LEARNING OBJECTIVES

After completing this case study, the reader should be able to:

- Recognize the signs and symptoms of heart failure.
- Develop a pharmacotherapeutic plan for treatment of heart failure with reduced ejection fraction (HFrEF).
- Outline a monitoring plan for heart failure that includes both clinical and laboratory parameters.

PATIENT PRESENTATION

Chief Complaint

“I’ve been more short of breath lately. I can’t seem to walk as far as I used to, and either my feet are growing or my shoes are shrinking!”

HPI

Rosemary Quincy is a 68-year-old African-American female who presents to her family medicine physician for evaluation of her shortness of breath and increased swelling in her lower extremities. She reports that her shortness of breath has been gradually increasing over the past 4 days. She has noticed that her shortness of breath is particularly worse when she is lying in bed at night, and she has to prop her head up with three pillows in order to sleep. She also reports exertional dyspnea that is usual for her, but especially worse over the past couple of days.

PMH

Hypertension × 20 years

CHD with history of MI in 2005 (PCI performed and bare metal stents placed in LAD and RCA)

Heart failure (NYHA FC III)
Type 2 DM × 25 years

Atrial fibrillation

COPD (GOLD 3, Group D)

CKD (Stage 4)

**FH**

Father died of lung cancer at age 71, mother died of MI at age 73.

**SH**

Reports occasional alcohol intake. States she has been trying to follow her low-cholesterol and low-sodium diet. Former smoker (35 pack-year history; quit approximately 10 years ago).

**Meds**

Valsartan 160 mg PO BID

Furosemide 40 mg PO BID

Warfarin 2.5 mg PO once daily

Carvedilol 3.125 mg PO BID

Pioglitazone 30 mg PO once daily

Glimepiride 2 mg PO once daily

**Potassium chloride** 20 mEq PO once daily

Atorvastatin 40 mg PO once daily

Aspirin 81 mg PO once daily

Albuterol MDI, two inhalations by mouth q 4–6 hours PRN shortness of breath

**Tiotropium** DPI 18 mcg, one inhalation by mouth daily

**Fluticasone/salmeterol** DPI 250 mcg/50 mcg, one inhalation by mouth BID

**All**

**Lisinopril** (cough).

**ROS**

Approximate 7-kg weight gain over the past week. No fever or chills. Denies any recent chest pain, palpitations, or dizziness. Reports worsening shortness of breath with exertion and three-pillow orthopnea.
Describes a chronic, dry (nonproductive), hacking cough, which she describes as usual without recent worsening. No abdominal pain, nausea, constipation, or change in bowel habits. Denies joint pain or weakness.

**Physical Examination**

**Gen**

African-American female in moderate respiratory distress

**VS**

BP 134/76 (sitting; repeat 138/78), HR 65 (irreg irreg), RR 24, T 37°C, O₂ sat 90% RA, Ht 5'5", Wt 79 kg (Wt 1 week ago: 72 kg)

**Skin**

Color pale and diaphoretic; no unusual lesions noted

**HEENT**

PERRLA; lips mildly cyanotic; dentures

**Neck**

(+) JVD at 30° (7 cm); no lymphadenopathy or thyromegaly

**Lungs/Thorax**

Crackles bilaterally, 2/3 of the way up; no expiratory wheezing

**Heart**

Irregularly irregular; (+) S₃; displaced PMI

**Abd**

Soft, mildly tender, nondistended; (+) HJR; no masses, mild hepatosplenomegaly; normal BS

**Genit/Rect**

Guaiac (–), genital examination not performed

**MS/Ext**

3+ pitting pedal edema bilaterally; radial and pedal pulses are of poor intensity bilaterally

**Neuro**
A & O × 3, CNs intact. No motor deficits

**Labs**

**Favorite Table | Download (.pdf) | Print**

| Na 131 mEq/L | Hgb 13 g/dL | Mg 1.9 mEq/L | INR 2.3 |
| K 3.5 mEq/L | Hct 40% | Ca 9.3 mg/dL | A1C 6.1% |
| Cl 99 mEq/L | Plt 192 × 10^3/mm^3 | Phos 4.3 mg/dL |
| CO2 28 mEq/L | WBC 9.1 × 10^3/mm^3 | AST 34 IU/L |
| BUN 32 mg/dL | | ALT 27 IU/L |
| SCr 2.3 mg/dL (baseline SCr 2.1 mg/dL) |
| Glucose 124 mg/dL |
| BNP 776 pg/mL (BNP drawn 2 months prior: 474 pg/mL) |

**ECG**

Atrial fibrillation, LVH.

**Chest X-Ray**

PA and lateral views (Fig. 15-1) show evidence of congestive failure with cardiomegaly, interstitial edema, and some early alveolar edema. There is a small right pleural effusion.

**FIGURE 15-1.**

A. PA CXR demonstrates increased vascular markings representative of interstitial edema, with some early alveolar edema. The *arrow* points out fluid lying in the fissure of the right lung. Note the presence of cardiomegaly. B. Lateral view of CXR. *Arrow* points out the presence of pulmonary effusion.
No evidence of infiltrates; evidence of pulmonary edema suggestive of congestive heart failure; enlarged cardiac silhouette.

**Echocardiogram**

LVH, reduced global left ventricular systolic function, estimated EF 20%; evidence of impaired ventricular relaxation, Stage 1 diastolic dysfunction.

**Assessment**

Admit to hospital for acute exacerbation of heart failure

**QUESTIONS**

**Problem Identification**
1.a. Create a list of this patient’s drug-related problems.

1.b. What signs, symptoms, and other information indicate the presence and type of heart failure in this patient?

1.c. What is the classification and staging of chronic heart failure for this patient?

1.d. Could any of this patient’s problems have been caused by drug therapy?

Desired Outcome

2. What are the goals for the pharmacologic management of heart failure in this patient?

Therapeutic Alternatives

3.a. What diuretic therapy should be recommended for this patient initially for acute treatment of her heart failure exacerbation?

3.b. How should this patient’s pharmacotherapy be adjusted for chronic management of her heart failure?

3.c. What nonpharmacologic therapy should be recommended for this patient with respect to her heart failure?

Optimal Plan

4. What drugs, doses, schedules, and duration are best suited for the management of this patient?

Outcome Evaluation

5. What clinical and laboratory parameters are needed to evaluate the therapy for achievement of the desired therapeutic outcome and to detect and prevent adverse events?

Patient Education

6. What information should be provided to the patient about the medications used to treat her heart failure?

SELF-STUDY ASSIGNMENTS

1. Develop a table illustrating the recommended target doses for ACE inhibitors, angiotensin II receptor blockers, and β-blockers in patients with heart failure with reduced EF.

2. Research the topic of diuretic resistance, and write a report describing the phenomenon and methods used to overcome it.


CLINICAL PEARL
The presence of pitting edema is associated with a substantial increase in body weight; it typically takes a weight gain of 10 lb to result in the development of pitting edema.

REFERENCES


Clinical Practice Guidelines and the Heart Failure Society of America. Circulation 2016;134. DOI:10.1161/CIR0000000000000435.
