HPM and Advanced Heart Failure

Vishal Kapadia D.O.
KU HPM Fellow
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OBJECTIVES:

• Define Advanced Heart Failure
• Explore symptoms of Advanced Heart Failure
• Discuss available treatment options as well as their risk and benefits
• Review tools that can help aid in giving Prognosis
• Address HPM considerations that may occur when treating a patient with Advanced Heart Failure

Financial Disclosure

No relevant financial or nonfinancial relationships exist.
**Definition**

- Conventional heart therapies and symptom management strategies no longer working
- Shortness of breath and other symptoms at rest
  - AHA/ACA Class D
- 10% of patients with CHF have Advanced Heart Failure

**Pathophysiology**

**Symptom Burden**
Caregiver Burden

- 13% of family members have to quit work²
- 25% of families lost most or all of their savings
- High stress burden
- Depression
- Poorer overall health

Health Trajectory

NON-INVASIVE TREATMENTS
General Medications

- ACE/ARB
- Beta Blockers
- Aldosterone Antagonist (Spironolactone)
- Hydralazine + Isosorbide dinitrate
- Diuretics
- Entresto (Sacubitril/valsartan)

Diuretics

- Optimize dose of oral loop diuretic (doses up to 4000 mg/day!)
- Change to SQ/IV, IV boluses can produce symptom relief in minutes.
- PRN oral thiazide diuretic (HCTZ, metolazone) can reestablish diuresis in a loop diuretic-resistant patient
  - Monitor electrolytes if patient is not imminent

Inotropes

- Indicated for decompensated HF with low cardiac output with evidence of end-organ hypoperfusion or hypotension
  - Stage D
  - Bridge to mechanical circulatory support or cardiac transplant
  - Destination Therapy
  - Increased quality of life and reduced symptom burden
  - Does not improved mortality
  - Need caregiver support
Inotropes

- **Dobutamine**
  - Pts with baseline hypotension or chronic renal insufficiency
  - Beta receptor agonist
  - Half life of 2 minutes
  - Worry about Ventricular arrhythmias
- **Milrinone**
  - Good with pts with elevated pulmonary vascular resistance awaiting cardiac transplantation and in those without hypotension
  - Phosphodiesterase inhibitor
  - Vasodilator for systemic and pulmonary circulation
  - Half life of 2.3 hours
  - Worry about hypotension, arrhythmias
- **Dopamine**
  - At low dose, no effect on urine volume, renal function, or outcomes compared with placebo.

Inotropes- Costs

- **Dobutamine**
  - ~$1140-$2790/month
- **Milrinone**
  - ~$4500-$21000/month

Inotropes-Medicare Coverage Requirements

- Symptoms must be uncontrolled⁸
- Hemodynamic studies performed within 6 months prior to initiation of home inotropic therapy
  - CI of 2.2 L/min/m² (minimum) and/or pulmonary capillary wedge pressure of 20 mmHg before infusion while on maximum tolerated oral medications.
  - 20% increase in CI and/or at least a 20% decrease in pulmonary capillary wedge pressure during inotrope infusion.
- Improvement in patient “well-being.”
- Documented deterioration with attempts to discontinue/wean the patient from inotrope
- Covered inotrope dosing must be within the following ranges:
  - Dobutamine 2.5-10 mcg/kg/min.
  - Milrinone 0.375-0.75 mcg/kg/min.
  - Dopamine may also be used at a rate of 2 mcg/kg/min.
- Efforts to maintain lowest practical dose must be made and documented during the first 3 months of therapy.
**Inotropes: Clinical Trials**

GALACTIC-HF Trial
- Omecamtiv Mecarbil/AMG 423 for HFrEF
- Phase 3 Trial
- Estimated Completion: 2021
- Locations of trials:
  https://clinicaltrials.gov/ct2/show/study/NCT02929329?show_locs=Y#locn

9. "Registrational Study With Omecamtiv Mecarbil/AMG 423 to Treat Chronic Heart Failure With Reduced Ejection Fraction - Full Text View." Registrational Study With Omecamtiv Mecarbil/AMG 423 to Treat Chronic Heart Failure With Reduced Ejection Fraction - Full Text View - ClinicalTrials.gov, Amgen, Mar. 2019, clinicaltrials.gov/ct2/show/study/NCT02929329?show_locs=Y#locn.

**Invasive Treatments**

**Ultrafiltration**
- Helps with fluid removal
- No clinical benefit from ultrafiltration over diuretic therapy
- Does not preserve renal function
Cardiac Transplant

- Indicated for NYHA Class IV stage D HF refractory to optimal treatment
- Overall improved survival and quality of life
  - 50% are alive 10 years after transplantation
- Risks:
  - Significant 1st year mortality
  - Lifelong immunosuppressive medications
- Less than 2500 patients/year receive transplantation 2/2 lack of available organs

Cardiac Transplant (continued)

- Contraindications (just to name a few)
  - High pulmonary vascular resistance
  - Active malignancy or infection
  - Active substance abuse
  - Inadequate social support
  - Excessive co-morbidities
  - Age/life expectancy

Surgery

- CABG for ischemic cardiomyopathy
- Mitral Valve Repair for dilated cardiomyopathy
  - No survival benefit
- Reconstructive cardiac surgery
  - For large akinetic or dyskinetic regions
  - Improve LV structure and function
  - Uniform clinical benefit has not been established
- Mechanical Inhibition of Dilation
  - Limit LV remodeling

Cardiac Resynchronization Therapy

- Pacemaker with RV pacing causes RV and LV to beat in synchrony.
- Indicated for NYHA Class III-IV, EF <35%, QRS duration >120ms
- Improves overall survival, symptoms, exercise capacity, and QOL
- 20-30% show no clinical response
- Often coupled with an ICD

CardioMEMS

- Device implanted in pulmonary artery
- Wireless Measuring of PA pressure
- Goal is to detect worsening heart failure before symptoms occur
- Costs: ~$20-70/month just to monitor

LVAD
LVAD

- Left Ventricular Assist Device
- Surgically connected to left ventricle and aorta
- Pump connects to a controller and power source
- Bridge vs Destination therapy

LVAD Video


LVAD Benefits

- Increased survival
- Better Quality of Life
- Improved Exercise Capacity

Evaluation for VAD

- Infectious Disease
- Pulmonary
- Neurology
- Nephrology
- GI
- Cardiovascular Surgery
- Anesthesia
- Endocrinology
- Psychiatry
- Palliative Care

Evaluation for VAD (continued)

- Right Heart Catherization
- ECHO
- CXR
- 24 hour urine sample
- Venous dopplers
- Colonoscopy
- Dental Exam
- Blood Tests
- Eye Exams
- Gynecological exam/Mammogram
- Immunizations
- Psychosocial assessment
- Nutritional assessment
- VAD Education
- Insurance

Potential Complications after LVAD Surgery

- Bleeding
- RV Failure
- Stroke
- Infection
- Kidney Failure
- Hypertension
- Arrhythmias
Lifestyle Changes/Restrictions

- VAD Clinic Visits
- Diet
- Exercising after VAD
- Cannot soak body in water (Swimming, bath)
- Driving restrictions
- Travel restrictions
- Reproductive restrictions

What happens if LVAD is no longer effective?

- Difficult decision to transition off the LVAD
  - Same complication risks (stroke, driveline infection, etc)

Discontinuing LVAD

- Reduce flow of pump and then turn off
- Usually results in acute pulmonary edema
- Symptom Management similar to transitioning off mechanical ventilation
• Physicians tend to overestimate patient prognosis\textsuperscript{2}
  • SUPPORT study
• Difficult to determine prognosis given episodic nature of CHF
• Most studies analyze outcomes of HFrEF
  • Difficult to determine outcomes with HFpEF

\begin{itemize}
\item NYHA class II \rightarrow 7\%
\item NYHA class III \rightarrow 13\%
\item NYHA class IV \rightarrow 20\%-52\%
\end{itemize}
Prognosis (Continued)

Hospitalized for decompensated CHF
• 2.22% die in the hospital
• 11% die within 30 days
• 33% die within a year
• 5 year mortality >50%

Seattle Heart Failure Model

Cardiovascular Medicine Heart Failure Index
General Predictors of Poor Prognosis

- Cardiac hospitalization
- Intolerance to neurohormonal therapy
- Impaired renal function
- Systolic blood pressure <100 mm Hg and/or pulse >100 bpm
- Decreased left ventricular ejection fraction
- Ventricular dysrhythmias, treatment resistant.
- Anemia (each 1 g/dl reduction in hemoglobin is associated with a 16% increase in mortality).
- Hyponatremia (serum sodium ≤135-137).
- Cachexia or reduced functional capacity.
- Orthopnea.
- Co-morbidities: diabetes, depression, COPD, cirrhosis, cerebrovascular disease, and cancer


HPM CONSIDERATIONS

Symptom Management

- Dyspnea- due to restriction in breathing (pulmonary edema), weakness, anxiety
  - Reassess HF Medications
  - Treat reversible causes
  - Diuretics
  - If not well controlled, consider afterload reducers, inotropes, opioids
  - O2 vs Room air
  - Fan Therapy
Symptom Management (continued)

• Pain—due to angina, edema, comorbidities
  • Target treatment based on type of pain (nociceptive vs neuropathic)³,⁶
  • NSAIDS usually worsens HF by antagonizing diuretics.

Symptom Management (continued)

• Depression—30-35% with advanced HF have clinical depression
  • Higher symptom burden
  • Treat uncontrolled symptoms
  • Multi-disciplinary approach (CBT, spiritual support)
  • Caution with SSRI
    • May prolong QTc
  • Stimulants for rapid relief of depressive symptoms
    • May cause hypertension, arrhythmias, exacerbate anxiety

Symptom Management (continued)

• Fatigue
  • Can also be medication induced (beta blockers, opioids)
  • Discuss energy conserving strategies
  • Exercise therapy
  • Stimulants
Hospice Eligibility Guidelines

- Symptoms of recurrent HF at rest (NYHA class IV) and b) on optimal treatment 2,14
- EF< 20% helpful, but not required
- Decreased Survival
  - Treatment resistant ventricular or supraventricular arrhythmias
  - Hx of cardiac arrest
  - Hx of unexplained syncope
  - Cardiogenic brain embolism
  - Concomitant HIV disease.

Overview

- Advanced Heart Failure can be defined as when conventional therapies don't work
- Dyspnea, Pain, Fatigue, and Depression are most common symptoms HPM physicians will face. Don't forget about Caregiver burdens
- Multiple risks/considerations need to be explored before starting Advanced Heart Failure Therapies
- There is an App for many Prognostication Tools
- At the end of the day, remember that Goals of Care drive Plan of Care!

THANK YOU!