ACHIEVING SUCCESS THROUGH FAILURE: UPDATE ON HEART FAILURE WITH PRESERVED EJECTION FRACTION

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DISCLOSURES

NONE
OUTLINE

- Systolic vs. Diastolic Heart Failure
- New Terminology: HFrEF vs. HFpEF
- Evolution of Heart Failure
- Clinical Evaluation of Heart Failure
- New York Heart Association (NYHA) Classification
- Approach to the patient with heart failure with reduced ejection fraction
  - ACEI/ARB
  - BB
  - Aldosterone antagonists
  - Hydralazine/nitrates in African-Americans
  - New addition: Sacubitril/Valsartan
  - Cardiac resynchronization therapy/implantable cardioverter defibrillator
  - Implantable monitoring device (Cardiomems)
  - Left ventricular assist device

SYSTOLIC VS. DIASTOLIC DYSFUNCTION

NORMAL
- The ventricles fill normally with blood

SYSTOLIC DYSFUNCTION
- The enlarged ventricles fill with blood

DIASTOLIC DYSFUNCTION
- The stiff ventricles fill with less blood than normal

“Can’t Pump”
“Can’t Fill”
NEW TERMINOLOGY

• Heart failure with reduced ejection fraction (HFrEF)
  • LVEF ≤ 40%
• Heart failure with preserved ejection fraction (HFpEF)
  • LVEF ≥ 50%

• HFpEF, borderline
  • LVEF 41-49%
  • Characteristics, treatment patterns and outcomes are similar to HFpEF

Evolution of Heart Failure

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Cellular Pathophysiology</th>
<th>Ventricular Remodeling</th>
<th>Ventricular Dysfunction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aging</td>
<td>Hypertrophy</td>
<td>LVH Dilatation</td>
<td>Systolic Diastolic Both</td>
</tr>
<tr>
<td>Hypertension</td>
<td>Infarction</td>
<td>Both</td>
<td>Both</td>
</tr>
<tr>
<td>Smoking</td>
<td>Accelerated Apoptosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>Fibrosis</td>
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<tr>
<td>Diabetes</td>
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<tr>
<td>Obesity</td>
<td>AHA / ACC Stages of Heart Failure</td>
<td></td>
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<tr>
<td>Genes</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Stage A</td>
<td></td>
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<tr>
<td>Stage B</td>
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<tr>
<td>Stages C and D</td>
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</tbody>
</table>
EVALUATION OF HEART FAILURE

<table>
<thead>
<tr>
<th>Congestion at rest? (e.g. orthopnea, elevated jugular venous pressure, pulmonary rales, S3 gallop, edema)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>Warm and Dry</td>
</tr>
<tr>
<td>Warm and Wet</td>
</tr>
<tr>
<td>No</td>
</tr>
<tr>
<td>OUTPATIENT</td>
</tr>
<tr>
<td>OUTPATIENT OR ED/INPATIENT</td>
</tr>
<tr>
<td>Yes</td>
</tr>
<tr>
<td>Cold and Dry</td>
</tr>
<tr>
<td>ICU</td>
</tr>
<tr>
<td>Cold and Wet</td>
</tr>
<tr>
<td>ICU</td>
</tr>
</tbody>
</table>


NEW YORK HEART ASSOCIATION CLASSIFICATION FOR HEART FAILURE

<table>
<thead>
<tr>
<th>NYHA Class</th>
<th>Level of Clinical Impairment</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>No limitation of physical activity. Ordinary physical activity does not cause undue breathlessness, fatigue, or palpitations.</td>
</tr>
<tr>
<td>II</td>
<td>Slight limitation of physical activity. Comfortable at rest, but ordinary physical activity results in undue breathlessness, fatigue, or palpitations.</td>
</tr>
<tr>
<td>III</td>
<td>Marked limitation of physical activity. Comfortable at rest, but less than ordinary physical activity results in undue breathlessness, fatigue, or palpitations.</td>
</tr>
<tr>
<td>IV</td>
<td>Unable to carry on any physical activity without discomfort. Symptoms at rest can be present. If any physical activity is undertaken, discomfort is increased.</td>
</tr>
</tbody>
</table>
Approach to the patient with heart failure with reduced ejection fraction

- ACEI/ARB
- BB
- Aldosterone antagonists
- Hydralazine/nitrates in African-Americans
- New addition: Sacubitril/Valsartan
ACE Inhibitors

- 16% reduction in mortality in patients treated with ACEI
- Reduction in death from progression of heart failure
- No significant impact on deaths from arrhythmia

SOLVD Trial


Beta Blockers

- 35% reduction in mortality in patients treated with carvedilol
- 3 Beta Blockers with mortality benefit in HFrEF
  - Carvedilol
  - Metoprolol XL
  - Bisoprolol
- Do not start in the setting of decompensated heart failure as this can acutely decrease contractility and precipitate cardiogenic shock

Mineralocorticoid antagonists

- 30% reduction in mortality in patients treated with spironolactone

- Similar reductions in mortality in patients treated with eplerenone (EMPHASIS-HF)

Angiotensin Receptor-Neprilysin Inhibitor (ARNI)

Valsartan

Sacubitril

Natriuretic Peptide System

- Sodium and water retention
- Natriuretic diuresis
- Aldosterone suppression
- Vasodilation
- Hyper trophy
- Fibrosis
- Inhibition of fibrosis
ARNI: Sacubitril/Valsartan

PARADIGM-HF

Sacubitril/Valsartan compared to Enalapril

Higher incidence of:
• Hypotension
• Nonserious angioedema

Lower incidence of:
• Renal impairment
• Hyperkalemia
• Cough


ARNI: Sacubitril/Valsartan

• Practical tips for initiation:
  • No ACEI for 36 hrs before starting ARNI
  • Target dose 97/105 mg PO BID; increase q 2-4 wks
  • Check BMP after dose adjustment
  • Do not monitor BNP
  • Consider decreasing diuretics
  • Avoid in severe hepatic impairment
  • Better to have BB + ARNI rather than BB or ARNI

Courtesy of: Dr. Jacob Abraham
Director, Advanced Heart Failure, Providence Heart Institute
Device Therapy: CRT and ICDs

Cardiac resynchronization therapy (CRT):
- Paces the right ventricle and left ventricular simultaneously
- Left ventricular lead placed via the coronary sinus

Indications:
LVEF ≤ 35%
LBBB
Guideline-directed medical therapy for at least 3 mths
IMPLANTABLE MONITORING DEVICE: CARDIOMEMS

LEFT VENTRICULAR ASSIST DEVICE (LVAD)
**ADDITIONAL RECOMMENDATIONS**

- Target optimal blood pressure (BP) of <130/80 mm Hg in those with hypertension and at increased risk (stage A HF).
- Formal sleep assessment in patients with NYHA class II–IV HF and suspicion of sleep-disordered breathing.
- Intravenous iron replacement in patients with NYHA class II and III HF and iron deficiency (ferritin <100 ng/ml or 100-300 ng/ml if transferrin saturation <20%), to improve functional status and QoL.
- Erythropoetin stimulating agents should NOT be used in patients with HF and anemia to improve morbidity and mortality.

**REVIEW**

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