

Acute Decompensated Heart Failure and the Use of Vasodilator Therapy in Canada

Case-based Study

COLD & WET

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Session Objectives

By the end of this session, participants will be able to:

- Differentiate patient profiles for treatment of acute decompensated heart failure (ADHF)
- Identify appropriate treatment options for each profile and apply evidence-based guidelines in managing patients with ADHF
- Identify indications and contraindications for use of nesiritide

Case Study – Mrs. CW†

Presentation:

- 62 year-old female with acute anterior myocardial infarction 3 years ago – unsuccessful PCI attempt
- Left with chronic NYHA FC II SOBOE
 - 6 minute walk 369 m.
- Lost to follow up
- Progressive SOB over the last 6 days, and admitted to hospital. On closer questioning, has had low BP while outpatient, requiring lower doses of antifailure drugs
- Since admission, BP has been decreasing. No chest pain and negative troponins
- Current medical Rx: metoprolol 25 mg BID, atorvastatin 80 mg qhs, and ramipril 2.5 mg OD, digoxin 0.125 mg OD, acetaminophen prn, furosemide 40 mg IV (has had 4 doses over last 24 hours)

†Fictitious patient profile. May not be representative of all patients with ADHF.

Case Study – Mrs. CW

Physical Exam:

- BP= 84/60 mm Hg, HR= 120 beats/min (regular), RR= 34 breaths/min
- O₂ sat % = 90% on 3 l/NP
- Cool extremities, mild peripheral edema
- JVP= 7 cm asa
- Bilateral crackles to mid-scapulae
- S3 / S4 gallop, 2/6 PSM apex

Case Study – Mrs. CW

Investigations:

- Serum creatinine= 145 $\mu\text{mol/L}$ (110 on admission)
- Na = 128 mmol/L; K = 3.8 mmol/L
- Hgb= 128, WBC= 9.9, Plt= 280
- Negative troponins (would borderline positive change your approach?)
- CXR c/w pulmonary edema

Diagnosis

Any further investigations?

- a. None needed
- b. Echocardiogram
- c. Repeat angiography
- d. CT chest
- e. Other

Case Study – Mrs. CW

Echocardiogram:

- LVEDD 65 mm
- Overall moderate reduction in LV systolic function: anterior wall, septum, and apex akinetic (LVEF 30%)
- RV normal
- Mild to moderate mitral regurgitation
- Mild tricuspid regurgitation
- PA pressure estimate 48 mm Hg

What are Your Treatment Goals and
Options with Mrs. CW?



Therapeutic Goals for ADHF

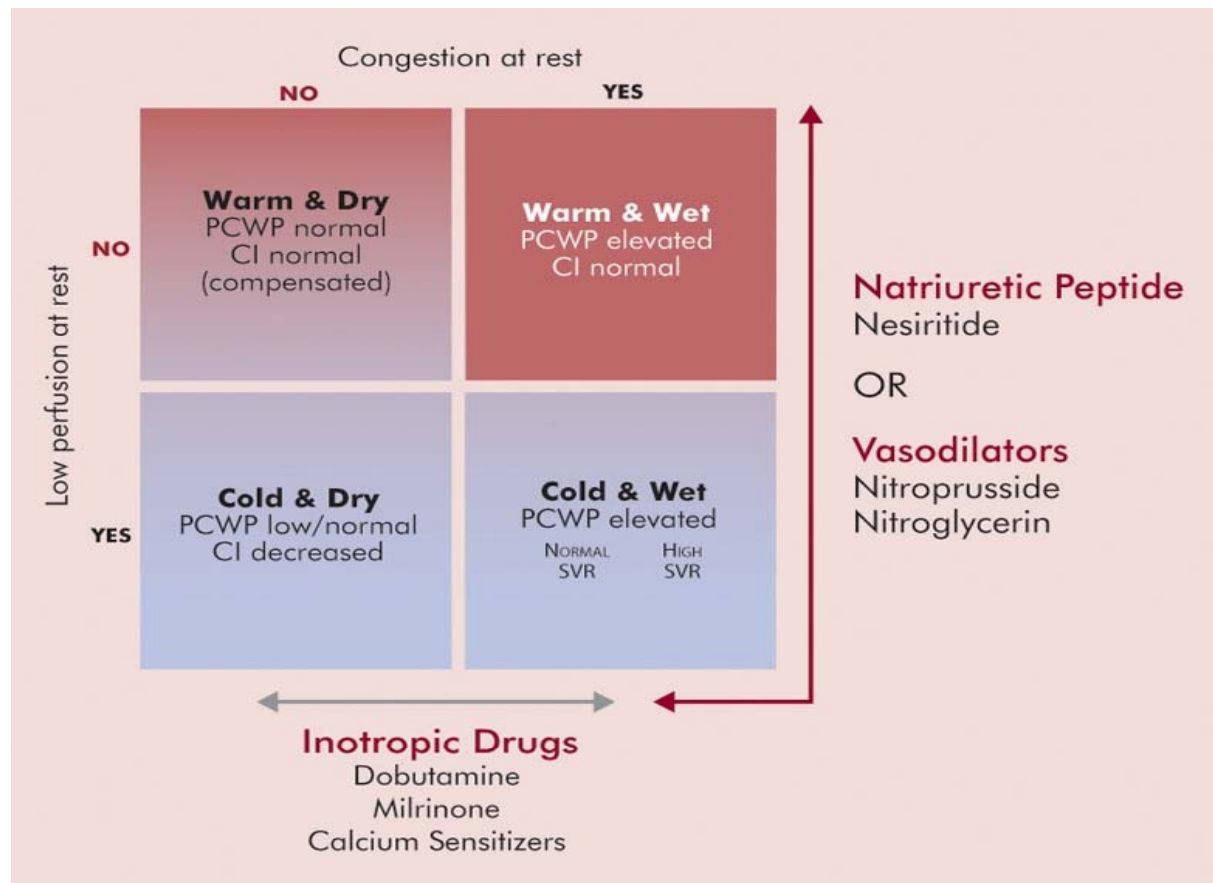
Goals	End Points
Relieve symptoms	Rapid reduction in dyspnea and other signs and symptoms of heart failure ¹
Reverse acute hemodynamic abnormalities	Lower PCWP with adequate systemic perfusion ¹ Use of ACE inhibitors, aldosterone antagonists, and β -blockers before hospital discharge ¹
Prevent end-organ dysfunction	Inhibit RAAS system, monitor inflammation caused by infection following a major surgery or trauma ^{2,3}
Apply treatment cost effectively	Shorten length of stay, minimize use of intensive care unit, reduce readmissions ¹ Ease of use: require minimal patient monitoring ⁴

1. Fonarow GC. *Rev Cardiovasc Med* 2002;3(Suppl 4):S18-S27. 2. Stier CT Jr et al. *Cardiol Rev* 2002;10:97-107.
3. Masai T et al. *Ann Thorac Surg* 2002;73:549-555. 4. VMAC. *JAMA* 2002;287:1531-40.

Based on CCS Guidelines, What are the
Appropriate Treatment Options?



Consider Mrs. CW's Hemodynamic Profile



Fonarow GC. *Rev Cardiovasc Med* 2001;2(Suppl 2):S7-S12.

What Treatment Would You Suggest for this Patient at this Point?

- a. Additional IV furosemide
- b. Nesiritide
- c. IV inotropes
- d. Add oral ACE-I
- e. Discontinue oral beta-blocker
- f. Pulmonary artery catheter
- g. Ventilatory support: intubation / BiPAP
- h. Mechanical circulatory support

Current Guidelines for ADHF

	HFSA ¹	ESC ²	CCS ^{3,4}
Vasodilators	In patients with acute pulmonary edema or hypertension, IV vasodilators (nitroglycerin, nitroprusside or nesiritide) in combination with diuretics	Vasodilators in most If acceptable BP and congestion with low diuresis: different dosages recommended Improved hemodynamics with nesiritide (compared to IV nitro) with fewer adverse effects	Vasodilators, including nitroglycerin, oral nitrates, nitroprusside and nesiritide (when available) may be useful in the initial management of AHF with SBP >100 mm Hg In inadequate response to diuretics, administration of combined IV diuretics and vasodilator therapy
Role of Inotropes	For relief of symptoms, to improve end organ function in patients with evidence of fluid overload unresponsive to IV diuretics or vasodilators or poor perfusion	When peripheral hypoperfusion, as evidenced by hypotension and decreased renal function, is present	Should be reserved for pts in cardiogenic shock and/or volume overload with diuretic resistance In patients with low cardiac output and systolic BP <90 mm Hg
Role of ACE Inhibitors		Not recommended in early stabilization of AHF Note a role for ACE-inhibitors in the early management (once stabilized over 12-24 hours)	Not recommended routinely in the first few hours of AHF Should be introduced when the patient is stabilized
Monitoring	Invasive hemodynamic monitoring not recommended unless patient is refractory to initial therapy, or unclear hemodynamics with deterioration	Arterial line as needed – when patients not responding in predictable ways to traditional treatments	Arterial line +/- pulmonary artery catheterization when there is evidence of very low cardiac output and compromised tissue perfusion

1. HFSA. *J Card Fail* 2006;12(1):e86-e103. 2. Nieminen MS *et al. Eur Heart J* 2005.
3. Arnold JMO *et al. Can J Cardiol* 2006;22(1):23-45. 4. Arnold JMO *et al. Can J Cardiol* 2007;23(1):21-45.

IV Inotropes: an Appropriate Choice for Mrs. CW

Mechanisms

- Increase intracellular cAMP and calcium
- Increase myocardial contractility, +/- vasodilation

Indications

- When there is evidence of hypoperfusion (cold) – in the absence of low filling pressures
- Palliative patients with end-stage cardiomyopathy
- Bridge to transplantation

Dosage

- Milrinone IV infusion of 0.25–0.75 $\mu\text{g}/\text{kg}/\text{min}$, bolus up to 25 $\mu\text{g}/\text{kg}$ over 15 minutes
- Dobutamine: no bolus, infusion of 2–10 $\mu\text{g}/\text{kg}/\text{min}$

Vasodilator Contraindications

- AVOID vasodilators (Nesiritide, NTG, NTP) in patients with:
 - Cardiogenic shock
 - Systolic BP <90 mm Hg
 - Low cardiac filling pressures
- Nesiritide is not recommended in patients for whom vasodilating agents are not appropriate, such as patients with significant valvular stenosis, restrictive or obstructive cardiomyopathy, constrictive pericarditis, pericardial tamponade, or other conditions in which cardiac output is dependent upon venous return

Milrinone was started at 0.25 $\mu\text{g}/\text{kg}/\text{min}$, without a bolus

- Furosemide 80 mg IV given
- Improved diuresis and O_2 sat, BP 90/60
- Milrinone increased to 0.375 $\mu\text{g}/\text{kg}/\text{min}$
- Over next 24 hours continued diuresis and improved creatinine
- Metoprolol held X24 hours, then restarted at reduced dose
- Pulmonary artery catheterization not performed due to gradually improving status

Days 1–5

- Mrs. CW was given intravenous inotropic therapy for the next 4 days, then was carefully weaned over the further 24 hours
- She had been targeted to lose 500-1000 grams of weight per day through a combination of vasoactive medications, combination diuretics and salt and fluid restriction
- How would you do this?

Days 6–11

- Over the course of six days, Mrs. CW was gradually changed to oral therapy
- An ace inhibitor, beta blocker, digoxin and oral diuretic were given and she was discharged home with:
 - Routine heart failure instructions
 - An appointment to see her family doctor
 - An appointment to get blood work
 - An appointment for the heart failure clinic
- How would you do this?