

**Weill Cornell  
Medicine**

# POCUS Conference

December 20, 2018

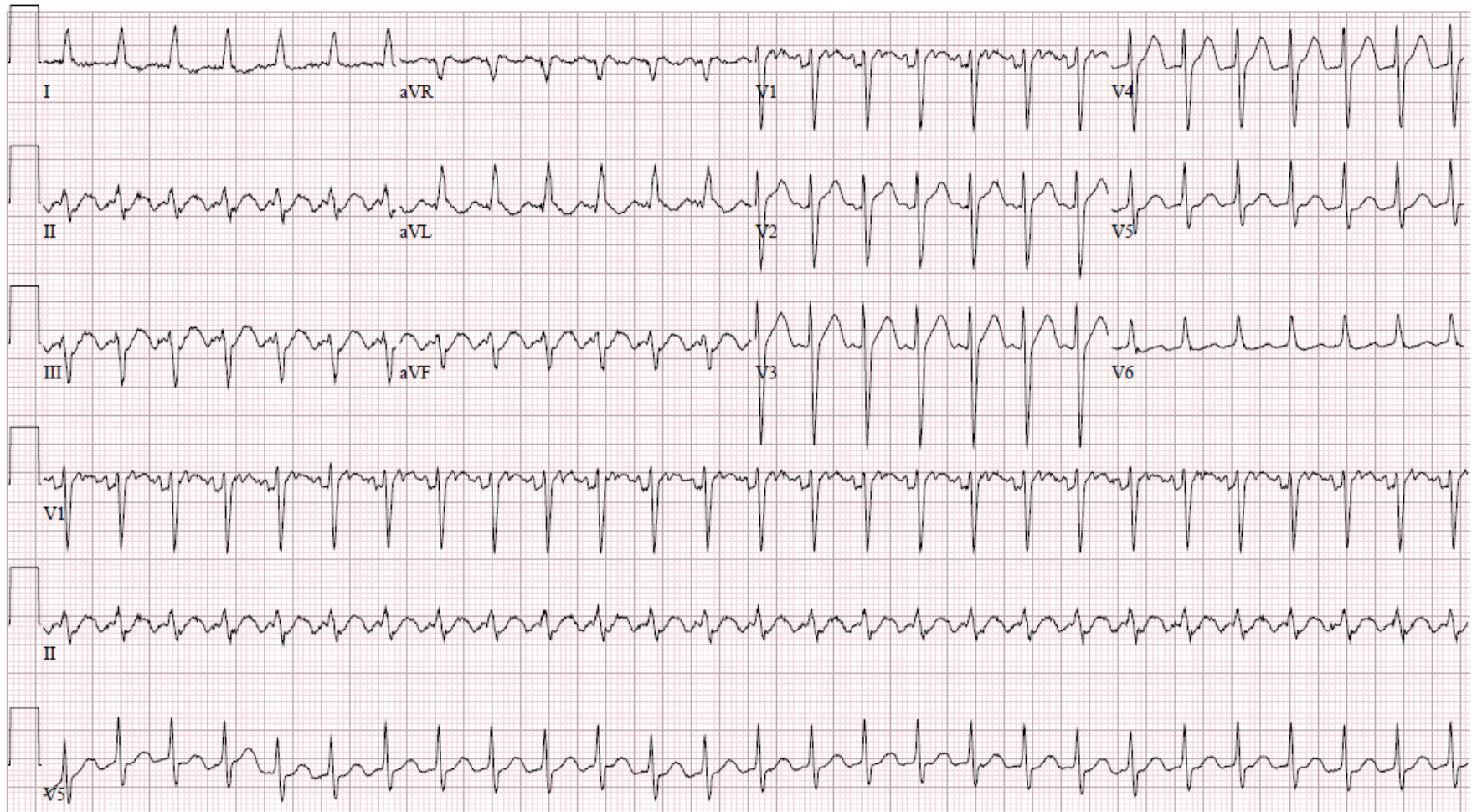


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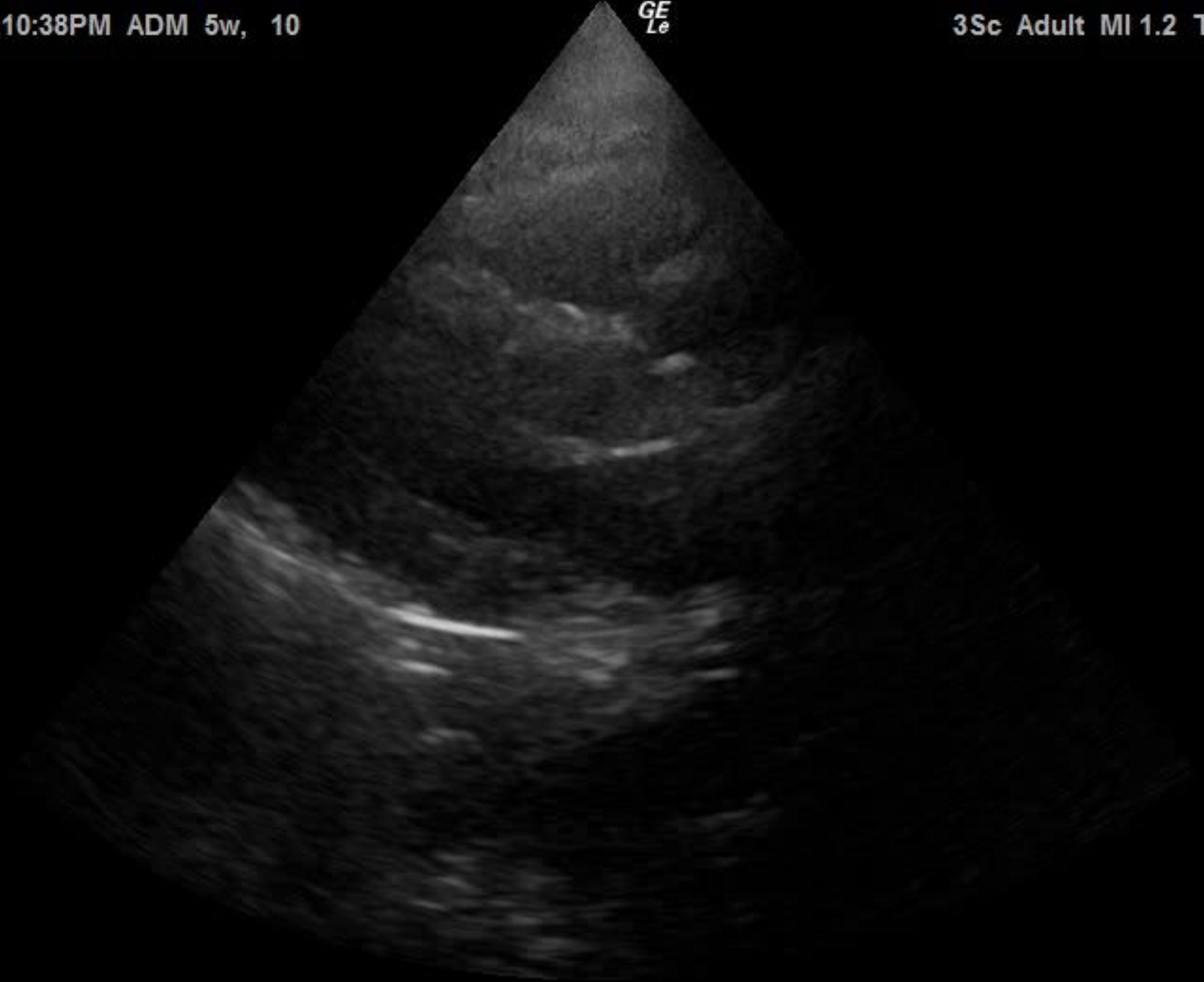
Hospital Medicine Clinical Scholars Program 2018-2019

# Help! Can you POCUS our patient who has worsening tachycardia and hypotension?





IMPRESSION: Increasing left lung base opacities, likely due to aspiration.

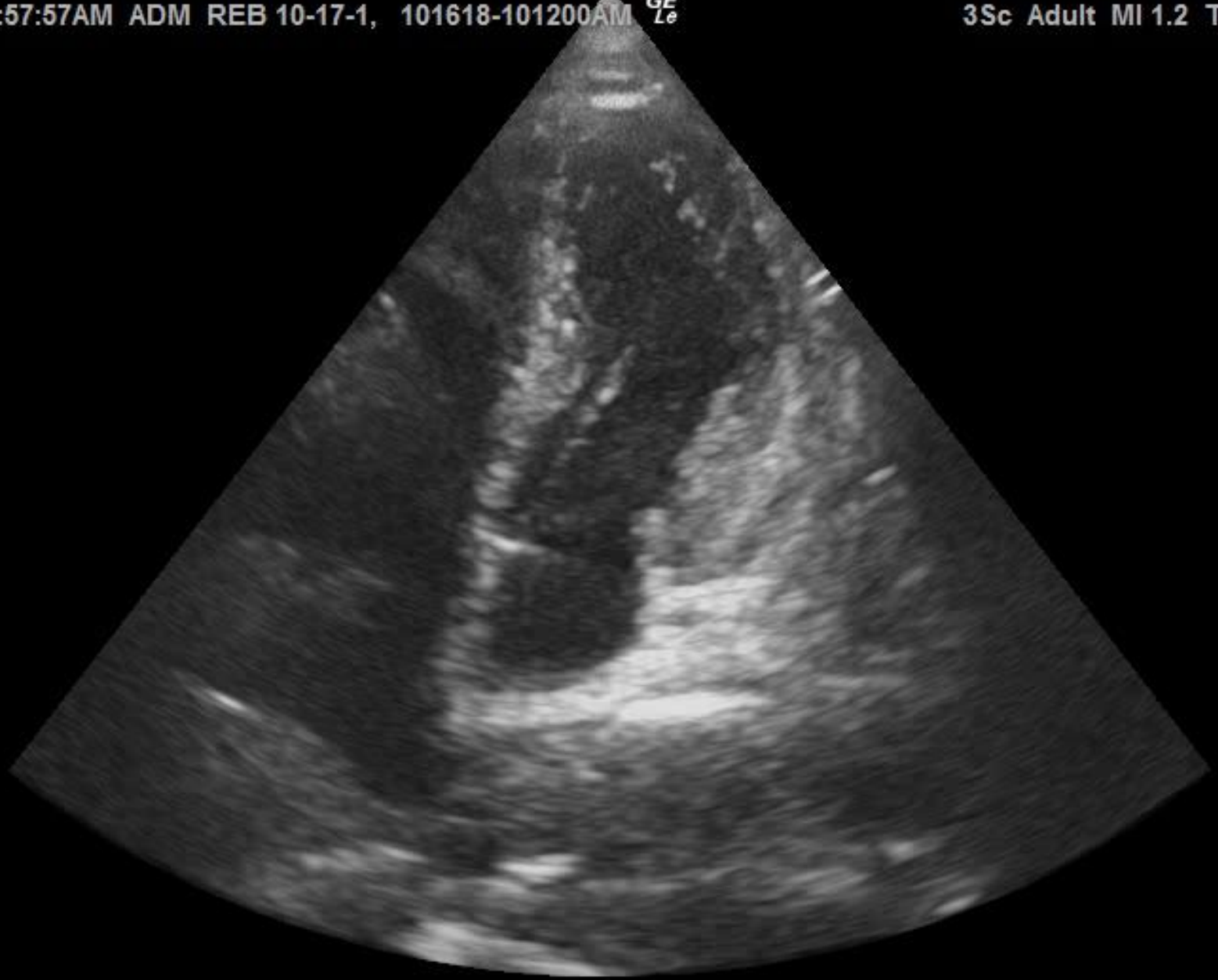


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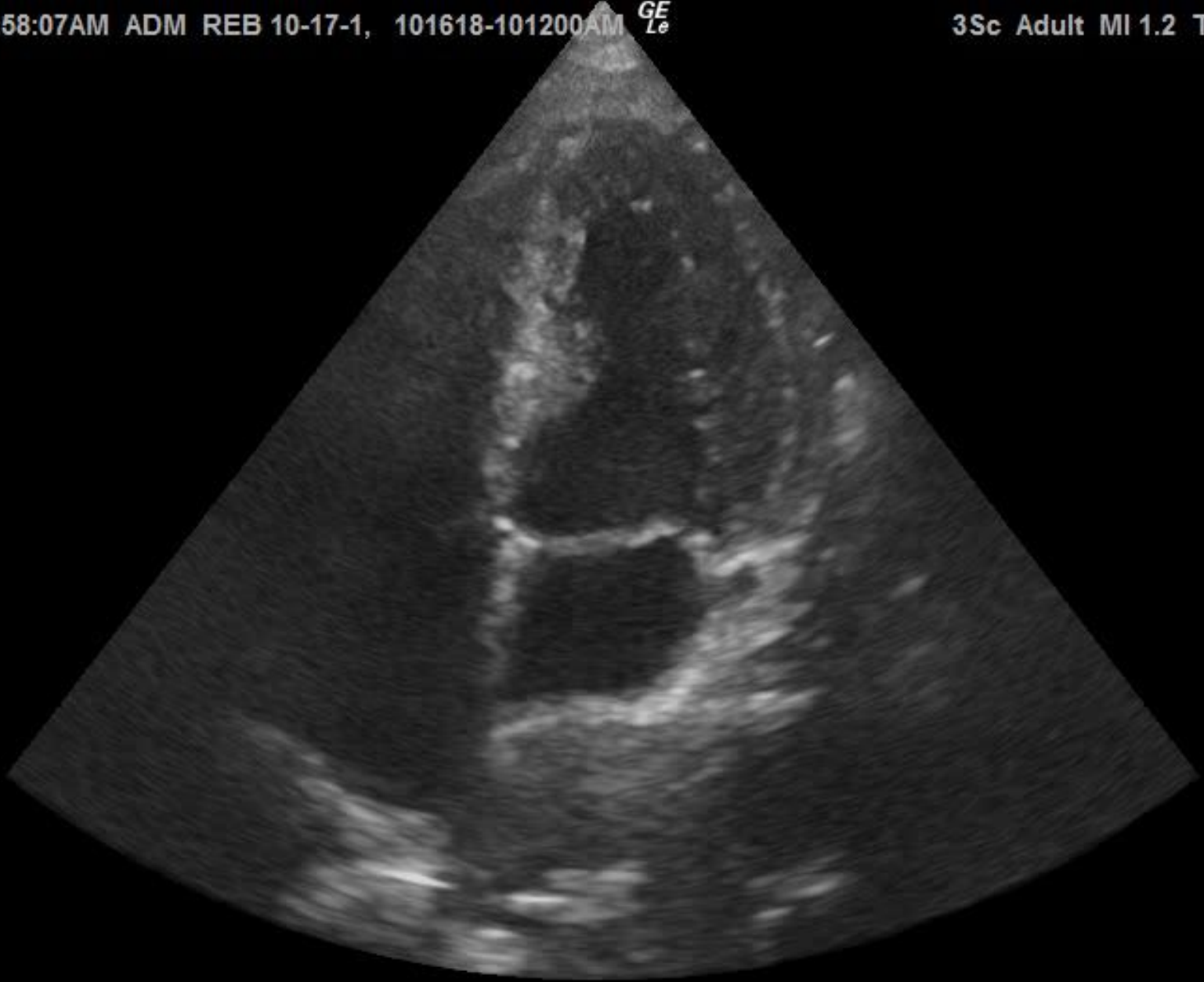
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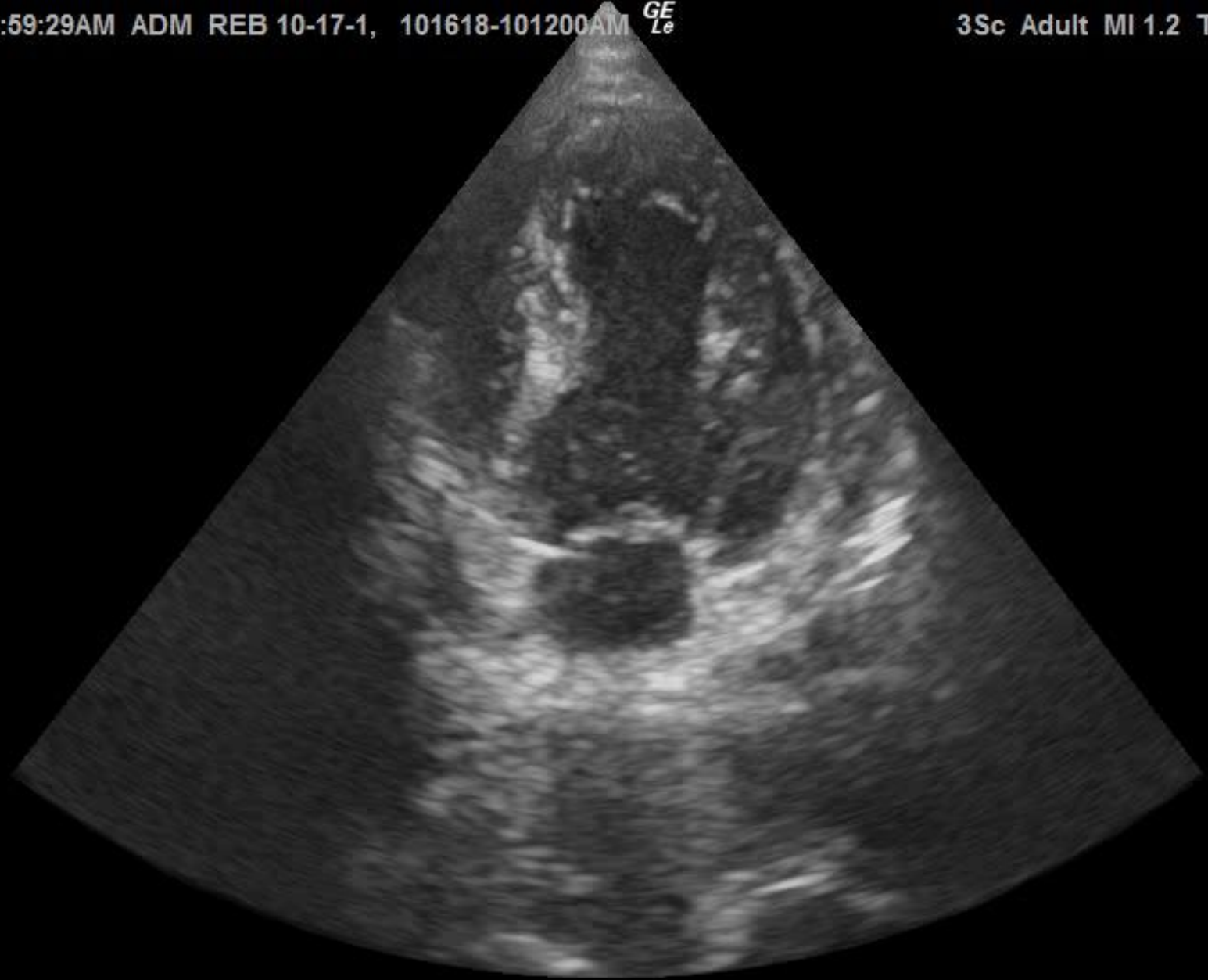
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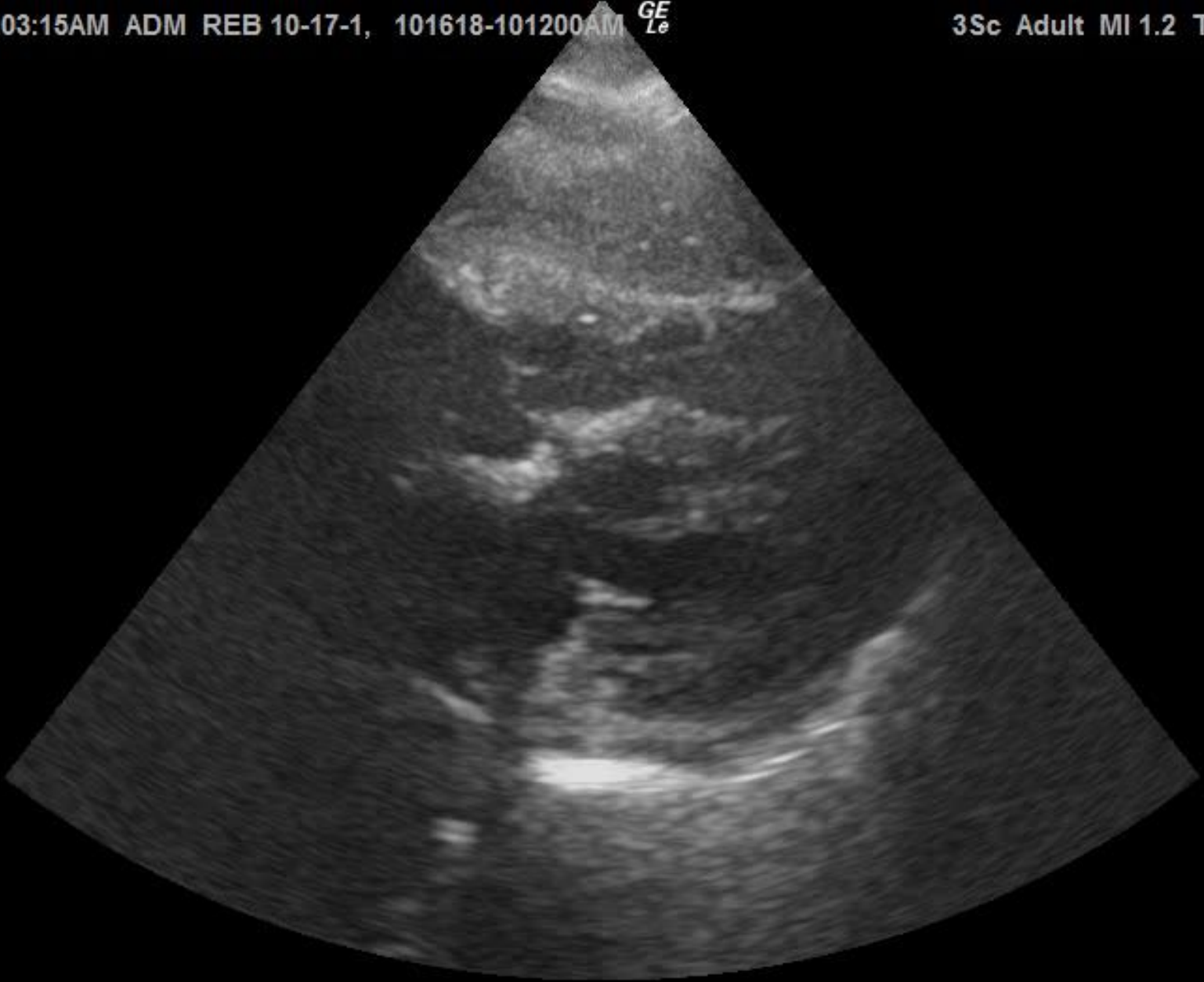
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0  
5  
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0  
5  
10  
15

R lung (base)



5

10



L lung (base)



L lung (base)



L lung (base)



GE

L lung  
(just superior to base)







# My summary of POCUS to team

- Very tachycardic
- No significant pericardial effusion, no tamponade
- Unable to get good PSL views, or any PSS views
- Mass (?extrinsic) compressing LA
- Difficult to comment on EF (tachycardia, poor windows)
- No obvious RV dilation/pressure overload (difficult study)
- R lung: B-lines up to mid-lung, none in apex
- L lung: mild/moderate pleural effusion, heterogeneous consolidation in mid-L lung. No B-lines
- IVC appears full without respiratory variation



# What could LA compression be from?

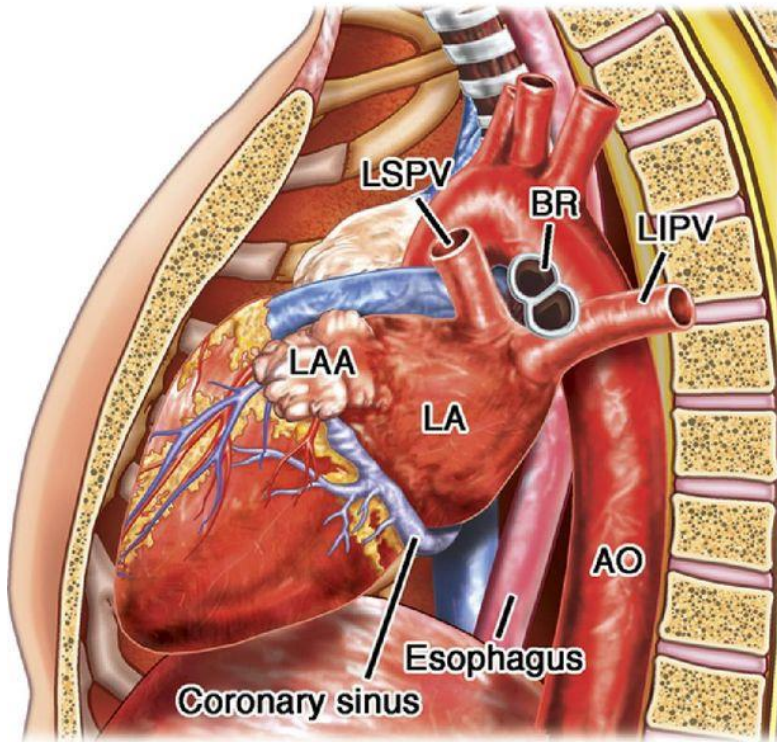


Image source: Naoum JACC 2011

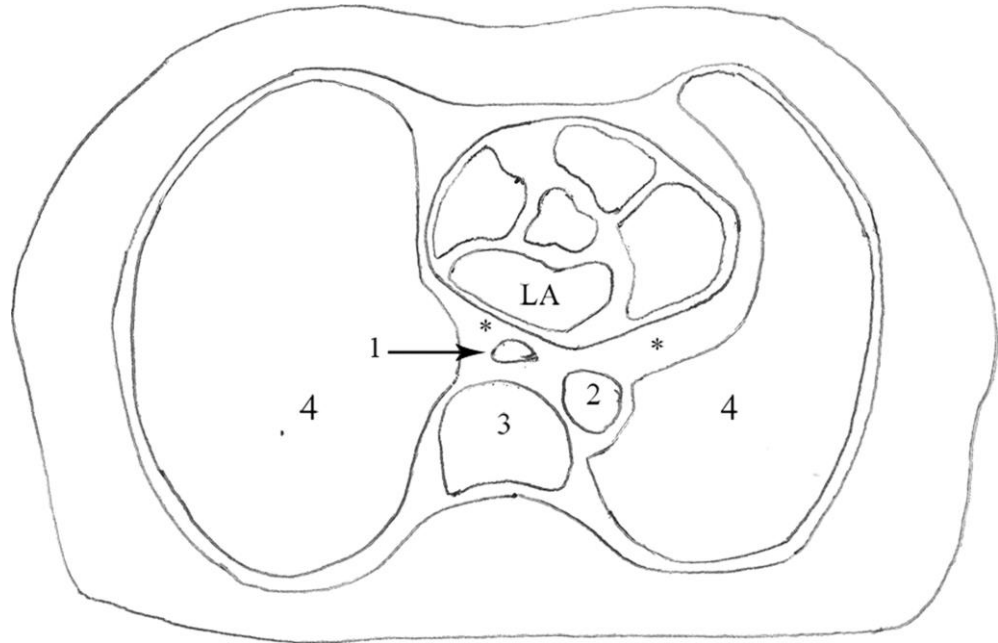


Image source: van Rooijen, Eur J Echocardiogr. 2008

# What is in the left atrium? Is it inside the LA or compressing from outside?

Differential diagnosis for Left Atrial intracardiac mass

| Thrombus                           | Valvular etc              | Tumor                                     | Normal Variants            |
|------------------------------------|---------------------------|---|----------------------------|
| In situ thrombus                   | Vegetations               | Metastatic (20x more common than primary) | Prominent papillary muscle |
| Paradoxical embolus via ASD or PFO | Flail Leaflets            | Myxoma                                    | false tendons              |
|                                    | Ruptured Chordae          | Pulmonary venous extension                | Endocardial thickening     |
|                                    | Rupture papillary muscles | Bronchogenic or mediastinal tumors        | Moderator bands            |
|                                    |                           | Sarcomas                                  |                            |

(Alam, Echocardiography 1993)



# What is in the left atrium? Is it inside the LA or compressing from outside?


Differential diagnosis for extrinsic/extracardiac LA compression

| Gastrointestinal                     | Mediastinum                        | Aorta/Pericardial                   | Pulmonary         |
|--------------------------------------|------------------------------------|-------------------------------------|-------------------|
| Hernia (esophageal or diaphragmatic) | Mediastinal tumors (lymphoma, etc) | Ascending thoracic aortic aneurysm  | Lung tumor        |
| Esophageal tumor                     | Sarcoidosis                        | Descending thoracic aortic aneurysm | Bronchogenic cyst |
| Achalasia                            | Thymoma                            | Aortic root dilation                |                   |
| Gastric volvulus                     |                                    | Pericardial hematoma, cyst          |                   |

(Van Rooijen, Euro J of Echocardiography 2008)



## A Case of Posterior Loculated Tamponade Masquerading as an Atrial Mass on Transesophageal Echocardiography

Amgad N. Makaryus MD, Svetlana Matayev MD, David Rosman MD, FRCP 

## A large pericardial cyst presenting with compression of the right-side cardiac chambers

Isabella Morais Martins<sup>I</sup>; Júlia Medeiros Fernandes<sup>I</sup>; Cláudio Léo Gelape<sup>II</sup>; Renato Braulio<sup>III</sup>; Vagner de Campos Silva<sup>IV</sup>; Maria do Carmo Pereira Nunes<sup>V</sup>

## Hemodynamically Significant Extrinsic Left Atrial Compression by Gastric Structures in the Mediastinum

Syed T. Raza; Sandip K. Mukherjee; Peter G. Danias; Jame Abraham; Kevin M. Johnson; Milton J. Sands; Morgan S. Werner; David I. Silverman

Unusual presentation of more common disease/injury

CASE REPORT

### Cardiac compression due to gastric volvulus: an unusual cause of chest pain

Alex Brown, David Austin, Venkatesh Kanakala

### Left atrial compression by a mediastinal bronchogenic cyst presenting with paroxysmal atrial fibrillation

ALBERTO VOLPI, AUGUSTO CAVALLI, ALDO PIETRO MAGGIONI, FRANCO PIERI-NERLI

## A Differential Diagnosis for Left Atrial Mass on Transthoracic Echocardiography: Hiatus Hernia


Harshil Dhutia

St George's University, London, UK

### Left Atrial Compression Secondary to Massive Esophageal Dilatation in a Patient With Idiopathic Achalasia

Alex dos Santos Felix, MD, MSc, Ananda Costa Quintes, MD, Gabriella Andrade de Sá, MD, Marcelo Ryoma Adachi, MD, Viviane Fittipaldi, MD, MSc, and Ana Paula dos Reis Velloso Siciliano, MD, PhD, *Rio de Janeiro, Brazil*

### Syncope Upon Swallowing Caused by an Esophageal Hiatal Hernia Compressing the Left Atrium: A Case Report

Yoshifumi Oishi M.D., Takeo Ishimoto M.D., Norio Nagase M.D., Kenichi Mori M.D., Sayuri Fujimoto M.D., Shigehito Hayashi M.D., Yoshie Ochi M.D. ... [See all authors](#) 

# Use of echo to evaluate cardiac masses

- Echocardiography first step in identification of cardiac masses
- Visualize anatomic extent and physiologic consequences of mass
- Limited field of view compared to MRI or CT
- TEE has superior specificity and sensitivity compared to TTE
  - Improved resolution of tumor and attachment
  - Improved visualization of RA tumors
  - Mediastinal tumors 2.9x less likely to be detected by TTE than TEE
  - Superior in diagnosing tumor infiltration and invasion of heart and great vessels
- Contrast perfusion imaging
  - Malignant tumors tend to be highly vascularized
  - Most benign tumors are avascular

Ragland, Clin Med Res 2006



# Are there features on TTE that can distinguish intracardiac vs extracardiac?

- Case reports of extracardiac pathology misdiagnosed as myxoma
  - Choi Korean J Anesthesiology 2014
  - Nishimura J Am Coll Cardiol 1985
  - Liao Cardiovascular Ultrasound 2010
- Intrinsic or extrinsic? (Raza Annals 1995)
  - Intrinsic atrial abnormalities will move with atria
  - Extrinsic masses move asynchronously with atria
- Some clues it might be extrinsic:
  - Extends outside margins of the atria (try angling transducer)
  - Peristalsis suggests hiatal hernia (Nishimura J Am Coll Cardiol 1985)
- Usually need additional imaging - TEE, CMR, CT



# Could LA compression alone cause all of the patient's findings? Probably

- Decreased LA filling → decreased LV filling → low CO
  - Tachycardia compensatory
- Increased LA pressure → pulmonary edema, pleural effusion
- Low CO →→ cardiogenic shock
- Tachycardia, tachypnea, hypotension, hypoxia all commonly described in case reports of LA masses and extrinsic compression



# Occam's razor: in a patient with known lung cancer...



1. **Large right infrahilar/subcarinal mass**, which splays the carina and encases the right upper lobe bronchus and **partially invades the bronchus intermedius**. The mass erodes through the right lower lobe bronchus with air and fluid extending into the right lateral margin of the mass. **Regional mass effect on the posterior margin of the heart and esophagus**, from which the mass is inseparable, is noted. There is suggestions of lymphangitic spread into the right lower lobe and to lesser extent right middle lobe. These findings are suspicious for a primary lung malignancy. Esophageal malignancy is felt less likely though not definitively excluded.
2. Small nodular opacities at the lung right lung base may be post obstructive. Infectious process should be excluded on clinical grounds.
3. Marked eccentric mural thrombus partially visualized along the left margin of the abdominal aorta as well as irregularity of the superior mesenteric artery and a diminutive left renal artery may reflect sequelae of chronic dissection versus pronounced atherosclerotic disease. Further evaluation may be obtained as clinically indicated.

# Official TTE from 1 month prior and day of POCUS

- 9/17/2018
  - Concentric left ventricular remodeling
  - Normal right ventricular size and function
  - Left atrial dilatation
  - Aortic valve calcification
  - Small pericardial effusion
  - Mild tricuspid regurgitation
  - Mild pulmonary hypertension
  - Abnormal left ventricular relaxation with high filling pressures.
  - **Echodensity measuring at least ~3.0 cm x 2.7 cm which appears to emanate from the free wall of the left atrium, most concerning for a mass.**
- 10/17/2018
  - unchanged from September, except **echodensity now ~3.3 x 3.0 cm**



- New pneumonia predominantly within the left lower lobe
- Interval mild increase in size of cavitating right infrahilar/subcarinal mass. New attenuation of the left mainstem bronchus, with opacification of smaller bronchi supplying the left upper and left lower lobes. Stable appearance of lymphangitic spread in the right lower lobe.
- New mild dilatation of the upper/mid esophagus, which contains an air/debris level.
- New layering small bilateral pleural effusions, left greater than right.

# Final Diagnosis

- LA compression due to primary lung tumor
  - Unclear whether extrinsic compression or ?wall invasion with intrinsic LA component
- L sided pneumonia
- Supraventricular tachycardia (SVT vs flutter) attributed to LA compression from mass +/- sepsis
- Hypotension due to poor LA filling → poor CO +/- sepsis
- Respiratory failure multifactorial
  - Pneumonia
  - Pleural effusions
  - Lymphangitic spread of cancer



# Case Follow-Up

- Became increasingly hypotensive → amiodarone to control HR
- Cardiology consulted → mass intracardiac on TTE, extracardiac on CT
  - concerned that further XRT/chemo could risk cardiac rupture
- HR 100s on amio, respiratory status transiently improved
- However, developed oliguric renal failure, passed away 3 days later

# Takeaways

- Rarely, tachycardia, hypotension, and hypoxia due to LA compression
- LA compression can be from extrinsic compression or cardiac mass
- Extensive ddx for both intrinsic and extrinsic causes of LA compression
- TTE valuable for initial evaluation of cardiac mass, but often need additional imaging to characterize further
- Important to review past imaging data prior to POCUS



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