Heart Failure With Preserved Ejection Fraction – How Can We Best Treat It?

25th Annual San Diego Heart Failure Symposium
June 28-29, 2019
La Jolla, CA

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Types of Heart Failure

Heart Failure Reduced Ejection Fraction
- Enlarged left ventricle
- Reduced pumping ability
- Thinned walls
- Weakened muscle

Normal Heart

Heart Failure Preserved Ejection Fraction
- Normal or small left ventricle size
- Thickened walls
- Stiff muscle
- Normal pumping capacity

High pressure needed to fill the ventricle
Heart Failure with Preserved Ejection Fraction (HFpEF)

• Signs and symptoms of HF occurring in patients with normal or near-normal EF (>0.50 or 0.45).
• Doesn’t exclude abnormalities in systolic function, but mildly reduced EF is not usually associated with HF in the absence of other factors.
• The constellation of clinical signs and symptoms leading to the consideration of HFpEF can be caused by diverse cardiac (e.g. MS, constriction) and non-cardiac etiologies (e.g. obesity, COPD).
Prevalence of HFpEF

13 Community Based Studies
1997-2006

Median = 52%  Mean = 55%

Reviewed by Hogg K et al, 2004 and Owan T et al, 2005, Owan T, NEJM, 2006; Bursi F, JAMA, 2006
Prevalence of Hospitalization for HFpEF is Increasing

GWTG-HF: N=110,621 patients hospitalized with HF
P<0.0001 for trend of increased HFpEF prevalence

Based on Steinberg et al. Circulation 2012
Distribution of EF According to Gender

Think HFpEF in older women with new onset HF

Comorbidities in HF Patients

Outcomes in HFpEF, HFrEF and HFmrEF

**GWTG in the U.S.**

**European Registry**

### Central Illustration: 5-Year Outcomes in Patients Hospitalized With HF With Preserved, Borderline, and Reduced EF

**Outcomes - 5-Year Event Rates (%)**

<table>
<thead>
<tr>
<th></th>
<th>Mortality</th>
<th>Readmission</th>
<th>CV Readmission</th>
<th>HF Readmission</th>
<th>Mortality/Readmission</th>
</tr>
</thead>
<tbody>
<tr>
<td>HFpEF</td>
<td>75.3</td>
<td>82.2</td>
<td>63.9</td>
<td>48.5</td>
<td>96.4</td>
</tr>
<tr>
<td>HFrEF</td>
<td>75.7</td>
<td>85.7</td>
<td>63.3</td>
<td>45.2</td>
<td>97.2</td>
</tr>
<tr>
<td>HFmrEF</td>
<td>75.7</td>
<td>84.0</td>
<td>58.9</td>
<td>40.5</td>
<td>97.3</td>
</tr>
</tbody>
</table>


1Shah KS et al, *Journal of the American College of Cardiology*, Volume 70, Pages 2476-2486
2Delepaule et al. ESC HF. 2017 May; 4(2): 99–104
% Deaths Due to Non-CV Causes

Olmsted County MN 1979-2002
1,063 Pts

Deaths due to Non-CV Causes More Common in HFpEF

5-Year Mortality 55%; HFpEF=HFrEF
Diagnosing HFpEF: What To Look For on the Echo

• Is the EF normal or depressed?

• Are there valvular or other structural abnormalities?

• Measures of increased filling pressures and diastolic function useful but not essential.

• Look for the ‘fellow travelers’ – LVH and large LA.

• Does the patient have pulmomyary hypertension?
Diastology
Pulmonary Artery Systolic Pressure

Adjusted P*<0.05 vs CON; †<0.05 vs HTN

Prevalence of PH (PASP >35):
2% in CON; 8% in HTN; 83% in HFpEF

Pulmonary HTN is very common in HFpEF patients

Lam C et al: JACC 2009
BNP in Systolic or Diastolic Dysfunction

Breathing Not Properly Multinational Study – 447 patients with acute dyspnea in the ED

Maisel et al. JACC. 2003;41:2010-2017
When the Diagnosis is in Doubt…Go to the Table of Truth!

75 YO C/O dyspnea, CP
HTN, Metabolic syndrome
Mild LAE, E/e’ 11, RVSP 32
Normal BNP

40 Watts Exercise

PCWP=LVEDP=12 mmHg;
CO 5.7 l/min

PCWP=LVEDP=40 mmHg;
CO 7.8 l/min
Treating HFpEF

THE THEORY
hundreds of papers!

THE EVIDENCE
virtually none!!
ACC/AHA Guidelines – Class I Recommendations

ACC/AHA Guidelines – Class I Recommendations

- Control BP (<130/80 mmHg)
- Control of tachycardia in AF
- Reduction of central blood volume

How to Accomplish Treatment Goals

- Agent not specified
- Dig, BB, CCB, amio/dronedarone
- Low salt diet, diuretics, nitrates
ACC/AHA Guidelines

Class IIa

• Coronary revascularization if ischemia is thought to be causing diastolic dysfunction
Impact of Revascularization on Survival in Patients With HFpEF

ACC/AHA Guidelines

Class IIb

- Restoration of sinus rhythm in AF
- If BP controlled, these might help ↓ Sx
  - ACE/ARB
  - Beta blockers
  - Calcium blockers
- Digitalis – use not well established
- Consider MRA in patients with EF ≥ 45%, GFR > 30, K < 5.0. (IIb, TOPCAT)
Preventing HFpEF Is the Best Treatment!
LV End Diastolic PV Relationships Are Related with Life Long Exercise Patterns

Bhella PS et al JACC, Volume 64, Issue 12, 2014, 1257–1266
Normalized Peak VO2 Increases With Lifelong Exercise

Bhella PS et al JACC, Volume 64, Issue 12, 2014, 1257–1266
Diet and Exercise Training Improve Exercise Capacity of HFpEF Patients

Effects of a 20-Week Caloric Restriction Diet on Exercise Capacity and Quality of Life in HFpEF

Change in Lateral $E'$ for Each Quartile of SPB Reduction

Experimental Therapeutic Agents for Treating HFpEF

- Sacubitril-valsartan
- Empagliflozin
- Soluble quanylate cyclase stimulators
- PDE5 inhibitors
- ET antagonists
Transcatheter Interatrial Shunt (REDUCE LAP-HF)

Shah S et al. JAMA Cardiol 2018;3:968-77.
Transcatheter Interatrial Shunt (REDUCE LAP-HF)

Shah S et al. JAMA Cardiol 2018;3:968-77.
Remote Hemodynamic Monitoring
Pericardial Release

Borlaug et al. Circ Heart Fail. 2017 Apr; 10(4);
Effects of Releasing Pericardial Restraint

Borlaug et al. Circ Heart Fail. 2017 Apr; 10(4);
Summary: Update on Treating HFpEF

- Effective management includes measures to relieve congestion, control heart rate and normalize blood pressure.
- MRA therapy appears to improve outcomes.
- Identifying and treating CAD has been associated with better survival.
- Prevention and healthy life style choices remain the best therapies.