

## Palliative Care in Heart Failure

Dr. Khadija Bhimji



## Objectives

- Understand the burden of HF
- Review disease trajectory of HF
- Review common symptoms in ESHF
- Briefly review pathophysiology of HF
- Discuss management of common sx's
- Discuss the role of inotropes in palliative symptom management



## Case Study #1 - Margaret

- 83 yr. old woman, in hospital for 7 weeks with symptoms related to end stage CHF
- PMHx: IBS, DM with leg ulcers, fem/pop bypass, toe amputation, TIA
- Maintaining pt's volume has proven to be very challenging
- Most stable on a continuous infusion of IV lasix.

## Case Study, cont'd

- Symptoms:
  - Feels a “smothering” sensation almost always even when SOB is not apparent
  - Sits up in chair most of the day and lies in high fowler's to sleep at night
  - Oxygen via NP
  - F/C but is able to walk to BR with walker
  - Poor appetite

### Case Study, cont'd

- Family meeting:
  - Desperate to return home to die – clearly does not wish to return to hospital
  - Worries about feeling “smothered” at end of life
  - Very supportive family

### Case study #2 - “Catherine”

- 71 yrs. old, long-standing history of cardiomyopathy, pulmonary hypertension, AF, and prior CVA
- In hospital x 1 month – presented with acute dyspnea
- Treatment included IV milrinone and IV lasix.
  - Unable to wean milrinone due to poor ejection fraction and pulmonary HTN

### Case Study, cont'd

- Symptoms:
  - SOB at rest and with minimal activity – cyanotic and SOB worse at night
  - Able to walk to BR
  - Continuous oxygen
  - Nausea

### Case Study, cont'd

- Discharge plans:
  - Pt realistic and understands she is unable to return home
  - Her house had a view of the Ottawa river and she was excited about the possibility of moving to “The Rockliffe” (RH) for EOL care
  - Well supported by family and friends

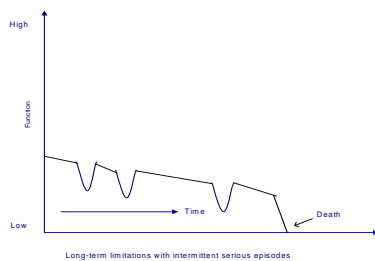
## End-Stage Heart Disease (HF)

- Half million Canadians have heart failure, and increasing
- HF = only cardiac diagnosis still rising in prevalence
  - Typically, disease of elderly (>70 yrs)
  - Advances in treatment of CAD and MI
    - Decreased death rate
    - Increased new cases of HF, death from HF
  - ICDs in LVEF<30% decreased risk of SCD
    - Progression to symptoms despite optimal treatment

## End-Stage Heart Disease (HF)

- Multiple co-morbidities
  - COPD
  - Anemia
  - CRF
  - Gout
  - DM
  - PVD, cerebrovascular disease
  - Depression
  - Cognitive dysfunction
- Concurrent comorbidities in generally elderly population adds to burden of primary condition

## Model of an Illness Trajectory for Organ Failure

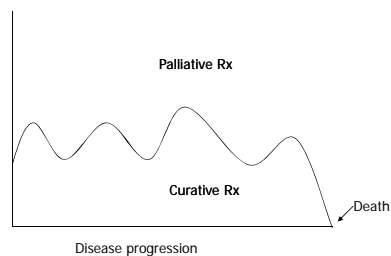


## End-Stage Heart Disease

- Despite complex array of treatments available, HF incurable in majority of cases
- HIGH mortality
  - 1 year mortality 30-50% (hospitalized pts)
  - 10% annual mortality in chronic, stable HF
  - Half die within 5 years of diagnosis
  - Most (half) die suddenly
    - NYHA II Annual Mortality 5-15% (50-80% sudden death)
    - NYHA IV Annual Mortality 30-70% (5-30 % sudden death)



## Palliative Care in HF



## Common Symptoms in ESHD

- Pain
- Dyspnea
- Fatigue
- Nausea and anorexia
- Psychological issues



## Symptom Prevalence in HF Patients

SYMPTOM	RSCD (1990-1998) Subset of patients with HF: 600 pts (informal carer interviewed)	J R Coll Phys London 1996 (ESHF)
Pain	78% (50% distressing)	78%
SOB	61% (43% distressing)	
Low Mood	59%	59%
Anxiety	30%	30%
Insomnia	45%	45%
Anorexia	43%	43%
Constipation	37%	37%
N / V		32%

•Symptoms are frightening, and diminish QOL

## Symptoms

Symptom	HF	Cancer	Last 3 days HF
SOB	60%	47%	43%-65% severely SOB
Pain	78%	84%	41% severe pain
Psychological symptoms	10%-20%		

▪Analysis of 236 patients dying of HF in SUPPORT and HELP databases

▪40% received major therapeutic intervention (last 3 days)

Ann Intern Med 1997

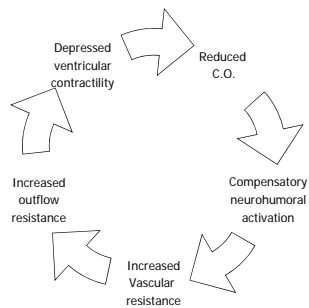
## Pathophysiology of HF

- Primary pathophysiological factor = cardiomyopathy
- Multiple etiologies
  - CAD = most common
  - HT, valvular disease
- ➔ ↓C.O. as ventricle dilates
  - ↓ Contractility
  - ↓ Stroke volume

## Pathophysiology of HF

- Hemodynamic model
  - Impaired cardiac contractility
  - Decreased C.O.
- BUT Tx with positive inotropes
  - Increased mortality
- Neurohormonal model of CHF
  - ACEI and beta blockers

## Neurohumoral Activation in CHF

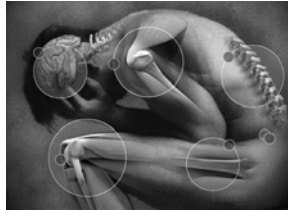


## Symptom Management in HF

- Unlike some illnesses, HF treatments have both QOL benefits and disease-modifying effects
  - ACEI
  - $\beta$  Blockers
  - Diuretics
  - Digoxin

## Pain

- Typically non-cardiac
  - Usually co-existing arthritis, other MSK
  - Diabetic neuropathy
- Ischemia



## Pain Management

- Avoid NSAIDs
  - Renal insufficiency
  - Fluid retention
- Low-dose opioids effective in reducing pain w/o significant toxicity (Am J Orthop 2002)
  - RI: care with Morphine, HM
    - Metabolites which can accumulate, adverse neuroexcitatory effects

## Dyspnea

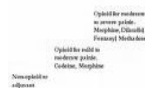
- Treat underlying etiology whenever possible
  - Pulmonary edema, ischemia, increased cardiac workload, AF
- *Mainstay* of Tx = diuretics
  - Reduce volume overload
- Nitrates
  - Worth a try for nonischemic etiology
- Opioids



## Opioids

- Opiates are recommended and don't preclude use of inotropes and IV diuretics for sx palliation of HF at EOL (Circulation 2005, 112:e154-235. ACC/AHA 2005 guideline update for the diagnosis and management of chronic heart failure in the adult: a report of the American college of Cardiology/ American Heart Association Task Force on Practice Guidelines).

### WHO Analgesia Ladder



## Opioids

- ↓Exertional dyspnea in moderately severe HF (Eur Heart J 2002)
- Reduces hypoxic ventilatory drive
- Improves exercise tolerance and exercise-related symptoms (even in stable HF) of SOB and peak VO<sub>2</sub>  
(J Am Coll Cardiol 1997, Heart 2003)
- Provides CV benefits from its sympatholytic effect on hyperadrenergic state occurring in advanced systolic HF  
(J Appl Physiol 2002; Circulation 1976)

## Opioid Concerns

- Morphine and sedatives near EOL *do not* necessarily hasten death (JAMA 1992, Crit Care Med 1999, JPSM 2001)
- Respiratory depression unusual if low initial dosing and slow titration
- Caution in presence of significant co-morbidities (COPD)
- NOT absolutely contraindicated (J Palliat Med 2006)

## Refractory ESHF

- Distressing symptoms at rest or with minimal effort despite maximal medical therapy



## Inotropic Management

- Indications
  - Temporary for AHF refractory to conventional mgmt
  - Bridge to definitive Tx
    - Transplant
    - CABG
  - Palliation of symptoms
    - Sufficiently severe despite maximal Tx
    - Goal of Tx = sx relief, not prolongation of life

## Inotropic Mechanism of Action

- All increase contractility by final common pathway of increasing intracellular levels of cAMP
- Increased calcium release from SR
- Increased contractile force generation by contractile apparatus



## Inotropes

- Catecholamines (eg: dobutamine)
- $\beta$ -adrenergic-mediated stimulation of adenylate cyclase
- Stimulates cAMP production
- PDE inhibitors (eg: milrinone)
- Selectively inhibits PDE III (enzyme that catalyzes breakdown of cAMP)
- PDE inhibition in vascular smooth muscle cells > vasodilation ("inodilators")

## Inotropes

	<b>Dobutamine</b>	<b>Milrinone</b>
<b>Action</b>	Stimulates myocardial adrenergic receptors $\uparrow$ C.O., contractility, and SV	$\downarrow$ Preload and afterload by direct dilating effect on vascular smooth muscle; $\uparrow$ myocardial contractility; $\uparrow$ C.O.
<b>Side Effects</b>	HT, $\uparrow$ HR, PVCs, headache	Ventric. arrhythmias, $\downarrow$ BP, headache, hypokalemia

## Hemodynamic and Clinical Effects

- Increase myocardial contractility w/o increasing MVO<sub>2</sub>
  - Improves end organ perfusion
- Decrease cardiac filling pressures
- INCREASES MORTALITY



## Mechanism of Harm

- Catecholamines  $\uparrow$  cardiac contractility at expense of increasing MVO<sub>2</sub>
- Exacerbate underlying ischemia, malignant ventricular arrhythmias
- Direct toxic effect of myocardium from long-term adrenergic stimulation

## Mechanism of Harm

- PDE inhibitors precipitate arrhythmias
  - $\uparrow$ QT interval
- Progression of HF when given long-term
  - Accelerates apoptosis



## BUT...

- It's *living* with heart disease that's the problem, not the dying from it



## Goals of Therapy

- Symptom relief / QOL (short term) vs. risk of  $\uparrow$ mortality (longer term)



### Indications for Inotropic Support

- Palliative symptom management in carefully selected patients with clearly end-stage disease, cannot function outside hospital
- Data on optimal patient selection and outcomes lacking

### COSI (Milrinone)

- Trials with oral milrinone → significant increase in all-cause mortality
- Long-term IV inotropic support
  - Intermittent
  - Continuous

### Guidelines for Milrinone

- For respiratory distress at rest
  - Pulmonary edema
  - Refractory to standard mgmt
- Initiate at 0.0375  $\mu\text{g}/\text{kg}/\text{min}$
- Increase to 0.5  $\mu\text{g}/\text{kg}/\text{min}$
- Increase to 0.75  $\mu\text{g}/\text{kg}/\text{min}$ 
  - Can increase drip rate by 1 increment / 12-24 hr period

### Milrinone monitoring

- CBC,  $\text{K}^+$ , LFTs, renal function, ECG
- SBP > 90 but < 150
- HR < 130 beats / min
- Absence of new atrial or ventricular arrhythmias
- Absence of nervousness, palpitations, CP, N/V, or worsening SOB
- Otherwise, D/C or ↓ infusion

## Intermittent Infusions

- 2-3 times / week for 4 hour periods
- Initiate at low dose, ↑ medium dose if tolerated
- Continue for 4-8 week period
- In case of improvement, continue at same interval
- In case of continuous improvement, wean over 4 treatments, once weekly

• Clin Cardiol. 27, 23-28, 2004

## Weaning Milrinone

- Weaning protocol
  - D/C milrinone for 12 hrs q 2<sup>nd</sup> day x 1 wk
  - D/C milrinone for 12 hrs daily x 1 wk
- If clinically stable, milrinone D/C'd at 2 wks
- Not clinically stable, then wean more slowly, or for fewer hrs / day
- Failure to wean
  - Clinically, increase in CHF symptoms

Tex Heart Inst J 2003;30:109-13

## Case Study Outcomes - #1

- Margaret was discharged home with an IV CADD infusion of Lasix 10 mg/hr with a bolus of 40 mg q8h
  - Pt and family understood the risks involved and declined regular BW
- Other meds: dilaudid and versed PRN, amiodarone, digoxin, nitro patch, insulin, pantoloc, potassium
- Homecare was consulted, hospice back up papers initiated

## Case Study Outcomes....

- Care overseen by a community palliative care physician
- She did well with no exacerbation of CHF symptoms for 6 weeks
- She deteriorated on a Monday evening with decreased LOC and died peacefully during the night.

## Case Study Outcomes - #2

- “Catherine” discharged to RH with IV milronone via CADD, low dose S.C. hydromorphone CADD for dyspnea
- Other meds: prn versed, po lasix, coumadin, laxatives, maxeran
- Her family physician was willing to oversee her care with support from PPSMCS
- She also had homecare involvement and hospice back up

## Case Study Outcomes...

- Catherine’s condition declined rather rapidly with increasing dyspnea and weakness
- Home for 3 weeks
- Transferred to hopsice, passed away within days
- Dyspnea controlled with hydromorphone and midazolam; milronone weaned

## References

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## Closing Thoughts...

- Even though these patients will still die, we can influence how well they die and, more importantly, how well they live during the remainder of their lives



**The End!**

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