

THE CHALLENGES OF DIASTOLIC HEART FAILURE

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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

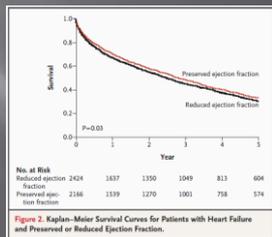
Epidemiology

- Comorbidities 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)



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 et 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 et 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 goal 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