THE CHALLENGES OF DIASTOLIC HEART FAILURE

Jamie L. W. Kennedy

26 October 2012

Outline

- Case Presentation
- Differential Diagnosis
- Confirming the Diagnosis
- Epidemiology
- Prognosis
- Therapeutic Strategies

Case Presentation

- 74 year old lady with history of permanent atrial fibrillation and hypertension presents with worsening dyspnea on exertion. She's able to climb just one or two stairs before stopping to rest.
- On exam, she is hypertensive to 150/90, has JVD and 1+ peripheral edema.
- BNP mildly elevated to 300, creatinine 1.5
- Prescribe a diuretic and order an echo

Case Presentation

- Echo…
  - Normal LV systolic function, EF 60-65%
  - Mild left ventricular hypertrophy
  - Grade II diastolic dysfunction
  - Moderate left atrial enlargement
  - PASP estimated at 40 mmHg

Case Presentation

- Diastolic heart failure
- Heart failure with preserved systolic function
- Heart failure with preserved ejection fraction (HFPEF)

Case Presentation

- Hold on there…
- HFPEF is a diagnosis of exclusion, so let's make sure we're not overlooking something

Valve Disease

- Aortic stenosis
  - Cath if unclear severity
- Aortic insufficiency
  - Acute, TEE
- Mitral regurgitation
  - Either acute or chronic, TEE
- Mitral stenosis
  - Cath if unclear severity

Other Pathologies

- Hypertrophic cardiomyopathy
  - Cardiac MR may be helpful to demonstrate pattern of hypertrophy, especially for apical variants
  - TTE or cath to look for dynamic outflow obstruction
- Myxoma or other intracardiac mass
  - TEE, cardiac MR

Other Pathologies

- Pericardial disease – constriction, effusion
  - Prior thoracic surgery, radiation, TB
  - Cardiac MR, cath
- Restrictive cardiomyopathy
  - Amyloidosis, hemochromatosis, sarcoidosis, prior radiation, familial
  - Cardiac MR, endomyocardial biopsy
- High output heart failure
  - Anemia, thyrotoxicosis, AV fistula

Other Pathologies

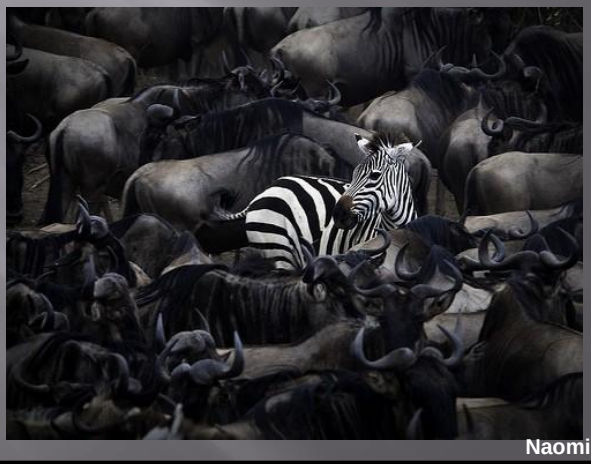
- Pulmonary hypertension
  - Pulmonary embolism (or risk factors for PE)
  - Rheumatologic disease
  - Chronic lung disease
  - Congenital heart defect (repaired or not)
  - Obstructive sleep apnea
- Markedly elevated PASP
- RV enlargement dysfunction
- Especially if left atrium is not dilated
- Cardiac catheterization

Other Pathologies

- Renal disease
  - Renal artery stenosis and flash pulmonary edema
  - Sometimes intrinsic renal disease is the primary pathology, but more often there's co-existing moderate renal impairment in many HFPEF patients, likely due to long-standing hypertension, diabetes, advancing age

Other Pathologies

- Many of these alternative etiologies are rare, and not every test is indicated for every patient



Naomi Roberts at Piccsy.com

Other Pathologies

- Often combination of problems, no one of which is sufficiently severe to cause a problem if isolated

Confirming the Diagnosis

- What if their exam is difficult and you're not sure if it's heart failure or COPD or something else?
  - Empiric trial of diuretics
  - BNP
  - Echo markers of diastolic dysfunction
  - Cardiac catheterization to define hemodynamics

BNP

- Peptide released from myocytes when wall stress is elevated
- Doesn't tend to be as high as in patients with reduced LV function
- Elevated BNP when you suspect HFPEF is helpful, but…
  - Can be elevated in PAH and pulmonary embolism due to right heart strain
  - Can be normal in obese patients with HFPEF

Echo Markers

- Several different criteria, which tells you that none of them is perfect.
  - LVH, LA enlargement, elevated PASP
  - Flow pattern across the mitral valve is altered by higher LV diastolic pressure
  - Flow pattern in the pulmonary veins is impacted by higher LA pressure
  - Mitral annular velocity correlates with rate of LV relaxation
- These markers are integrated into an overall assessment

Nagueh et al *J Am Soc Echocardiogr* 2009; 22: 107

Epidemiology

- About 50% of patients with heart failure have HFPEF
- Risk factors for HFPEF
  - Age over 70
  - Female sex
  - Hypertension
  - Atrial fibrillation

Owan et al *NEJM* 2006; 355: 251
Lee et al *Circ* 2009; 119: 3070
Yancy et al *JACC* 2006; 47: 76

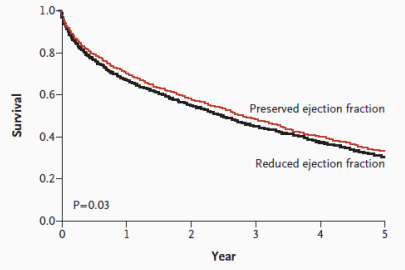
Epidemiology

- Comorbities are common
  - Obesity
  - Coronary artery disease (though less likely to have had an MI than patients with reduced EF)
  - Diabetes mellitus
  - Dyslipidemia

Lam et al *Eur J Heart Fail* 2011; 13: 18

Prognosis

- Mortality similar for HF with PEF vs REF, about 2.1 year median survival (Framingham)



No. at Risk						
Reduced ejection fraction	2424	1637	1350	1049	813	604
Preserved ejection fraction	2166	1539	1270	1001	758	574

Figure 2. Kaplan–Meier Survival Curves for Patients with Heart Failure and Preserved or Reduced Ejection Fraction.

Lee et al *Circ* 2009; 119: 3070
Owan et al *NEJM* 2006: 355: 251

Prognosis

- I-PRESERVE predictors of death or HF admission
  - N terminal BNP
  - Age
  - Diabetes mellitus
  - Previous heart failure hospitalization
- Olmsted predictors of mortality
  - Age
  - Female
  - Hemoglobin and creatinine on admission
  - Hypertension
  - Diabetes

Komajda *Circ Heart Fail* 2011; 4: 27
Owan et al *NEJM* 2006; 355: 251

Evidence-Based Therapies

http://www.saharamet.com

Clinical Trials

- Lack of evidence is not for lack of effort
- Limitations in studying this disease
  - Diagnostic criteria have been vague and variable from trial to trial, though that's changing lately
  - Pathophysiology of the disease is not entirely clear
  - May well be multiple distinct clinical entities that we are inappropriately grouping together

Negative Clinical Trials

- All randomized and placebo-controlled
- Primary endpoints were death or hospitalization
- Renin Angiotensin Aldosterone System
  - PEP-CHF – perindopril
  - CHARM-Preserved – candesartan
  - I-PRESERVE – irbesartan
- Beta blockade
  - SENIORS – nebivolol (subgroup analysis)
- DIG trial - digoxin

Cleland et al *Eur Heart J* 2006; 27: 2338
Yusuf et al *Lancet* 2003; 362: 777
Massie et al *NEJM* 2008; 359: 2456
Flather et al *Eur Heart J* 2005; 26: 215
Ahmed et al *Circ* 2006; 114: 397

Clinical Trials

- Ongoing investigations
- RELAX - sildenafil
- TOPCAT - spironolactone
- Beta blockers
  - Beta-PRESERVE – metoprolol succinate
  - J-DHF - carvedilol

ACC/AHA Guidelines

- Class I
  - Control blood pressure (<130/<80) (A)
    - No evidence to support one drug over another, though may have other indications like ACE for DM
  - Rate control in atrial fibrillation (C)
  - Diuretics to control pulmonary congestion and peripheral edema (C)

Hunt at al *Circ* 2009; 119: e391

ACC/AHA Guidelines

- Class IIa
  - Coronary revascularization if ischemia is likely causing diastolic dysfunction (C)
- Class IIb
  - Restoration and maintenance of sinus rhythm (C)
  - ACE/ARB, beta blockers, and calcium channels blockers for hypertension may also help control symptoms (C)
  - Usefulness of digoxin has not been established (C)

Hunt at al *Circ* 2009; 119: e391

So What Do I Do?

- Control blood pressure
- If they feel much worse in atrial fibrillation, try to keep them in sinus rhythm
  - May require an antiarrhythmic
  - May not be successful
- Patient education
  - Restrict sodium to 2 grams/day and fluids to 2 liters/day
  - Daily weights
  - Call if weight is climbing or worsening symptoms

So What Do I Do?

- Cautious with precipitating medications
  - NSAIDS
  - Pioglitazone
  - Calcium channel blockers
- Treat contributing comorbidities
  - Sleep apnea
  - Obesity

Decompensation

- Sometimes predictable – try to plan ahead if possible
  - Change in living situation
  - Elective surgery
- Medication and dietary non-compliance
- Labile hypertension
- Atrial fibrillation
- Acute non-cardiac illness requiring fluid resuscitation
  - Make every effort to restore euvolemia prior to discharge to reduce chances of readmission with HF

Diuretic Dosing

- Keep patients breathing comfortably (NYHA class II to III) and edema to a dull roar
- Often struggling with renal function
- Don't worry about small changes in creatinine
- Always talk with the patient about their symptoms before adjusting diuretic dose
- Try reducing the diuretic dose instead of completely discontinuing them

Diuretic Dosing

- If you can't keep someone out of pulmonary edema without making them uremic, then they probably need renal replacement therapy
- Not infrequently this becomes a goals of care discussion in elderly patients

Summary

- HFPEF is quite common in older patients with hypertension and atrial fibrillation
- Consider alternative pathologies
- Lack of evidence-based therapies
- Control blood pressure and heart rate
- Use diuretics to keep patients comfortable
- Be alert for potential causes of decompensation and try to intervene early to prevent a hospitalization