ADVANCES IN THE MANAGEMENT OF CONGESTIVE HEART FAILURE

Manpreet Singh MD
DISCLOSURE

• I have no financial disclosures
Heart Failure

- Approximately 5 million Americans have CHF (male to female ratio 1:1)
- 550,000 new cases annually
- Incidence of 10/1000 > 65 years of age
- Hospital discharges > 1,000,000
- Single largest expense for Medicare
- Five-year mortality rate as high as 50%
Background

- HF is **NOT** a disease it is a syndrome
- HF has many causes (over 200)
- HF comes in all ages and can be hard to diagnose
- HF with preserved EF (50% or >)
  - HFpEF
- HF with reduced EF (≤40%)
  - HFrEF
Heart Failure History

- Orthopnea
- PND
- DOE
- Syncope/ pre-Syncope
- Angina
- Early satiety
- Edema
## CLASSIFICATION OF HF: ACC/AHA stage vs NYHA Class

<table>
<thead>
<tr>
<th>ACC/AHA Heart Failure Stage</th>
<th>NYHA Functional Class</th>
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<tbody>
<tr>
<td>A. At risk for heart failure but without structural heart disease or symptoms</td>
<td>None</td>
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<tr>
<td>B. Structural heart disease but without heart failure</td>
<td>I. Asymptomatic</td>
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</table>
| C. Structural heart disease with prior or current heart failure symptoms | II. Symptomatic with moderate exertion  
III. Symptomatic with minimal exertion |
| D. Refractory heart failure requiring specialized interventions | IV. Symptomatic at rest |

HFrEF (Systolic Heart Failure)
Etiology

- Myocardial
  - Ischemia
  - Viral
  - Idiopathic
  - Hypertension (burned out)
  - Toxin
    - ETOH
  - Metabolic

- Valvular
  - Aortic insufficiency
  - Mitral insufficiency
  - Aortic stenosis (burned out)

- Volume overload
  - Congenital
  - Av fistulae
  - Hyperthyroid
HFrEF (Systolic Heart Failure) Compensatory Mechanisms

• Dilatation
  • Over time the heart enlarges to compensate for a low stroke volume

100 cc volume with normal EF 65% = 65cc stroke volume

300 cc volume with a 20% EF = 60 cc stroke volume
HFrEF (Systolic Heart Failure)
Compensatory Mechanisms

• Renin Angiotensin Aldosterone system (RAAS)
  • The kidney senses low blood pressure (similar to hypovolemia) and this activates the RAAS.
  • Aldosterone causes the kidney to retain salt and water thus increasing plasma volume and helping dilatation of the LV.

• Heart rate (SNS)
  • Baroreceptors in the carotid are stimulated because of reduced flow and pressure. The result is an increase in sympathetic tone.
  • This results in increased norepinephrine
  • Norepinephrine increases heart rate and results in increased CO
Compensatory Mechanisms Run Amuck

- The dilatation of the heart alters the geometry and reduces contraction further.
- The salt and water retention of the RAAS further dilate the heart. Stretching the heart causes increased myocardial oxygen use and can worsen ischemia.
- The sympathetic nervous systems increase of norepinephrine causes a host of problems:
  - Arrhythmia (sometimes fatal)
  - Beta receptor down regulation
    - Less contraction for the same amount of myocytes
HFrEF (Systolic Heart Failure) Prognosis

- 15% die within 3 months of diagnosis
- 40% die within 2 years of diagnosis
- 87% die within 10 years of diagnosis

- Ischemic patients die sooner.
- Low serum Na+, very large heart, and arrhythmia are indicators of a poor outcome.
- High norepinephrine is associated with increased risk of death.
HFrEF (Systolic Heart Failure) Therapy

- Relieving symptoms
  - Salt restriction reduces congestion
  - Congestion causes shortness of breath; diuretics help this.
  - Self monitoring is best
  - Digitalis improves exercise

- Diuretic Therapy
  - Loop reduce preload congestion symptoms; and reduce survival.
  - Spironolactone improves survival but has little effect on symptoms
HFrEF (Systolic Heart Failure) Therapy

• Prolong survival
  • ACE inhibitors are #1 drugs for this
    • Reduce blood pressure (afterload) and improve heart performance.
    • Reduce remodeling (dilatation)
  • Reduce myocyte death
  • ARBs if ACE intolerant
HFrEF (Systolic Heart Failure) Therapy

• Beta Blockers
  • Up regulate beta receptors on the heart
    • Increased contraction
  • Reduce arrhythmias
  • Reduce ongoing myocyte death
• Carvedilol, Metoprolol Succinate, Bisoprolol
HFrEF (Systolic Heart Failure)

Therapy

- Aldosterone blockers
  - Spironolactone
  - Eplerenone
- Reduce mortality in patients on ACEi and Beta Blockers
- Class III or post MI

- Hydralazine/Isosorbide
  - Beneficial in AA on standard therapy
  - May have a role in 30-35% of caucasians
CRTD in Appropriate Patients

- Defib therapy in patients with EF <35
- CRT if QRS >120ms and symptoms on medical Rx
- CRT reduces mortality independent of Defib
Implanted Cardioverter Defibrillator
CRT-D Therapy
Acute Decompensated Heart Failure (ADHF) Treatment

**Vasodilators**
- NTG
  - IV with BP monitoring
  - Topical
- Nesiritide
  - BP over 100 systolic
  - Watch renal function
- Nitroprusside

**Inotropes**
- Increase mortality
- Help increase fluid removal
- Dobutamine and Milrinone most common
- Arrhythmias common
Heart Failure with Preserved Ejection Fraction (HF-PEF)

- HFPEF is defined by heart failure symptoms with a normal or near-normal EF >0.50.
- This cut point does not exclude mild systolic dysfunction.
- The term “preserved ejection fraction” is preferred because ejection fraction is what is commonly measured.
- HF-PEF is often equated with diastolic heart failure.
DIAGNOSIS OF HF-PEF

• Symptoms and clinical signs of HF
• Absence of a major co-morbid condition that mimics an HF presentation (CKD, COPD, Anemia)
• Echocardiographic abnormalities: increased LV Mass, LA size, Doppler parameters of diastolic dysfunction
• Elevated Natriuretic Peptides
Standard Therapy for DHF

- AHA/ACC and HFSA guidelines
  - Level of Evidence = C “Expert Opinion”
- To date, RCT in HF-PEF ≈ negative
  - Dig Trial – NEG for Mortality CV Hospitalizations
  - PEP-CHF – ACE-I – NEG
  - SENIORS – BB (POS - very few HF-PEF)
  - CHARM-Preserved (ARB) - NEG
HF-PEF

Current treatment targets and options

• LV volume & edema: Diuretics, salt restriction, nitrates
• Rx HTN: Diuretics, CCB, BB, ACEI, ARB
• Reverse LVH: Most antihypertensives
• Prevent ischemia: BB, CA, nitrates
• Reduce HR, prevent AF: BB, rate lowering CA, ARB
• Bradycardia: Atrial Pacing
• Enhance relaxation: No current treatment
• Prevent vascular events: ACEI, ARB, BB
Stage C Therapy (HF-PEF with Symptoms)

Recommended Therapies for Routine Use:

- Treat known risk factor - hypertension
- Ventricular rate control
- Drugs for all patients -
  - Diuretics
- Drugs for appropriate patients
  - ACEI
  - ARBs
  - Beta-Blockers
  - Digitalis
- Coronary revascularization in selected patients
- Restoration/maintenance of sinus rhythm in
Sensors in Heart Failure

Abnormal LV function

Increased filling pressures

Pulmonary and systemic congestion
• THANK YOU