# Cardiac Tamponade

53 yo M presenting with CP during dialysis

Sandra Coker, MDc

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RAD 4001

Pritish Bawa, MD

UTHealth
The University of Texas Health Science Center at Houston
McGovern Medical School

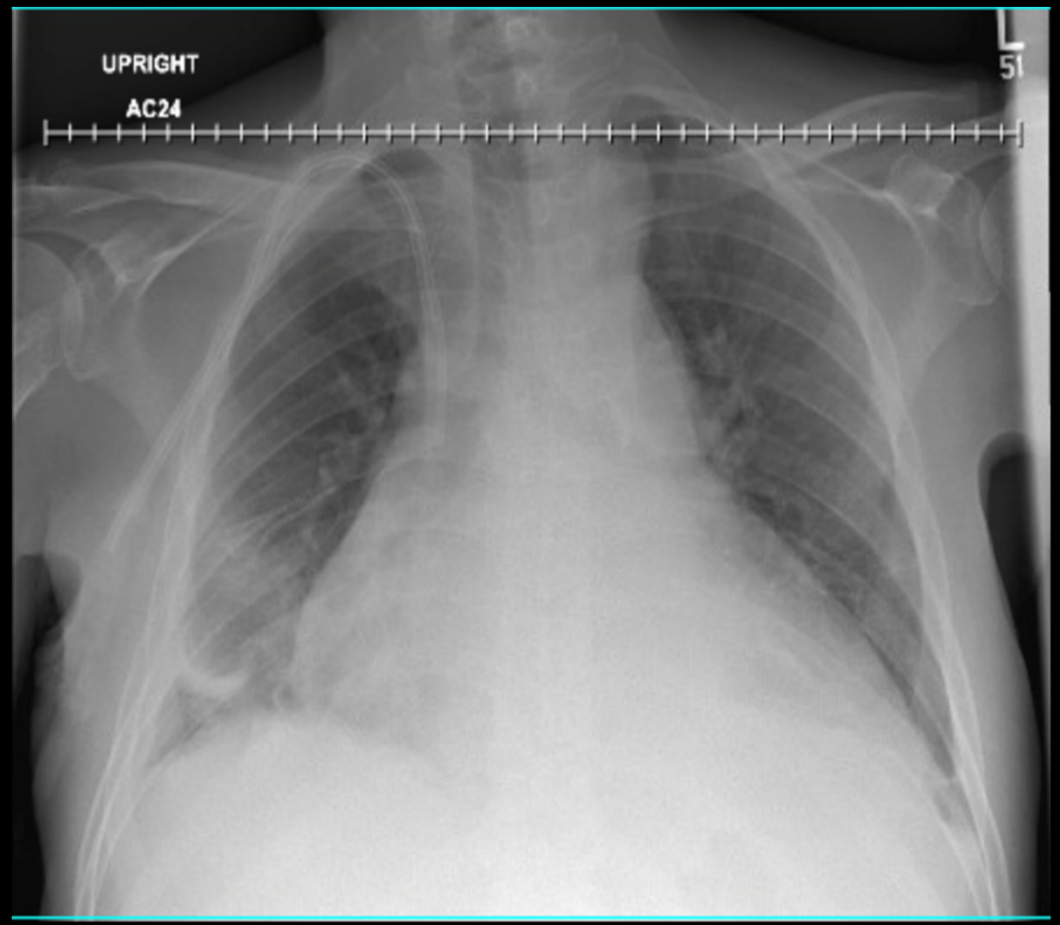
# Clinical History

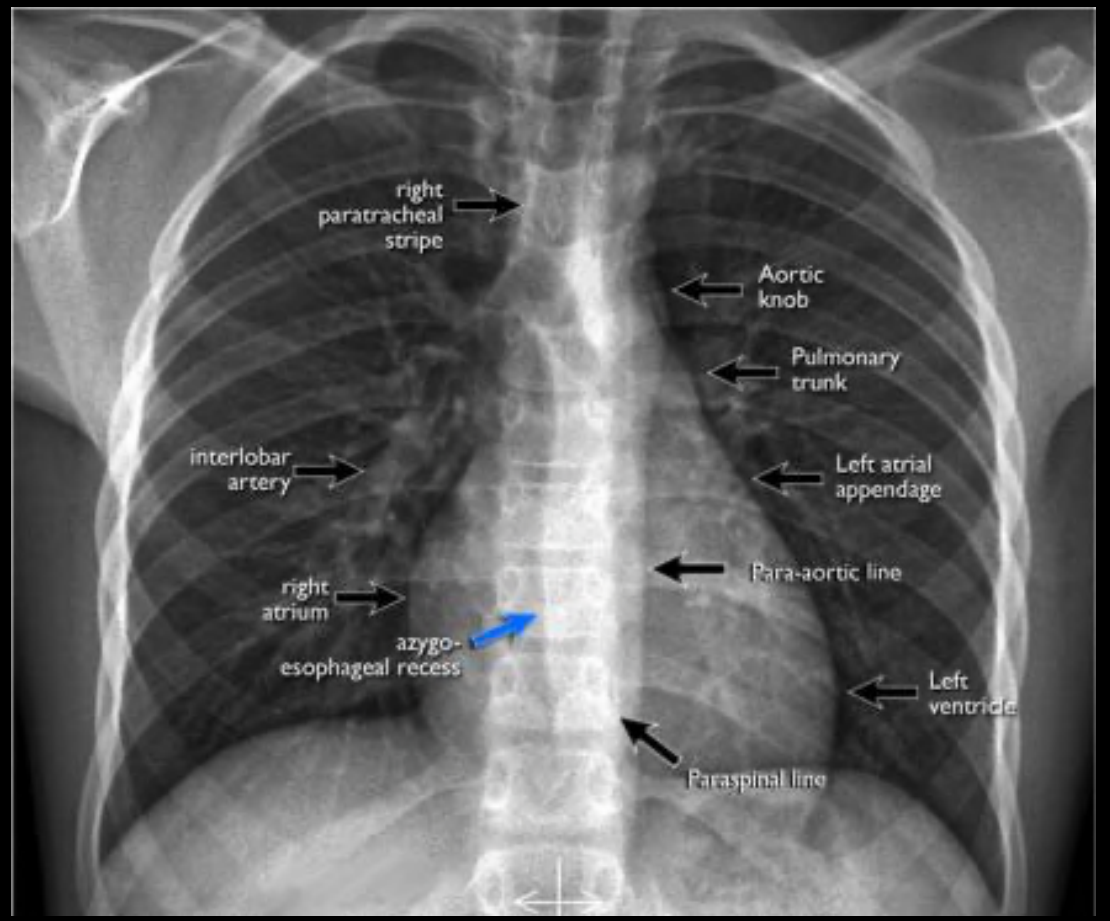
- 53 yo M w/PMH of HTN, HF, DM, CKD stage V (dialysis MWF), colon CA s/p resection 20 yrs ago
- Presents to ED with substernal → L chest 10/10 ”burning” pain + SOB
  - Afib with RVR – resolves
  - Symptoms disrupt dialysis
- +325mg ASA, Nitro x2 (en route by EMS) – no relief of sx

# ED Workup

- VS
  - BP 146/102 RR 23 HR 102 SpO2 97% on 3L afebrile
- EKG
  - r/o ischemia
- CXR
  - Marked enlargement of cardiac silhouette compared to 8/5/2019 → cardiomegaly or new pericardial effusion
  - Small bilateral pleural effusions w/bibasilar atelectasis
- BSUS
  - Large pericardial effusion
  - No evidence of tamponade

# CXR 2/17


UPRIGHT
AC24
L
51


right paratracheal stripe
Aortic knob
Pulmonary trunk
interlobar artery
Left atrial appendage
Para-aortic line
right atrium
azygo-esophageal recess
Left ventricle
Paraspinal line

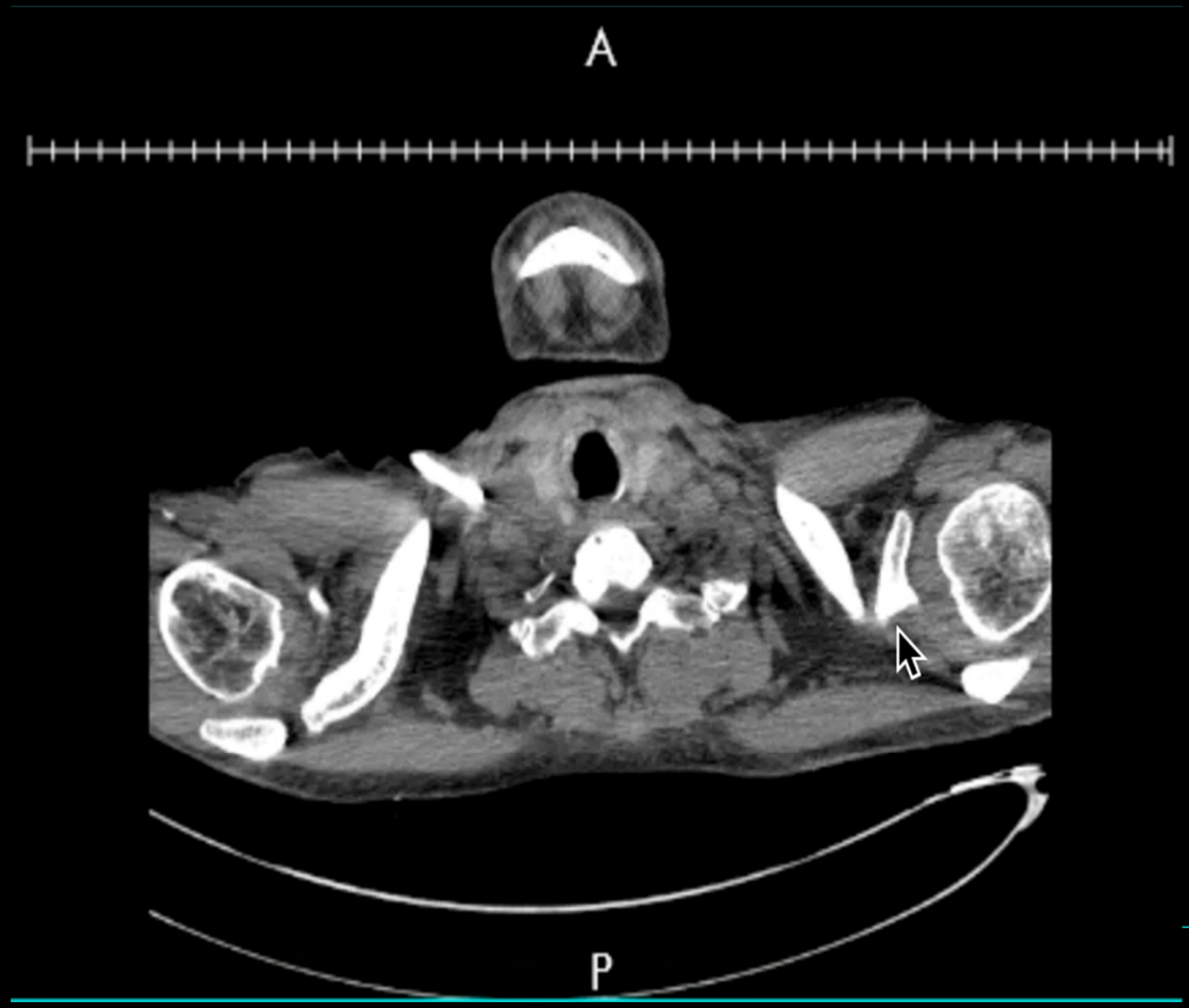
# Meanwhile…

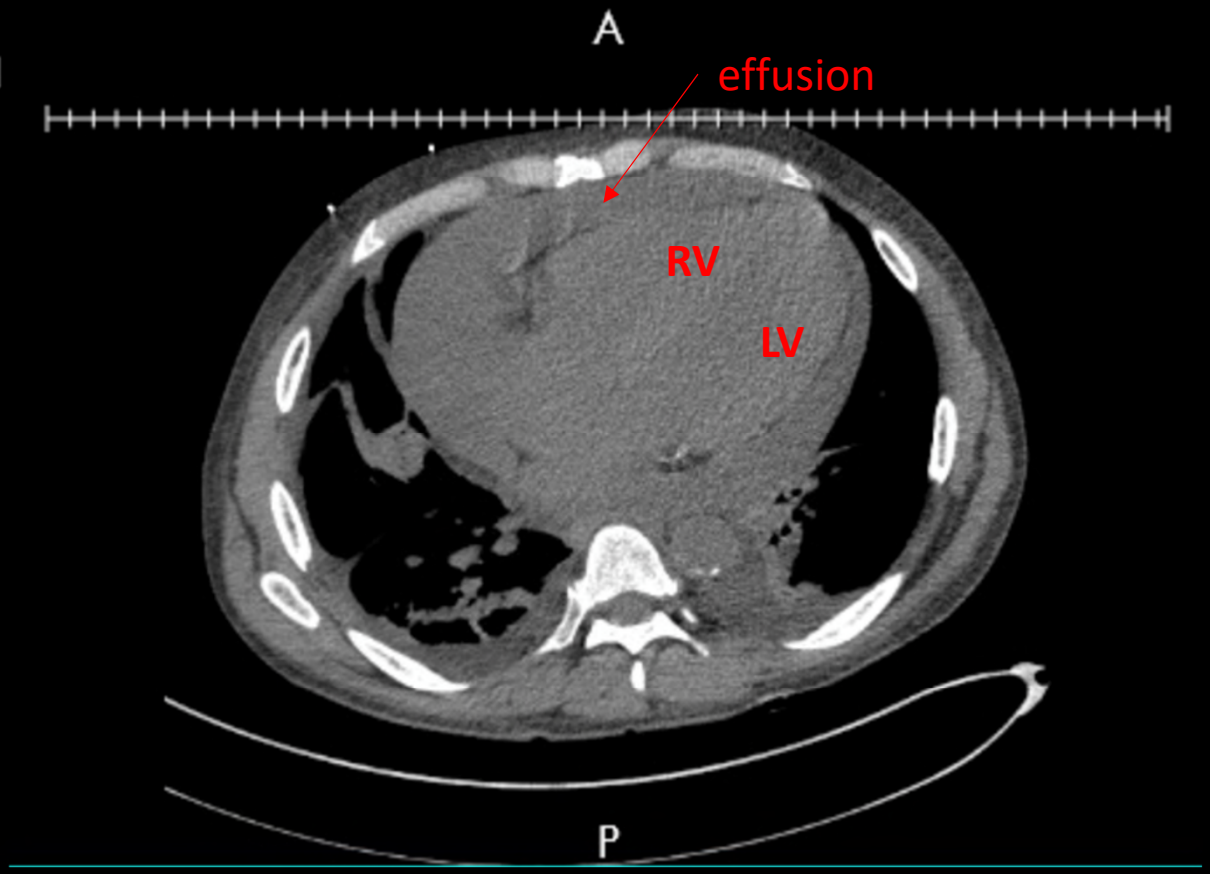
- Hypoxemic respiratory failure
  - 4L NC
  - Hypervolemia – orthopnea, recent 7kg weight gain, LE edema, abd distension
  - Dialysis & Diuresis
- Hyperkalemia
  - 5.4 in ED
  - Needs dialysis

# The Next Day

- CT chest
  - Large pericardial effuison with mild concave deformity of RV
  - Pleural effusion and subsegmental atelectasis
- Pericardiocentesis with intraprocedure TTE
  - LV: thickened and reduced EF 30-35%
  - RV: intermittent diastolic collapse
  - Large mostly anterior pericardial effusion
  - L pleural effusion
  - ~1100cc of fluid drained from pericardial space

# CT Chest w/o contrast



# ACR Appropriateness Criteria

**Variant 5:** **Dyspnea due to suspected pericardial disease. Ischemia excluded.**

| Radiologic Procedure | Rating | Comments | RRL* |
|---|---|---|---|
| X-ray chest | 9 | | ☢ |
| US echocardiography transthoracic resting | 9 | | O |
| MRI heart function and morphology without and with IV contrast | 9 | | O |
| MRI heart function and morphology without IV contrast | 8 | | O |
| CT heart function and morphology with IV contrast | 7 | | ☢☢☢☢ |
| CTA chest with IV contrast | 7 | | ☢☢☢ |
| CT chest without IV contrast | 7 | This procedure may be appropriate if the patient cannot have contrast. | ☢☢☢ |
| CT chest with IV contrast | 7 | | ☢☢☢ |
| US echocardiography transesophageal | 5 | | O |
| CTA coronary arteries with IV contrast | 5 | | ☢☢☢ |

# Pericardial Compressive Syndromes

- Cardiac Tamponade
  - Acute or subacute accumulation of pericardial fluid under pressure
- Constrictive Pericarditis
  - Loss of elasticity of pericardial sac
  - Elevation of RA & pulm wedge pressure after draining pericardial fluid → constrictive process
- Effusive-Constrictive Pericarditis
  - Underlying constrictive physiology w/effusion and tamponade

# Cardiac Tamponade

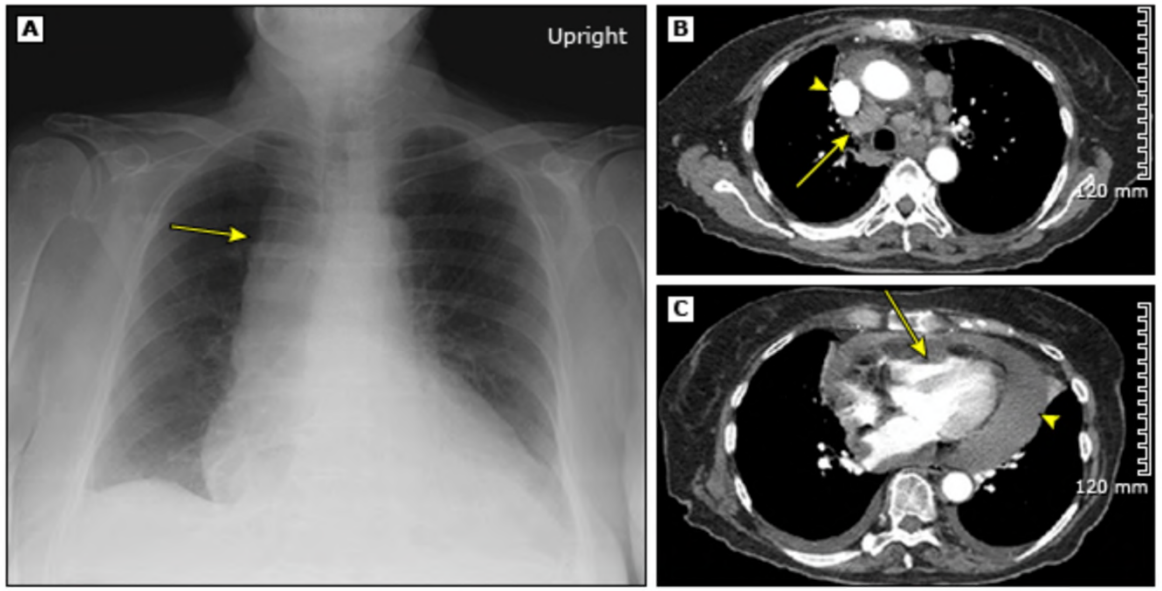
- Compression of the heart due to fluid accumulation in the pericardial space → interferes with cardiac filling
- Severe: total venous return decreases, chambers shrink, CO decrease
- Ventricular interdependence – when pericardial P >> ventricular dia P
  - distension of RV and decreased filling of LV → septum bulges to the L → decreased LV compliance & filling during inspiration
- Etiology:
  - Pericardial disease – infectious, autoimmune, inflammatory, neoplasm, dissecting Ao aneurysm, trauma, metabolic (uremia, hypothyroid), radiation

# Clinical Presentation & Physical Findings

- Presentation depends on timeline
  - Acute – CP, dyspnea, tachypnea, silent heart sounds, JVD
  - Subacute – asx → chest discomfort, dyspnea, peripheral edema
- Physical findings
  - Tachycardia
  - Hypotension
  - Elevated JVP
  - Pulsus paradoxus – decrease >10mmHg of systolic BP on inspiration
  - Pericardial rub – tamponade due to inflammatory pericarditis

# Cardiac Tamponade on CT

**Pericardial tamponade on radiograph and CT**



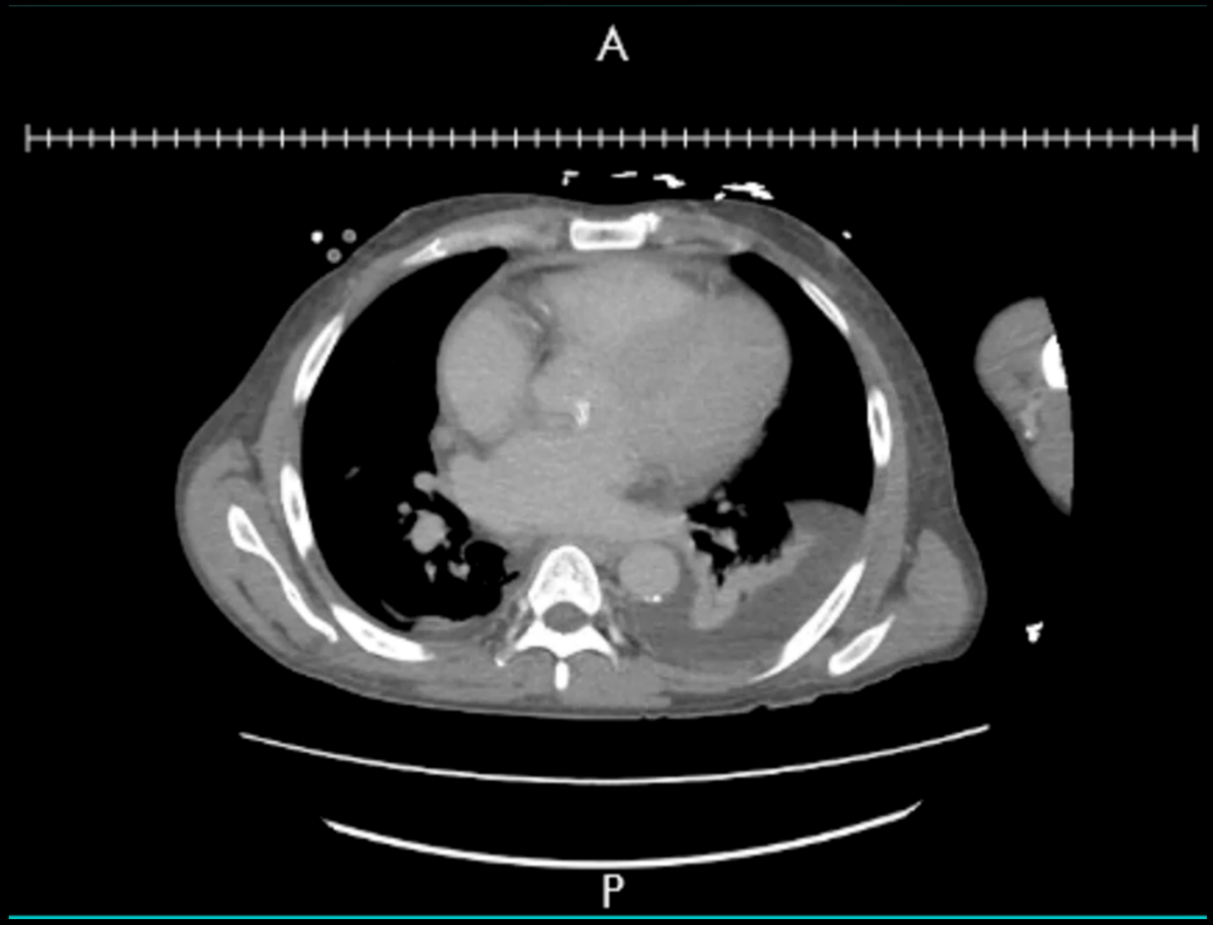

A patient presented to the emergency room with dyspnea. A chest radiograph (A) shows cardiomegaly and widened mediastinum (arrow). Image B shows an enlarged superior vena cava (arrowhead) and mediastinal adenopathy (arrow). Image C shows compression of the right ventricle (arrow) and a large malignant effusion (arrowhead). Cardiac catheterization confirmed tamponade physiology.

back to our patient

# Hospital Course

- decreased CP and SOB s/p pericardiocentesis
- Pericardial fluid cytology & culture – negative for malignancy; no growth
- 2/18 & 2/19 hemodialysis
- CT Chest/Abd/Pelvis to evaluate for possible underlying malignancy
  - Supraclavicular & mediastinal lymphadenopathy – likely reactive
- 2/20 & 2/21 - repeat TTE
  - Right heart – no abnormality
  - Improved LV systolic function, LV EF – 55-60%
- Additional ~700cc pericardial drain output; removed 2/21

# CT Abd/Pelvis – 2/19



# CT Chest – 2/19

# Hospital Course (cont.)

- Drain removed 2/21
- Minimal effusion and improved LV function
- d/c home 2/21
  - f/u nephrology, continue MWF dialysis, repeat TTE in 2-3 weeks

# Final Diagnosis

Cardiac Tamponade

Noninflammatory Pericardial Effusion

# Catheter Pericardiocentesis

- Procedure to drain fluid that has built up in the pericardial sac
  - Local anesthesia
  - Needle guided by echo or fluoroscopy
  - Catheter placed, continuous drainage hours-days (<25mL/day)
- Typically done in pts who are hemodynamically unstable or have a worrisome clinical presentation
  - Early tamponade = conservative mgmt – monitoring, serial echo, avoid volume depletion, tx underlying cause of effusion
- Risks: puncturing the heart or liver; excess bleeding; air in chest cavity; infections; abnormal heart rhythyms
- Post-op – repeat TTE, chest CT, EKG

# Imaging Costs at Memorial Hermann

- CXR 1View (1) - $683
- Chest US (1) - $903
- CT Chest w/ contrast (1) - $3936
- CT Chest w/o contrast (1) - $3788
- CT Pelvis/Abdomen w/ contrast (1) - $7998
- TTE (4) - ??

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- Total Imaging Cost = $17,308

(excluding TTE cost)

# Take Home Points

- Utility of BSUS in ED
- Subacute cardiac tamponade may not present with the most alarming signs/sx
- Serial exams needed in pt who has pericardial effusion and worsening clinical picture
- Catheter pericardiocentesis w/echocardiographic guidance is treatment of choice

# References


- https://www.uptodate.com/contents/cardiac-tamponade?search=cardiac%20tamponade&source=search_result&selectedTitle=1~150&usage_type=default&display_rank=1#H9

- https://www.hopkinsmedicine.org/health/treatment-tests-and-therapies/pericardiocentesis

- https://acsearch.acr.org/list?_ga=2.96928217.796648380.1582823996-815117025.1582823996


Questions?