Internal Medicine Clerkship
Case Discussions

Congestive Heart Failure
Student Guide

Objectives:

1. Identify characteristics and relevant review of systems that determine the presence of decompensation and precipitants of congestive heart failure including dyspnea, orthopnea, and paroxysmal nocturnal dyspnea.
2. Assess for risk factors and predisposing conditions including coronary artery disease, pulmonary hypertension, and medication nonadherence.
3. Assess for social risk factors and causes for decompensation including tobacco use and dietary or fluid indiscretion.
4. Identify key physical exam findings that help determine the presence of decompensation and differentiate right from left sided heart failure (including rales/crackles, presence of S3, and peripheral edema).
5. Identify and interpret key laboratory and imaging tests and list indications, benefits, test characteristics, risks, and costs of testing that determine severity (including N-terminal pro-B-type natriuretic peptide) and determine underlying etiology (including electrocardiogram and echocardiography).
6. Describe a rational and evidence-based approach to treating a patient with congestive heart failure:
    a. Describe initial treatment modalities including diuretics, ACE inhibitors/Angiotensin receptor blockers, and beta-blockers.
    b. Describe indications for hospitalization based on history or exam.
7. Describe possible complications of congestive heart failure including sudden cardiac death.
8. Describe factors that affect prognosis including demographics, hospitalization, and heart failure etiology.

Clinical Case 1:

A 72-year old retired CTA bus driver has been under your care for hypertension and diabetes for the past 12 years. She presents to your office for a routine visit and complains of leg swelling, mild exertional dyspnea, and 10-pound weight gain over the past month. She denies chest pain, orthopnea, PND, though she sleeps propped up in bed. She does not smoke or use alcohol. Her current medications include metformin 2000mg/day, atenolol 100mg/day, HCTZ 25 mg/day, ibuprofen 600 mg TID prn, and lisinopril 20 mg/day. She is able to walk 2 blocks before she starts to develop shortness of breath.

BP 170/100, RR 20, HR 66, T 98f
Gen: Overweight African American female in no apparent respiratory distress
Neck: JVP to angle of jaw, positive hepatojugular reflux
Lungs: Dull at bases
CV: S4 audible, PMI Diffuse in MCL, 2/6 holosystolic murmur at apex
Abd: obese, without hepatomegaly
Ext: 1+ Bilateral ankle edema present

Updated 4/12/24 MRE

Questions:

1. What are the common etiologies of heart failure, and which does this patient most likely have? Differentiate the causes based on heart failure with reduced ejection fraction and heart failure with preserved ejection fraction.

2. What are the likely pathophysiologic mechanisms at work in this patient's heart failure?

3. What are the common symptoms of heart failure?

4. What physical exam signs should you be careful to assess for on exam?

5. What are the NYHA classes of heart failure and what are the ACC/AHA stages of heart failure? What class and stage does she have?

6. What is the significance of the patient's blood pressure, and how will it affect your management?

7. What tests are indicated to make the diagnosis?

The patient undergoes additional evaluation. Her cbc is normal, chemistry notable for a creatinine of 1.3, normal liver function tests, and hga1c 7.6. Her echo reveals LVH, a mildly dilated left atrium, and an EF 55%.

8. What changes would you make in the patient's diabetic drug therapy?

9. What type of heart failure does she have, and how would you treat her?

10. What is her prognosis? Does the NYHA class help you with the prognosis?

Updated 4/12/24 MRE

Clinical Case 2:

A 74-year old retired elementary school principal is referred to you for general care after a change in his HMO provider. He has a history of CAD and suffered a large anterior wall infarction eight months ago complicated by acute pulmonary edema requiring mechanical ventilation. He subsequently underwent a PTCA and stenting of the LAD and has had no ischemic symptoms since. The LV ejection fraction was last measured at 25% by echocardiogram done three months ago. There was mild mitral regurgitation noted.
For the past two months he has noted increasing dyspnea on exertion and an eight-pound weight gain. He never complains of chest discomfort but is only able to walk up one flight of stairs before having to rest. He uses 3 pillows to prop his head up at night and will occasionally wake up in the middle of the night with a dry cough.

His medications include lisinopril 20mg/day, aspirin 325 mg/day, plavix 75 mg/day, and furosemide 20 mg/day. He has no drug allergies.

BP 110/70 HR 110 RR 20 T 97F
Gen: Appears older than stated age, able to complete sentences, comfortable while sitting.
Neck: JVD 10 cm at 45o
Lungs: Few rales at bases
CV: PMI laterally displaced, S1 S2 regular, soft S3 and 3/6 HSM at apex radiating to axilla, no rub.
Abd: Normal
Ext: 1+ Bilateral ankle edema

Questions:

1. What factors may be contributing to this patient's apparent exacerbation of heart failure?

2. What further diagnostic testing is indicated at this time?

3. Is there an indication to admit this patient to the hospital for treatment at this time?

4. How would you treat this patient's symptoms? Is there a need for an adjustment in his present medication regimen? What medications would you add or remove and why?

5. List the mediations that improve mortality in patients with LV dysfunction and CHF. If you were forced to pick one medication to treat chronic heart failure based on evidence, which one would provide the greatest survival advantage?

Updated 4/12/24 MRE

6. Comment on the utility of digoxin, diuretics, and calcium channel antagonists with patients with heart failure with reduced ejection fraction.

7. What are the contraindications to starting beta-blocker therapy inpatients with CHF?

References:

Harrison's Principles of Internal Medicine, 21e. Chapter 257: Heart Failure: Pathophysiology and Diagnosis
https://accessmedicine-mhmedical-com.archer.luc.edu/content.aspx?bookid=3095&sectionid=265451573

Harrison's Principles of Internal Medicine, 21e. Chapter 258: Heart Failure: Management
https://accessmedicine-mhmedical-com.archer.luc.edu/content.aspx?bookid=3095&sectionid=265451702

Harrison's Manual of Medicine, 20e. Chapter 126: Heart Failure and Cor Pulmonale
https://accessmedicine-mhmedical-com.archer.luc.edu/content.aspx?bookid=2738&sectionid=227558121

Redfield MM. Heart Failure with Preserved Ejection Fraction. N Engl J Med. 2016 Nov 10;375(19):1868-77. PMID 27959663
https://www-nejm-org.archer.luhs.org/doi/full/10.1056/NEJMcp1511175

Houston BA, Brittain EL, Tedford RJ. Right Ventricular Failure. N Engl J Med. 2023 Mar 23;388(12):1111-1125. doi: 10.1056/NEJMra2207410. PMID: 36947468.
https://www-nejm-org.archer.luc.edu/doi/10.1056/NEJMra2207410

Murphy SP, Ibrahim NE, Januzzi JL Jr. Heart Failure With Reduced Ejection Fraction: A Review. JAMA. 2020 Aug 4;324(5):488-504. doi: 10.1001/jama.2020.10262. Erratum in: JAMA. 2020 Nov 24;324(20):2107. PMID: 32749493.
https://jamanetwork-com.archer.luc.edu/journals/jama/fullarticle/2768982