

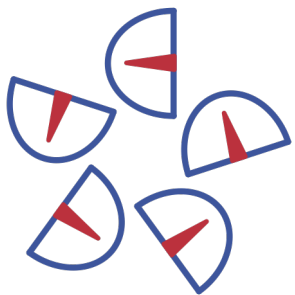
# CLAP Snaps

5 Key Messages

Mechanical Circulatory Support and Heart Transplant

Thursday 29<sup>th</sup> July 2021

[www.CardiothoracicAnaesthesia.com](http://www.CardiothoracicAnaesthesia.com)



# All is Calm in the Heart Attack Centre

Dr Bonnie Kyle



## PPCI can be stressful!

- Emergency (unstarved!)
- Remote location
- Time critical
- On-table GA
- Unfamiliar team
- Task-fixated cardiologists
- Unstable patient

1

## When to intubate?

- Talk to cardiology
- Potentially long, difficult procedure
  - Unstable/agitated patient
  - Easier to do it pre-PPCI



## Use the cardio art line

- Saves time
- Tell them you are using their line!

2

## Is this cardiogenic Shock?

- Cool peripheries
- Pulmonary oedema
- SBP <90
- HR <50 or >120
- Reduced GCS



## Teamwork

Be part of the team

- Understand cardiologist's task fixation
- Use other team members (esp. Physiologist)
- Ask for help, share your concerns

# Shock in the Cath Lab

Dr Alastair Proudfoot and Dr Stephen Shepherd



1

## Management Priorities

1. Coronary perfusion (↑ coronary blood flow)
2. Ventricular support (↓ myocardial oxygen demand)
3. Circulatory support (↑ organ perfusion)

PPCI is the only evidence-based intervention here!

2

## Ventilation

40-88% of cardiogenic shock patients will require mechanical ventilation

Use PEEP!

- Helps pulmonary oedema
- Offloads heart
- Reduces LV transmural pressure

3

## Grading Cardiogenic Shock

SCAI grading (see next slide)

- Persistent SBP <90
- Secondary to cardiac dysfunction (EF <30%)
- With signs of clinical and biochemical hypoperfusion

Recognise, manage, escalate!

4

## ECMO – not without complications

Access is key

Femoral access can be tricky: complicated access = complications

New micropuncture approach with very small needle and wire may improve access complications

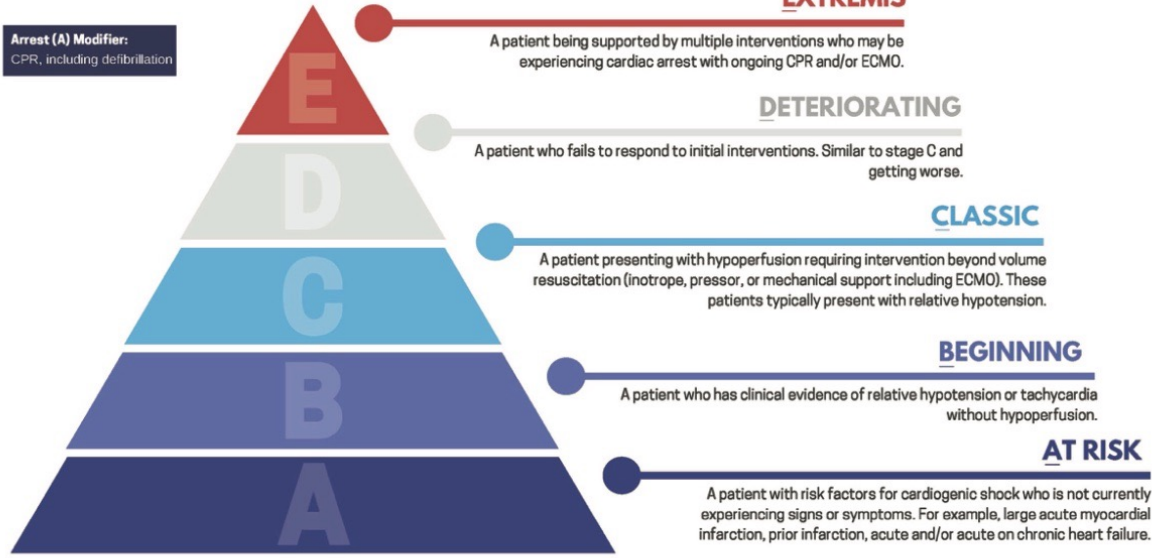
5

## Recognise when palliation is appropriate

- Increasing age
- Anoxic brain damage
- Severely impaired LV
- Increasing need for *vasopressors*
- RRT
- Multi organ failure

(Combination of all these factors in context of PMH and acute scenario)

**Arrest (A) Modifier:**  
CPR, including defibrillation

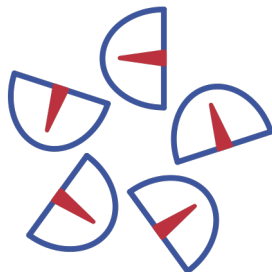


## Shock in the Cath Lab

Dr Alastair Proudfoot (@ICUDocAP)

and

Dr Stephen Shepherd (@sj\_shepherd)



SCAI SHOCK STAGE	PHYSICAL EXAM	BIOCHEMICAL MARKERS	HEMODYNAMICS
<b>A</b>	Normal JVP Lung sounds clear Strong distal pulses Normal mentation	Normal renal function Normal lactic acid	Normotensive (SBP > 100 or normal for pt.) If hemodynamics done: ▪ Cardiac Index > 2.5 ▪ CVP < 10 ▪ PA Sat > 65%
<b>B</b>	Elevated JVP Rales in lung fields Strong distal pulses Normal mentation	Normal lactate Minimal renal function impairment Elevated BNP	SBP < 90 OR MAP < 60 OR > 30mmHg drop Pulse > 100 If hemodynamics done: ▪ Cardiac Index > 2.2 ▪ PA Sat > 65%
<b>C</b>	Ashen, mottled, dusky Volume overload Extensive Rales Killip class 3 or 4 BiPap or mechanical ventilation Acute alteration in mental status	Lactate > 2 Creatinine doubling OR > 50% drop in GFR Increased LFTs Elevated BNP Urine Output < 30mL/h	Drugs/device used to maintain BP above stage B values. ▪ Cardiac Index < 2.2    ▪ PCWP > 15 ▪ RAP/PCWP > 0.8    ▪ PAPI < 1.85 ▪ Cardiac Power Output < 0.6
<b>D</b>	Any of stage C	Any of stage C AND deteriorating	Any of stage C AND Requiring multiple pressors OR addition of mechanical circulatory support devices to maintain perfusion
<b>E</b>	Near pulselessness Cardiac collapse Mechanical ventilation Defibrillator used	Lactate > 5 pH < 7.2	No SBP without resuscitation PEA or Refractory VT/VF Hypotension despite maximal support

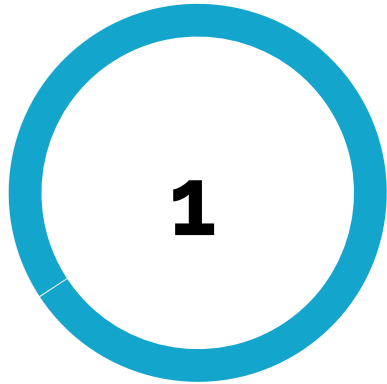
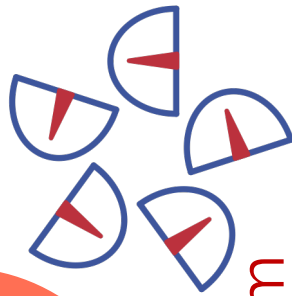
Baran DA, Grines CL, Bailey S, et al. SCAI clinical expert consensus statement on the classification of cardiogenic shock. Catheter Cardiovasc Interv. 2019;1-9. <https://doi.org/10.1002/ccd.28329>

© 2019 Society for Cardiovascular Angiography and Interventions

Figure 1. Reprinted with permission from the Society for Cardiovascular Angiography and Interventions (SCAI). Visit the SCAI Shock Resource Center at SCAI.org for more information.

# Left Ventricular Assist Devices

Dr Chris Walker



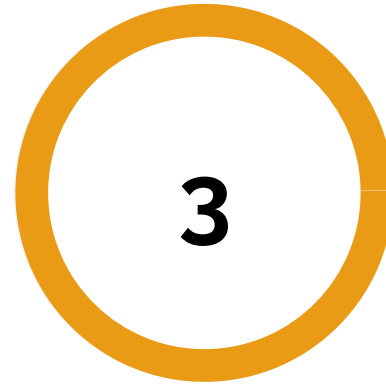
- Use all the available agents:
- iNO
  - Milrinone
  - +/- Prostacycline
  - Sildenafil (IV/PO)

**The RV is Key!**



- Suction events
- RV DysFn (15-25%)
- Bleeding/anticoagulation
- Infection [drivelines] (50%)
- Stroke (10-15%)
- Resuscitation – avoid CPR!

**Post-op  
LVAD Issues**



- Hypovolaemia /obstruction
- Tamponade
- RH Failure
- Inflow obstruction (rare)
- Outflow obstruction (v. rare)

**Vigilance on  
ITU – TOE!**



LV shrinks closed  
IVS pulled to left

Due to  
hypovolaemia,  
RV Fn, excessive  
pump speed

Manage with  
fluids, RV  
support, adjust  
LVAD settings

**Suction Events**



Frequent  
No LA kick  
Usually VT

Sedate VF  
patients!

Mexilitine if IV  
lignocaine is  
useful

Catheter ablation

**Arrhythmias**

# Anaesthesia for Heart Transplantation

Dr Sachin Mehta

SachMehta@doctors.org.uk

## 01 Pre-op

Assessment can yield a lot of information. In particular, look out for resternotomy, implanted ICD, renal impairment, long term anticoagulation

## 02 Special Considerations

LIJV line – pt will have early R heart cath & biopsy. Anticoagulated – careful TOE insertion, reverse warfarin with PCC & vit K intra op. Resternotomy – external pads, a protonin. ICD – turn off defib, DOO

## 03 Vasoplegia

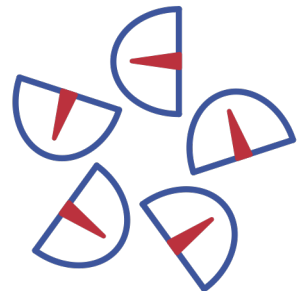
Can be profound – norad & vasopressin, methylene blue (100mg IV over 60mins), central arterial line, steroids, cytosorb filter, plasmaphoresis

## 04 Post-Op Goals

R heart support. Optimise haemodynamics. Optimise fluid balance. Antibiotics and immunosuppression. Aim for extubation within 24hrs, Analgesia.

## 05 Acute Rejection

High vigilance – arrhythmia, pulmonary oedema, low cardiac output. Inform transplant team early, rule out other causes, ensure immunosuppressants are correctly charted and administered, may need Bx



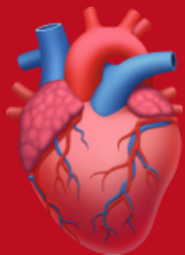
Sachin's fantastic HTx anaesthesia handout is available in the 'Resources' section on:

[www.CardiothoracicAnaesthesia.com](http://www.CardiothoracicAnaesthesia.com)



# Surgical Aspects of Heart Transplantation

Mr Davorin Sef



## Donor Aims

'Rule of hundreds'

- SBP >100mmHg
- HR <100 bpm
- UOP >100ml/hr
- PaO<sub>2</sub> >100mmHg\*
- Hb >100g/L

\*13.3kPa



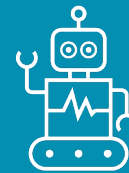
## Bicaval > Biatrial

- Better for TV & MV
- Lower requirement for PPM
  - Better haemodynamics
- Improved 1yr survival



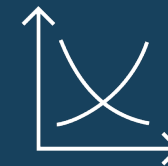
## Progress

Heart transplantation has made huge progress but is hindered by scarcity of donors & late complications.



## Organ perfusion system

Allows *ex vivo* diagnostic assessment, treatment and optimisation of explanted hearts



## Complications

Most common causes of death (over 15 years):

- Malignancy
- Graft failure
- Infection
- Cardiac allograft vasculopathy
- Renal failure

