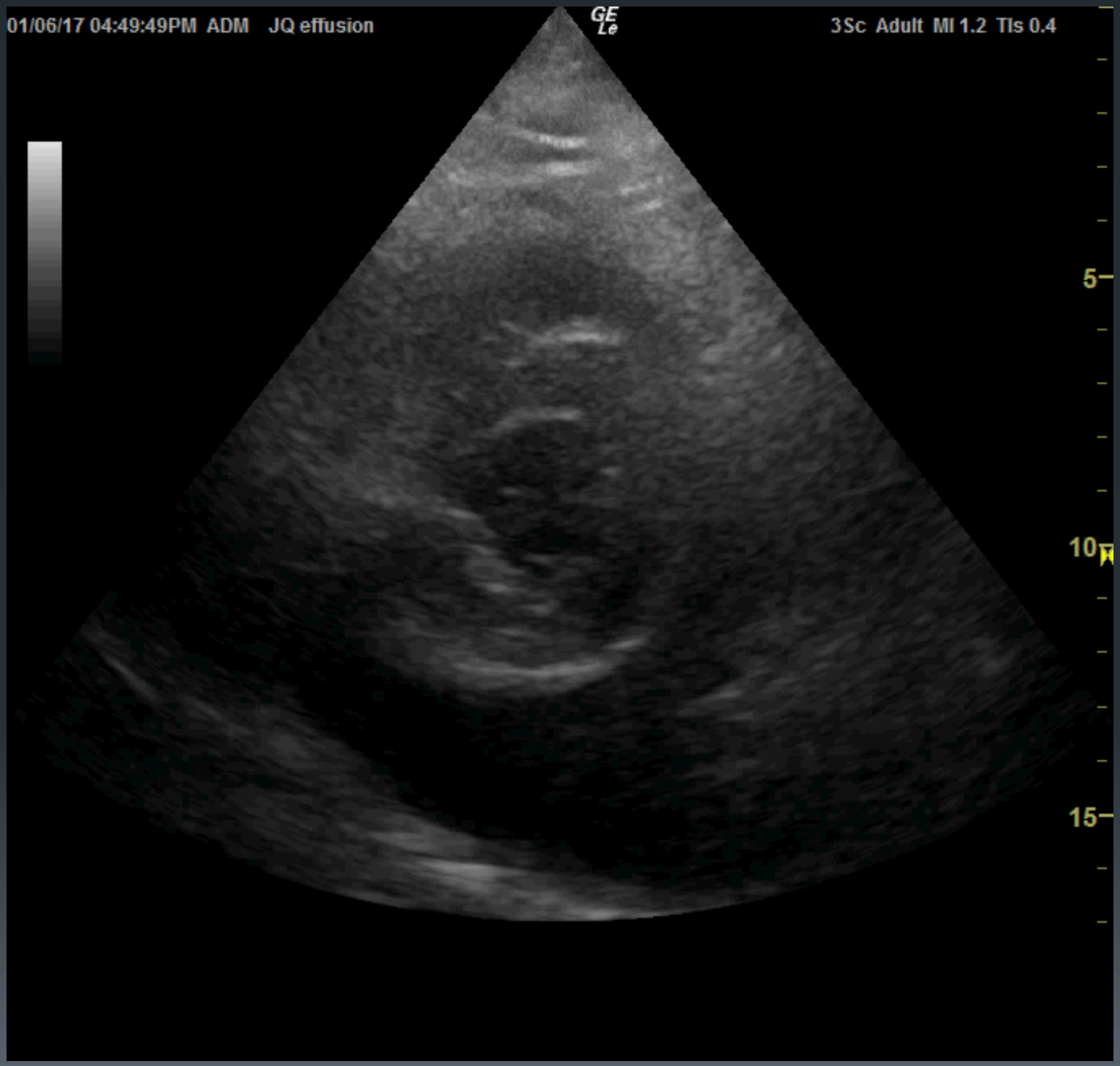
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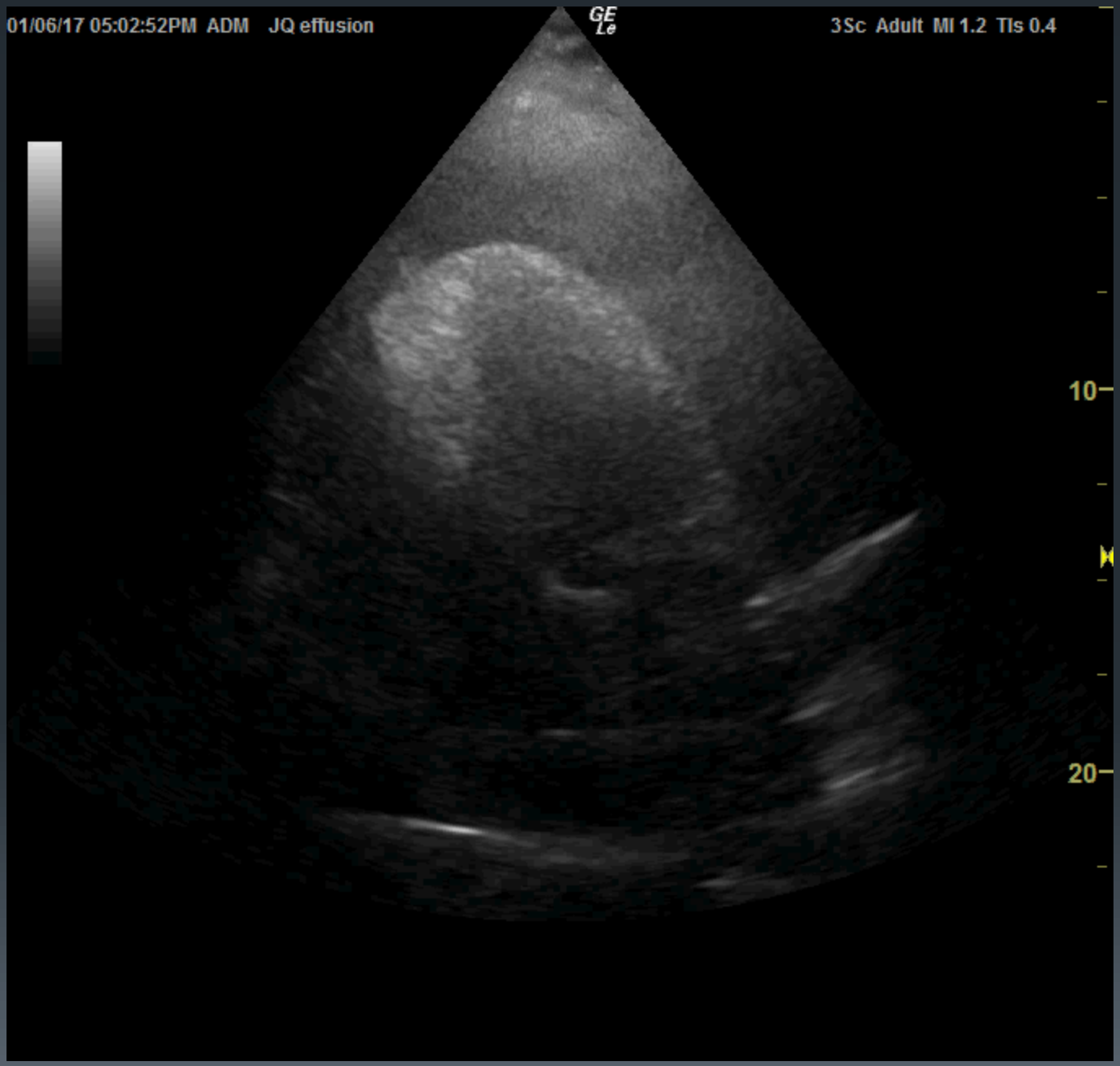
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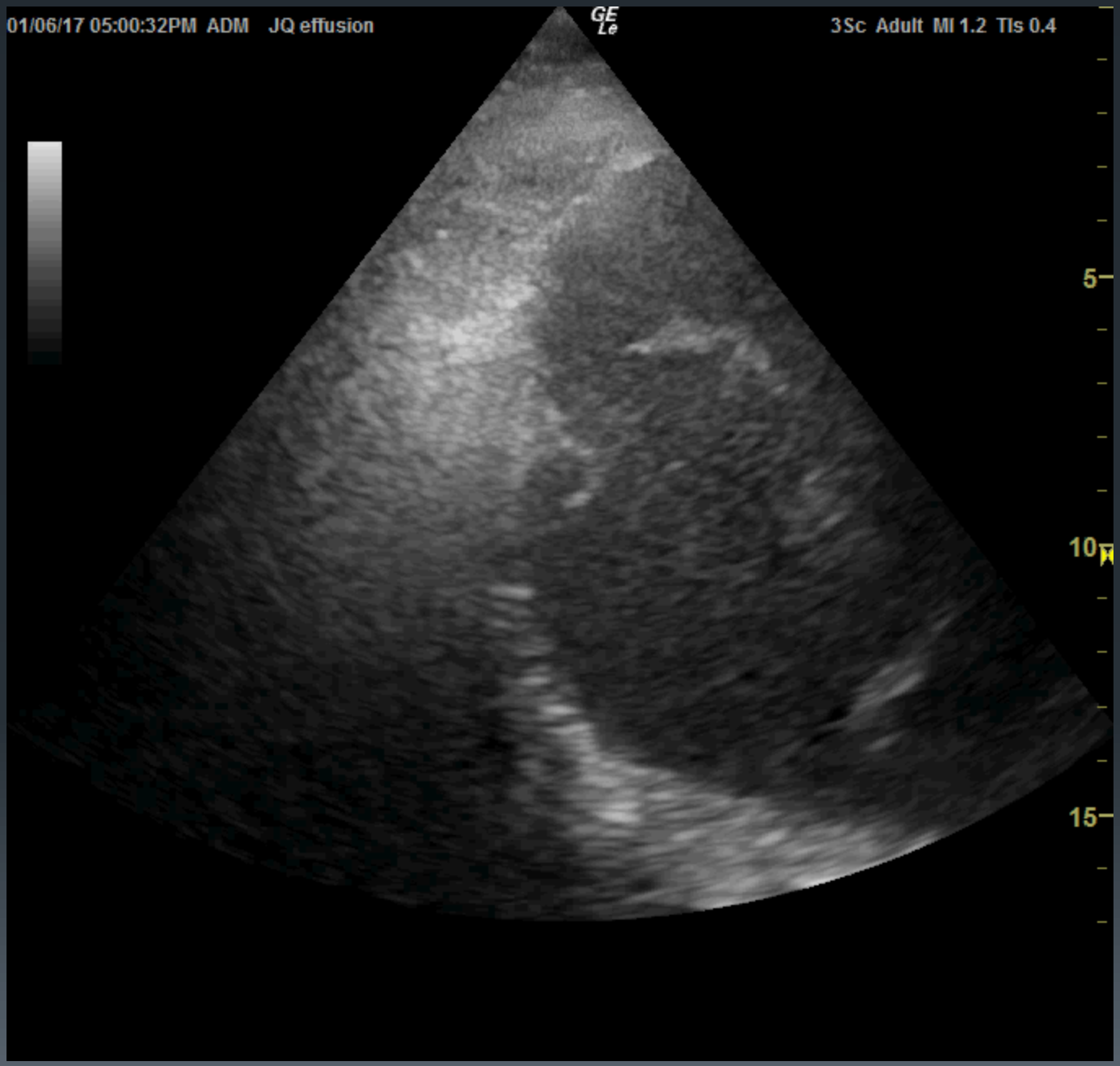
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The patient was admitted to 4N for monitoring and serial echos with a plan for pericardiocentesis after correction of INR.

Pericardiocentesis was performed, with 1.1L of serosanguinous fluid (Hct 13%) removed.

Did this patient have tamponade?!

The urgency of pericardiocentesis depended on the medical team's assessment of whether the patient was in tamponade.

The Data Points:
-normotensive
-ECG without acute changes
-Pulsus paradoxus performed by intern = 20
-cardiology fellow bedside TTE: no evidence of tamponade
-formal TTE read: "There is a large circumferential pericardial effusion containing fibrinous material. There is reduced early diastolic right ventricular filling consistent with elevated intrapericardial pressures. There is marked respirophasic variability of transmitral and transtricuspid diastolic velocities consistentwith tamponade/constrictive physiology.

Correlation between clinical and Doppler echocardiographic findings in patients with moderate and large pericardial effusion: Implications for the diagnosis of cardiac tamponade

Jordi Mercé, MD, Jaume Sagristà-Sauleda, MD, Gaietà Permanyer-Miralda, MD, Arturo Evangelista, MD, and Jordi Soler-Soler, MD, FACC *Barcelona, Spain*

110 patients with moderate (10-20mm) or large (>20mm) pericardial effusion
-assessed for clinical signs of tamponade: venous hypertension, pulsus paradoxus, arterial hypotension
-echocardiography carried out by staff physicians from echo lab: analysis of chamber collapse, venous flow patterns in suprahepatic veins and/or SVC

Table II. Prevalence of right chamber collapse and venous flow abnormalities in patients with and without clinical features of cardiac tamponade

	Tamponade (n = 38)	No tamponade (n = 72)
Any collapse	34	25
Isolated RA collapse	9	18
Isolated RV collapse	6	1
RA and RV collapse	17	6
No collapse	4	47
Abnormal VF*	18	4
Abnormal VF + 1 collapse	7	3
Abnormal VF + 2 collapses	9	1
Not valid VF	14	26
Normal VF	1	37

RA, Right atrium; *RV*, right ventricle; *VF*, venous flow.
*Suggestive of tamponade.

Table IV. Right cardiac chamber collapse and abnormal venous flow: Sensitivity, specificity, and positive and negative predictive values for the occurrence of cardiac tamponade

	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)
Any collapse	90	65	58	92
RA collapse*	68	66	52	80
RV collapse*	60	90	77	81
RA + RV collapse	45	92	74	76
Abnormal† VF	75	91	82	88
Abnormal VF plus 1 collapse	67	91	80	84
Abnormal VF plus 2 collapses	37	98	90	75

RA, Right atrium; RV, right ventricle; VF, venous flow.
*When calculating values for RA collapse, both patients with isolated or simultaneous RA collapse were included. The same was done for RV collapse.
†Suggestive of tamponade.

+LR	-LR
2.6	0.15
2	0.48
6	0.44
5.6	0.6
8.3	0.27
7.4	0.36
18.5	0.64

How does this translate to POCUS?

- Emergency physicians detected pericardial effusion with a sensitivity of 96% and specificity of 98%.
- No data on my literature search on sensitivity of POCUS for diagnosing cardiac tamponade.

References

- Mandavia DP[1], Hoffner RJ, Mahaney K, Henderson SO. Bedside echocardiography by emergency physicians. Ann Emerg Med. 2001 Oct;38(4):377-82.
- Mercé J, Sagristà-Sauleda J, Permanyer-Miralda G, Evangelista A, Soler-Soler J. Correlation between clinical and Doppler echocardiographic findings in patients with moderate and large pericardial effusion: implications for the diagnosis of cardiac tamponade. Am Heart J. 1999 Oct;138(4 Pt 1):759-64.