



Heart Failure

Sept 2014

Inability of heart to pump sufficiently to provide for metabolic demand of tissues

Cardiogenic shock

Hypotension (SBP <90) and hypoperfusion (lactic acidosis) secondary to dysfunction of heart
CI <1.8 – 2.2; PA occlusion p >18; occurs in 5% STEMI's

Assessment

Clinical assessment + ECG + CXR = 94% sens, 70% spec, LR 3

Hx: PMH CCF (LR 6); AF (LR 4); PMH MI (LR 3); PND (LR 2.5); orthopnoea (LR 2); SOB (LR 1.5); peripheral oedema (LR 0.5)

NYHA

- I:** Sx on abnormal exertion
- II:** Sx on ordinary exertion - 10% annual mortality
- III:** Sx on less than ordinary exertion - 20% annual mortality
- IV:** Sx at rest - 40-50% annual mortality

Examination

Incr HR, TR, MR; abdominal jugular reflex; lung creps

Systolic: S3, otherwise as above

Diastolic: DBP >100; S4; LVH on ECG; otherwise as above

RVF: incr JVP ; if chronic, hepatomegaly, ascites, peri oedema, pleural effusions

Cardiogenic shock: SBP may be >90 if pre-existing HTN; pulse p narrow due to extreme vasoC; incr JVP; lung fields may be clear if RV infarct

Investigations

ECG

BNP >100

Sens 93%, spec 77%

Use when diagnosis unclear or for OP monitoring of treatment; >300 LR 5, >500 LR 10

Cons:

- Most levels intermediate, not useful
- False negative can occur early
- No more accurate than routine assessment in ED
- False +ive in PE, ARF, AF, sepsis, pul HTN, HRT, female, old, cirrhosis
- Variability of normal range with age
- Decr sens in sudden onset APO
- Decr sens in obese

CXR

75% sens, 95% spec, LR 11

Appearance lags behind Sx by 6hrs

Echo

Needed to differentiate between systolic and diastolic (esp good for diastolic)

Lung USS

90% sens, 95% spec



Management

General

Rest, Na controlled diet; moderate fluid restriction; treat cause (eg. PTCA, valve repair)

ACEi (40% decr mortality, decr re-hospitalisation)

Statins; dig (if systolic failure); aldosterone antagonists (class III and IV)

Beta-blockers (when condition stable; improve cardiac performance, decr disease progression, decr need for hospitalisation, incr survival)

A, B

O₂; sit up

CPAP: indicated if: SaO₂ <90% on high flow O₂, incr CO₂, signs of fatigue
decreases VR - decr preload
decreases need for intubation
no change in hospital mortality or LOS (when compared to nothing or ETT)

IPPV: if CPAP fails; beware decr BP with induction

BiPAP: needs more study as assoc with AMI

Morphine: 10% incr mortality, need for ventilation and hospital LOS

C

GTN: 3-30mcg/min (or 1mcg/kg/min; max 200mcg/min)

decr preload and afterload, incr myocardial O₂; good if HTN, little peri oedema

beware in pre-load dependent states: RV infarct, AS, vol depletion, HOCM

Na nitroprusside: 0.1-10mcg/kg/min titrated to BP

if incr SVR despite GTN; decr afterload

Diuretics: give usual morning dose IV, or 40mg IV frusemide

no study has ever shown benefit

decr preload; aim UO >500ml in 1st 2hrs (>250ml if renal impairment)

Cardiogenic shock

Early PTCA (preferred to thrombolysis)

IABP (weak evidence)

Dopamine/dobutamine (1-20mcg/kg/min; if SBP <70-100)

NAD (2-20mcg/min; if SBP <70)

Note inotropes will incr myocardial O₂ demand so only use as temporising measure

Consider small fluid challenge

Pathophysiology

CO = 5.5L/min SV = 70ml EF = 65% EDV = 130ml

Preload: length of cardiac fibres at onset of systole; Frank Starling's law

Determined by venous tone, muscle pump, blood vol, intrathoracic p, diastolic function, atrial fx

Afterload: load against which ventricle must contract

Determined by SVR, aortic compliance

CCF: incr RAA secondary to decr Na, SNS stimulation, incr ADH (due to incr AII and decr BP), decr PG / dopamine, decr GFR

High output failure

Fever, thyrotoxicosis, AV fistula, Pagets, erythroderma, anaemia



Systolic failure

Low output; 2/3

LV dilation

Impaired contractility and decr EF (asymptomatic until EF <40%)

Incr LAP, PVP

Mechanical: valves, congenital, tamponade, myxoma, papillary muscle dysfunction, VSD, contusion

Pressure: HTN, PE

Myocardial: IHD (2/3), cardiomyopathy, negative inotropes (eg. Beta-blockers), metabolic, arrhythmia, post-cardioversion, myocarditis

Sensitive to incr afterload (beware NAD, adrenaline)

- backlog into lungs - pul oedema when pul p's >20 - backlog into body - Peri oedema, incr JVP, displaced apex beat

Usually not fluid overloaded

Diastolic failure

1/3 (esp in elderly women)

Better prognosis than systolic

No dilation, normal/incr EF

Incr diastolic p for any vol – due to abnormal V filling, slowed/incomplete relaxation

Causes: LVF, RV infarct, PE, cor pulmonale, R - L shunt, pul valve disease, TR

Sensitive to preload (beware diuresis, GTN) - HTN

NO peri oedema/incr JVP/displaced apex beat

Prognosis

APO = 50% 5yr survival; poorer in men; 60% hospitalised again in 6/12

Any symptoms - 2yr mortality 35%; 6yr mortality 65-80%

For patients who present with 1st episode of APO, 50% 1yr mortality