Management of Heart Failure
2013

Theo E. Meyer MD DPhil
Chief of Clinical Cardiology
Director Advanced Heart Failure Program
UMMHC
Nothing to declare
Challenges in 2013

- No significant advances in last 5 years or so.
- Focus on cost of HF care
  - Appropriate use – ICD, BiV Devices and Angiography
  - Readmission rates
  - Multiple providers- limited communication
- Aging population:
  - Polypharmacy
  - Impact; benefit versus risk.
  - EOL
Life of a HF patient

ED → Hospital → Discharge

Hospital → Rehab Facility

Rehab Facility → Home

Home → Office
Case Discussion.

- 55 yr old male presents to the outpatient clinic with hx of 4 months progressive SOB and orthopnea.
- No hx of CP, syncope or leg edema
- PMHx: OSA, Morbid obesity, DM2, OA of R knee.
- Non-smoker, no family hx of HF
- Meds: Avandia 4 mg po qday, Ibuprofen 400 mg tid.

- Exam: BP 105 / 65; p=90 bpm, O2 sat 92%
- JVD elevated
- S4 No murmurs
- Decreased air entry both lung bases, inspiratory rales
- Abdomen soft
- Trace leg edema

- Labs:
  - Cr 1.4
  - Na+ = 134
  - HbAic=10.3%
  - HCT= 38%
ECG
What next?

- Additional tests?
- Diagnosis
- Contributing factors?
- Treatment regimen?
- Which drugs first?

- Echo:
  - Large anterior dyskinetic area.
  - EF25%
  - Moderate MR
  - Preserved RV function?

- Cath:
  - LAD occluded proximally
  - 60% Mid LCx
  - 50-70% Mid RCA
Follow-up

- FCII
- Meds:
  - Captopril 12.5 mg tid
  - Carvedilol 12.5 mg po bid
  - Spirinolactone 12.5 mg qday
  - Bumetamide 2 mg qday
  - ASA 81 mg qday
  - Simvastatin 40 mg qday
  - Metformin 500 mg qday
- Target doses?
- Role of coumadin?
- Risk of sudden death?
- Role of digoxin?
- Aneurysmectomy?
- Telemanagement?
- OSA- CPAP?
ICD therapy is recommended for primary prevention to reduce total mortality by a reduction in sudden cardiac death in patients with ischemic cardiomyopathy who are at least 40 days post-MI, have an LVEF of 30% or less, are NYHA functional class I-III on chronic optimal medical therapy, and have reasonable expectation of survival with a good functional status for more than 1 year.

Level of Evidence B:
Any etiology, FC II-III, EF 30-35%.

Supporting Clinical Trials
Spectrum of HF

- Mildly symptomatic - Difficult to Dx
- Syndrome of dry heart failure.
  - CHF = chronic heart failure
- Moderate to severe HF (Stage D)
- Diastolic heart failure (HFPEF)
- Acute decompensated HF
  - Normotensive, Hypertensive and Hypotensive
Reality of HF

- Disease modifying agents are underutilized and not properly dosed.
- Underutilization of ICD / BIV pacemakers
- EOL discussions – deferred.
Admitted 3x / last year for ADHF

Triggers for admission:
- Dietary and medication noncompliance
- AF with RVR
- Worsening renal function: Cr 1.7

Vitals: BP 90/60 mmHg; HR = 75 regular. Wt = 120 Kg.
Mild leg edema. JVD = 6 cm.

Medications:
- Captopril 25 mg tid
- Coreg 25 mg po bid
- Bumetamide 2 mg daily
- Digoxin 0.125 mg daily
- Coumadin
- ASA 325 mg qday
- Sprinolactone 25 mg Qday
- Simvastatin 80 mg qday
- Amiodarone 400 mg qday
- Glyburide 5 mg qday
- Diclofenac 50 mg po bid
Questions

- Is the patient on guideline proven therapies?
- What changes in medications would you propose?

60% of HF are not adherent with medications:

- 3 triggers to nonadherence:
  - Lapses in attention
  - Daytime sleepiness
  - Taking meds > 2 x / day.

Meds:
- Captopril 25 mg tid
- Coreg 25 mg po bid
- Bumetamide 2 mg bid
- Digoxin 0.125 mg daily
- Coumadin
- ASA 325 mg qday
- Sprinolactone 25 mg Qday
- Simvastatin 80 mg qday
- Amiodarone 400 mg qday
- Glyburide 5 mg qday
- Diclofenac 50 mg po bid

Meds:
- Lisinopril 10 mg qday
- Metoprolol succinate 200 mg qday
- Torsemide 60 mg qday
- Digoxin 0.125 mg daily
- Coumadin
- ASA 81 mg qday
- Sprinolactone 25 mg Qday
- Atorvastatin 80 mg qday
- Amiodarone 400 mg qday
- Glyburide 5 mg qday
- Ultram
Other issues

- Digoxin levels?
- Digoxin useful in rate control?
- HbA1c ~ 8.1% - add other meds?
- Patients complains of ED? Cialis safe?
- Potential cause for worsening renal failure?
- K^+ has increased to 6.0?
  - What next
Ongoing challenges

- Patient becomes more symptomatic.
  - FC III symptoms - SOB, no CP: BP 85/50 mmHg, HR 58 bpm; JVD 8 cm, HPJR; MR murmur. 1+ leg edema.

- What would you do next?
  - BNP level?
  - Echo?
  - Change meds?
A-Heft Survival

No. at Risk
Placebo 532 466 401 340 285 232 24
Isosorbide dinitrate plus hydralazine 518 463 407 359 313 251 13

Days since Baseline Visit
Overall Survival (%)
Emphasis HF study

The TIME-CHF study demonstrated that intensified N-terminal BNP–guided heart failure therapy did not improve overall 18-month survival free of any hospitalizations or improve quality of life more than those receiving standard symptom-guided therapy.
Evaluation of the Persistently Symptomatic HF patient

- Medical regimen appropriate?
  - Side effects of medications - TSH – Amiodarone.

- Structural changes?
  - EF; new MR; new wall motion abnormality
  - Ischemia

- Volume status:
  - Define dry weight
  - Role of BNP?
Continued:

- Arrhythmia’s?
- New LBBB?
- Untreated sleep apnea
  - Development of PHTN.

Considerations:
- Refer to HF program
- Consider advance therapies.
Left Bundle Branch Block
Wide QRS – Proportional Mortality Increase

**Vesnarinone Study**
(VEST study analysis)

- NYHA Class II-IV patients
- 3,654 ECGs digitally scanned
- Age, creatinine, LVEF, heart rate, and QRS duration found to be independent predictors of mortality
- Relative risk of widest QRS group 5x greater than narrowest

---

Cardiac Resynchronization Therapy

Patient Indications

CRT device:
- Moderate to severe HF (NYHA Class III/IV) patients
- Symptomatic despite optimal, medical therapy
- QRS $\geq 120$ msec
- LVEF $\leq 35$

CRT plus ICD:
- Same as above with ICD indication
Challenges for Managing Decompensated Heart Failure

- Worsening renal failure - following treatment with diuretics
- Hypotension - following treatment with diuretics and other agents.
- Diuretic resistance
- Contraction alkalosis
- Best initial treatment in patients with GFR <20 ml/min?
- Rate of volume removal?
Management of Resistance to Diuretics

• General:
  – Avoid NSAID
  – Avoid aggressive vasodilator therapy that reduces renal perfusion pressure

• Specific:
  – furosemide/ bumetamide, give doses more frequently (same total dose)
  – increasing doses more frequently
  – IV diuretics
  – continuous infusion (furosemide 5-20 mg/hour)
Specific continued

- sequential nephron blockade:
  - loop diuretic + thiazide (HCTZ 25 mg/day or metolazone 2.5 mg/day)
  - loop+ HCTZ and triamterene (dyazide)
  - add low dose spironolactone
  - add ACEI
  - short term acetazolamide in selected patients
Does Rising Creatinine Indicate Adequate Decongestion?

- Rising Cr indicates that diuresis has exceeded the plasma refill rate (PRR).
- PRR dependent on interstitial and intravascular hydrostatic and oncotic pressures.
- Renal function should not worsen provided PRR is not exceeded.
- If PRR is exceeded, Cr will rise despite persistent volume overload.
Kidney
Interstitial compartment
Plasma Refill Rate
Vascular compartment
Azotemia
Kidney
Take Home Points

- Renal function closely related to mortality
- Congestion - detrimental effects
- Worsening renal function during treatment for HF portends worse outcome
- Baseline CVP predicts worsening renal failure
Medicines to Avoid in HF patients

- **HTN:**
  - \(\alpha\) adrenergic blockers:
    - Prazosin
    - Doxazosin (ALLHAT trial)
  - Minoxidil: Fluid retention
  - CCB
    - Diltiazem / Verapamil
    - Nifedipine / Nisoldipine / Nicardipine

- **DM:**
  - Metformin: FC III and IV HF, poor renal fxn
  - TZD (rosiglitazone and pioglitazone) FC III and IV HF,

- **Peripheral vascular disease:**
  - Cilastozol (phosphodiesterase inhibitor)
Challenge 4: Management of HF with preserved EF.
Secular Trends in the Prevalence of Heart Failure with Preserved Ejection Fraction

Heart Failure with Normal EF

- Hypertension
- Diabetes
- Renal Insufficiency
- Aging
- Diastolic Dysfunction
Management Principles of Patient with Diastolic Heart failure

• Goals:
  – Reduce congestion
  – Prevent tachycardia and maintain sinus rhythm.
  – Treat ischemia
  – Control Hypertension

• Theoretical Goals
  – Promote regression of LVH
  – Prevent myocardial fibrosis
Diastolic Heart Failure Treatment

1) Fluid retention
   - Diuretics → BE CAREFUL

2) BP control
   - ACE, ARB, B Blocker → Diuretics
   - HTN and Renal Failure: Furosemide 60 mg BID

3) HR control

4) Ischemia
   - B Blocker / Revascularization

5) Patient Education
   - Disease Management
Causes Precipitating Heart Failure with Preserved EF

- Syst. BP >200 mmHg
- Non-Compliance
- MR/AR >3+
- ACS
- Renal Insuff.
- Afib/Flutter/SVT
- Severe COPD/Asthma
- Pneumonia
- AS/MS <1.0 cm²
- Sepsis

Patients (%)
Challenge 6: Disease Management for HF
Treatment of Decompensated Heart Failure: HF Disease Management Program

85% Reduction

p=0.0001

214 patients 6 months pre-evaluation vs 6 months post-evaluation
ACEI dose increased (151 mg), diuresed (4 liters), flexible diuretic, home exercise
Ahmanson-UCLA Cardiomyopathy Center

Fonarow JACC;1997;30:725-32
Technology-Assisted Monitoring

![Graph showing OptiVol fluid index and Thoracic impedance (ohms) over time from July 2003 to July 2004. The graph includes two lines: one for OptiVol threshold and another for daily and reference fluid measurements.](image)
Referral to HF program

- Uncertain diagnosis
- New onset HF
- Diagnostic work-up
- Advanced therapies:
  - ICD
  - BiV pacers
  - Transplant evaluation
  - Ischemic work-up
    - PCI
    - CABG

- Disease management
  - High risk for readmissions
    - Elderly
    - Single
    - Male
    - CRI
    - Significant diuretic requirements
    - Patient with TR
Working together

PCP/FP

CV / HF specialist

Stages of HF