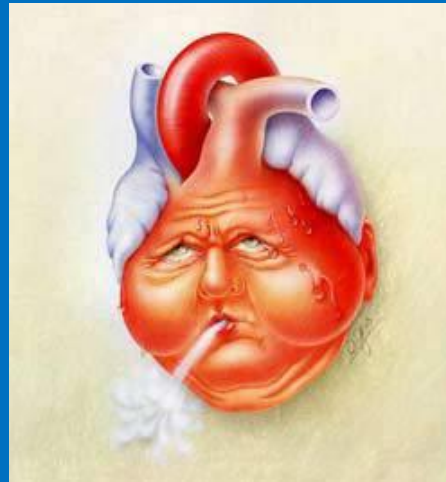


Hypertensive Hypotension

It's deadly!

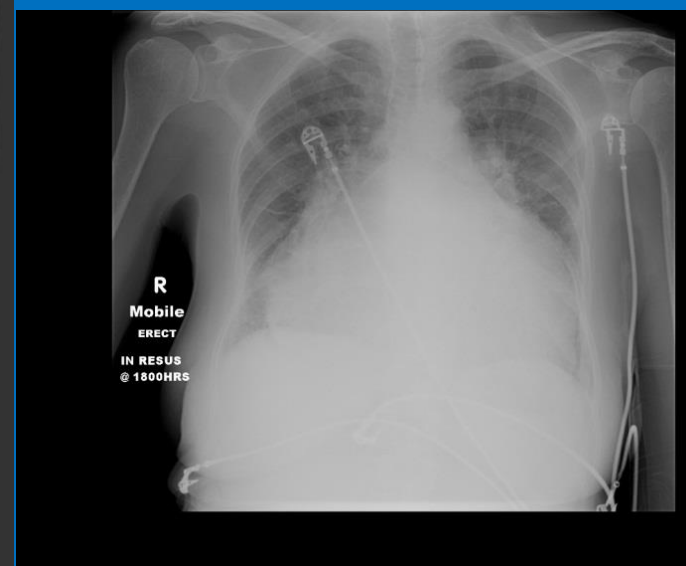
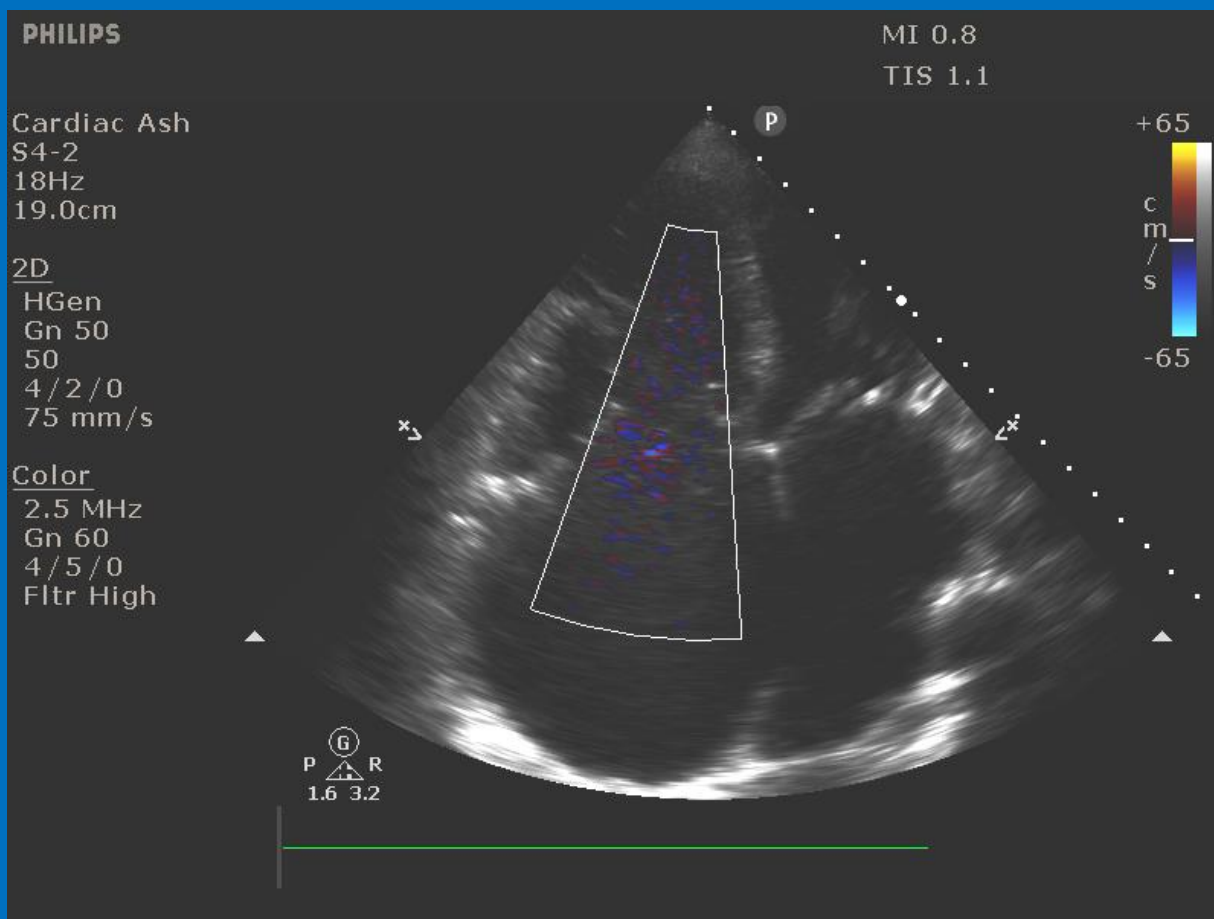


Ash Mukherjee *MBBS, FRCS, FRCER, FACEM, CFEU, CCPU*

Consultant Emergency Physician

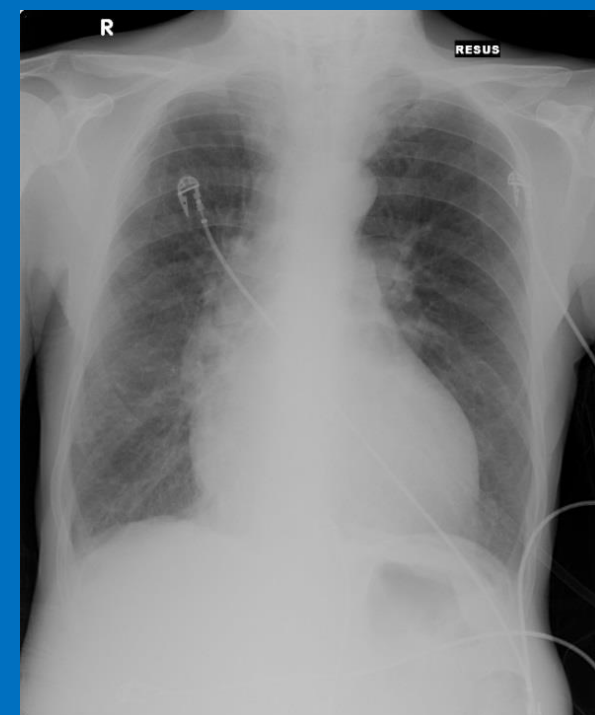
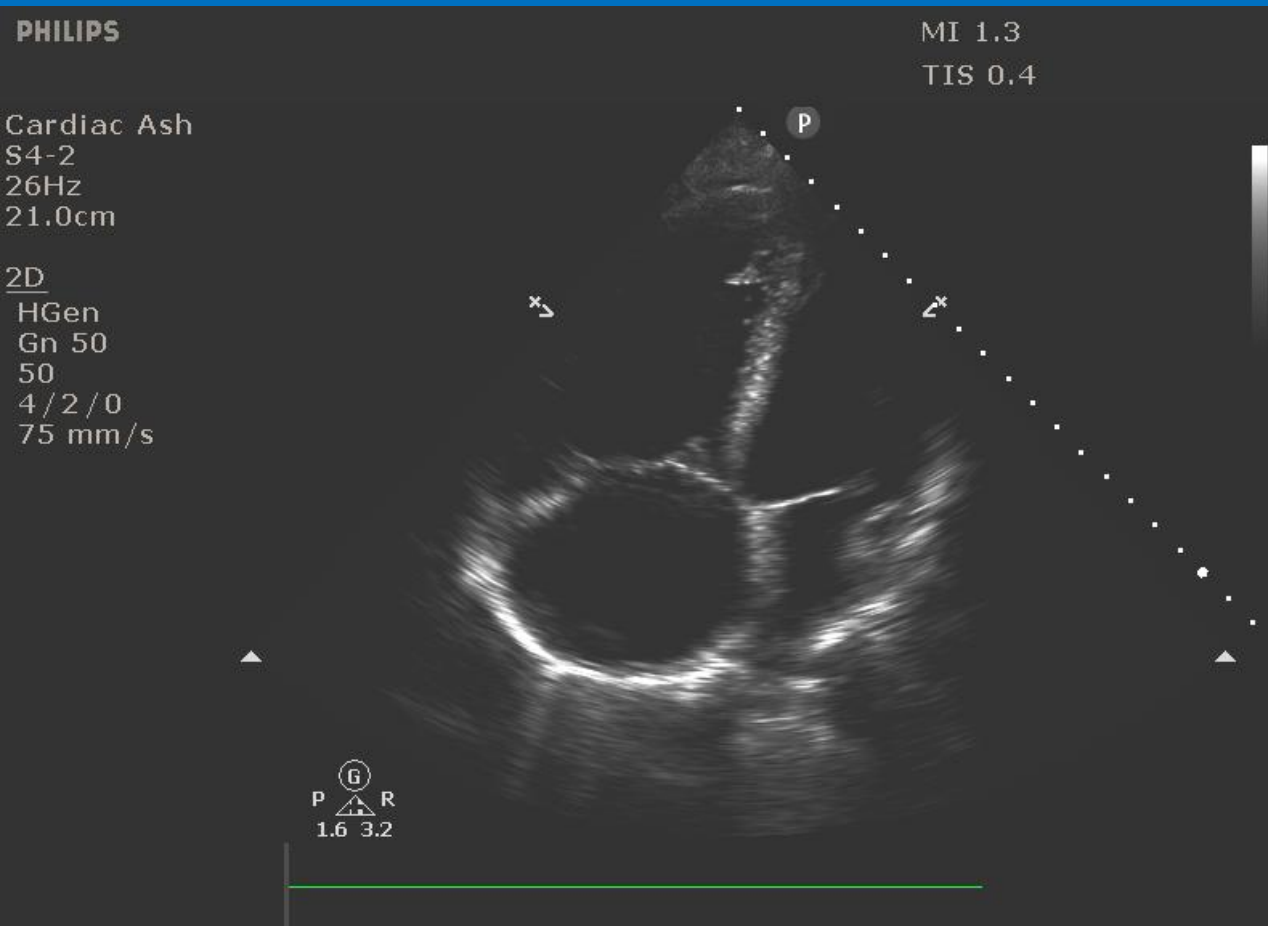
T- 39.6°C	SpO ₂ - 88% RA	pH-7.30
HR-133	GCS-14	Lactate- 9.3
BP- 126/70	RR-30	ECG- AF

75 yr febrile
and unwell



T- 38.4°C	SpO ₂ - 84% RA	pH-7.28
HR-113	GCS-15	Lactate- 4.8
BP- 130/70	RR-30	ECG- S Tachy

64yr
Febrile
with ↑SOB
and cough



1. Rosecrance, S. Pulmonary hypertension: current diagnosis and treatment. *Curr Opin Cardiol* 2007; 5:641-647.
2. Gatzert, A. et al. A meta-analysis of trials of pulmonary hypertension: A clinical condition looking for drugs and research methodology. *Ann Heart J* 2007; 153: 1037-47.
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7. Heart Lung Transplant 2009;23(62):1527.
8. Vladojevic, A. et al. Recent cancer rates in Europe - 2002-03 period analysis of EUROCAIS data. *Lancet Oncol* 2007; 8:784-786.
9. <http://www.phaedra.ac.uk>. Accessed from: http://www.phaedra.ac.uk/living_with_ph/. Last accessed May 2011.
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11. Picot, A. Treatment of Pulmonary Hypertension. *BMJ* 2009; 339: 835-836.
12. Rubin, et al. *Bosentan therapy for pulmonary arterial hypertension*. New England Journal of Medicine 2002; 346: 590-593.
13. Sitash, et al. *Endothelin Receptor Antagonists: Maintenance of Improvement in Pulmonary Vascular Disease with Long-Term Bosentan Treatment: Results of the SERAPH-1 Open-Label Extension Study* Circulation 2006; 114: 578.
14. Quin, et al. Long-Term Arterialization Therapy for the Treatment of Pulmonary Hypertension. *Journal of the American College of Cardiology* 2004; 54: 1071-1081.
15. Ellis, G. et al. Worldwide physician education and training in pulmonary hypertension: pulmonary vascular disease: the global perspective. CHEST 2010; 137(4): 554-564.
16. Picot, et al. *An epidemiological study of pulmonary arterial hypertension*. *Eur Respir J* 2009; 33: 109-119.
17. ESC/ERS Guidelines. Guidelines for the diagnosis and treatment of pulmonary hypertension. *European Heart Journal* 2009; 31: 2492-2537.

Setting of Acute illness in chronic PH

- RV failure [49%]
- Progressive Respiratory failure [18%]
- Sudden Cardiac death [17%]
- Cardiopulmonary resuscitation is rarely successful
- Hospital Mortality
 - 28% in Mild PH
 - 67% in moderate PH
 - 80% in Severe PH

The sexy Stuff

Systemic circulation

Left heart

Systolic function

SOME STATISTICS:

100% of men didn't notice King Kong is on the picture

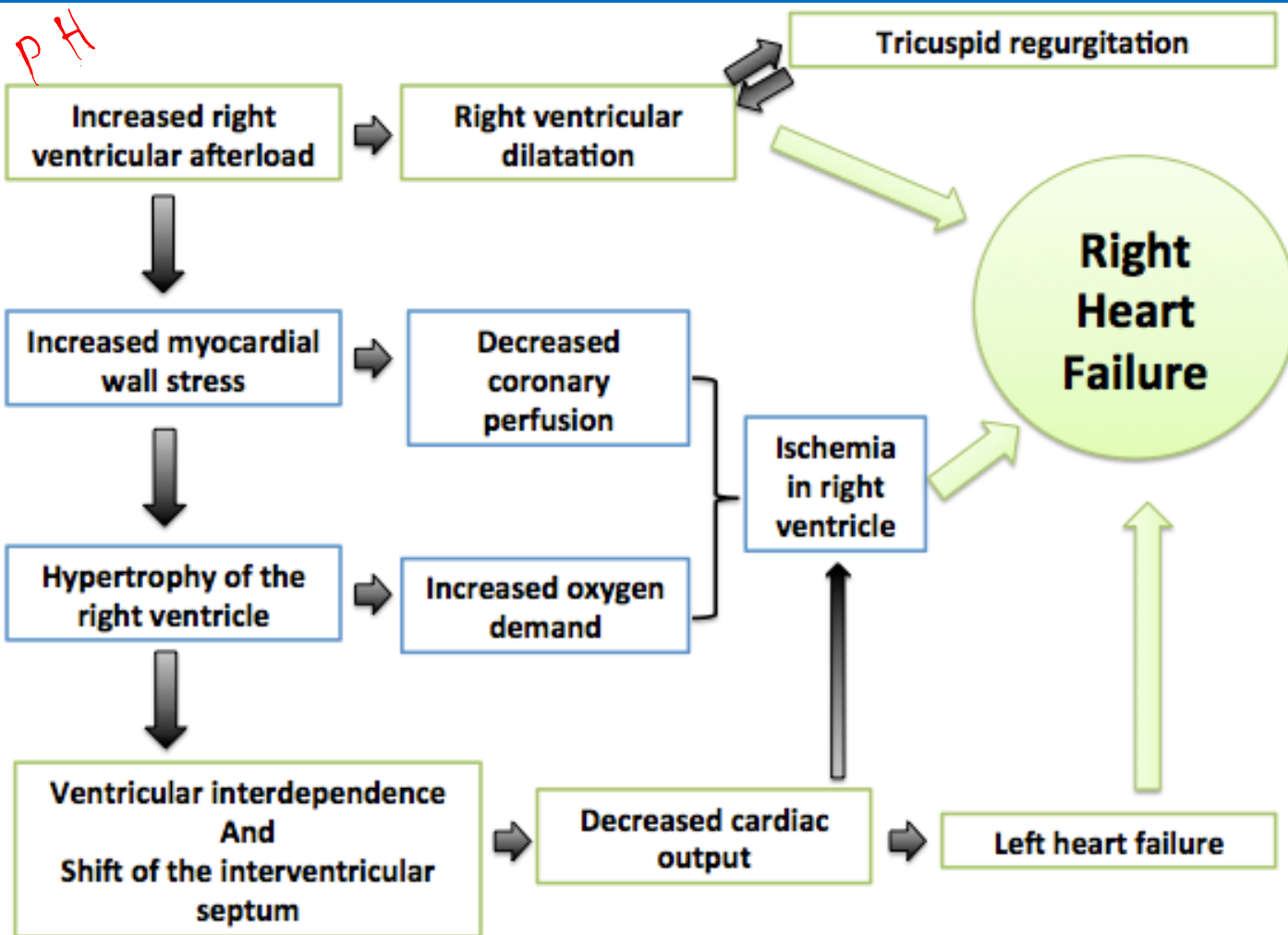


The not so sexy Stuff

Pulmonary circulation

Right heart

Diastolic function



Adapted from Chest. 2005;128:1836-1852



Pulmonary hypertension

Physical Examination

ECG

R in V1, RAD, RAE,
RBBB and TWI

CXR

Prominent PA,
peripheral pruning
in PAH, and
cardiomegaly

**These are later findings
associated with the
development of right heart
failure secondary to pulmonary
hypertension.

JVP

- Prominent 'a' wave
- Prominent 'v' wave
- Elevated JVP**
- Positive Kussmaul's sign**
- Positive Abdominojugular reflex**

ABDOMEN

- Ascites**
- Painful hepatomegaly**
- Pulsatile liver**

LEGS

- Edema**

PRECORDIUM

Palpation:

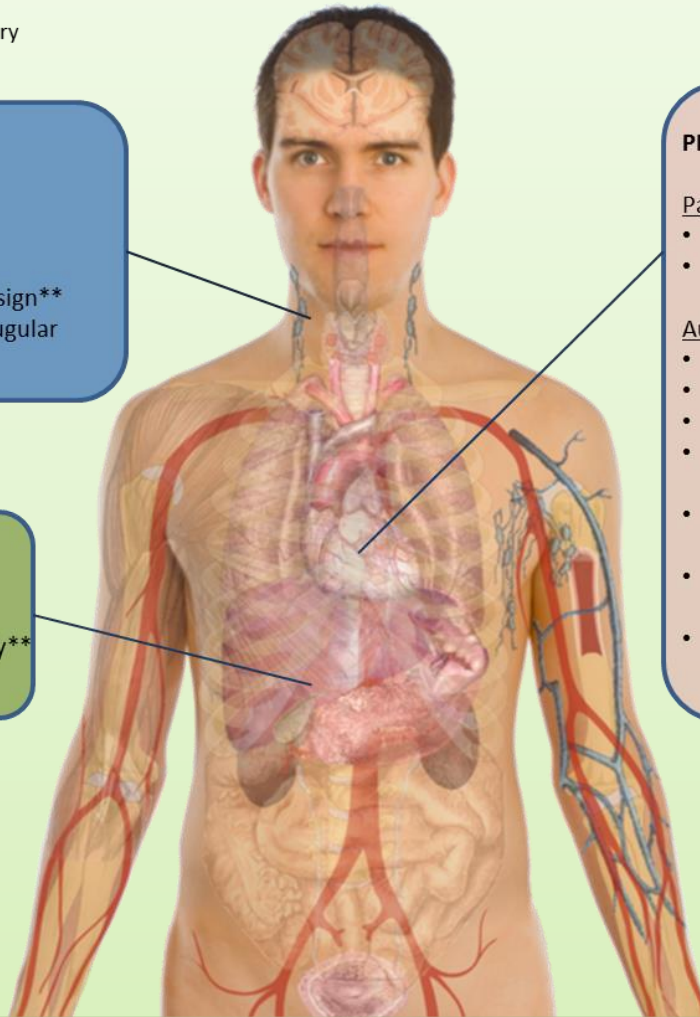
- Parasternal heave
- Palpable p2

Auscultation:

- Loud P2
- Narrowed/widening of S2
- S4, S3**
- Systolic pulmonary ejection click
- Ejection midsystolic pulmonic murmur
- Diastolic pulmonary regurgitation murmur
- Pansystolic tricuspid regurgitation murmur**

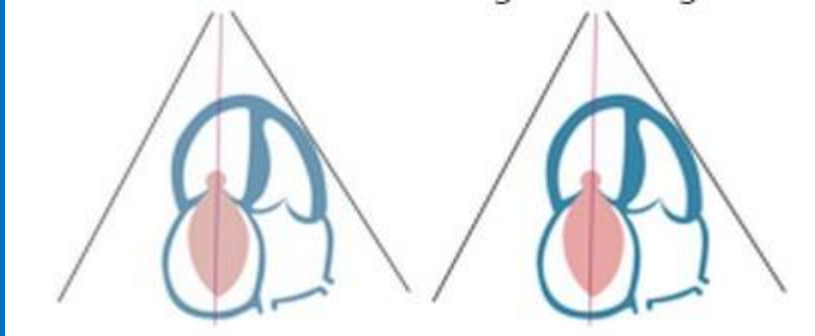
PULSE

- Diminished**



2D Echocardiogram

$$\text{PASP} = \text{RVSP} = 4 \times [\text{TR } V_{\text{max}}]^2 + \text{RAP}$$



Is PH suspected?

- TRV $\geq 2.6 \text{ m}\cdot\text{s}^{-1}$ [13][#]
- RV $\geq 1/2$ LV from PLAX [11]
- TAPSE $< 20 \text{ mm}$ [8, 28–30, 33, 53, 54]
- IVC $> 20 \text{ mm}$ and $< 50\%$ inspiratory collapse [8]

IVC (diameter)	Inspiration	RA pressure
small (Collapsing	0– 5 mmHg
normal (1.5- 2.5cm)	> 50% diameter reduction	5– 10 mmHg
dilated (>2.5cm)		10– 15 mmHg
IVC + liver veins dilated	no diameter change	> 20 mmHg

Infection, anemia,
arrythmia, hypoxia,
hypercarbia, acidosis

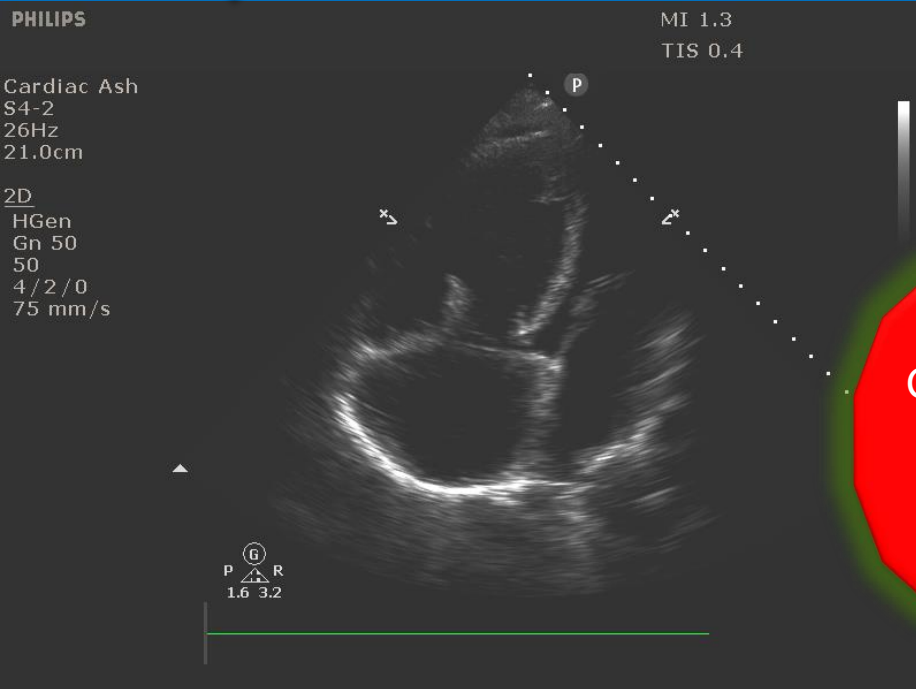
Treat trigger

Cautious IV fluids
Diuretics/filtration

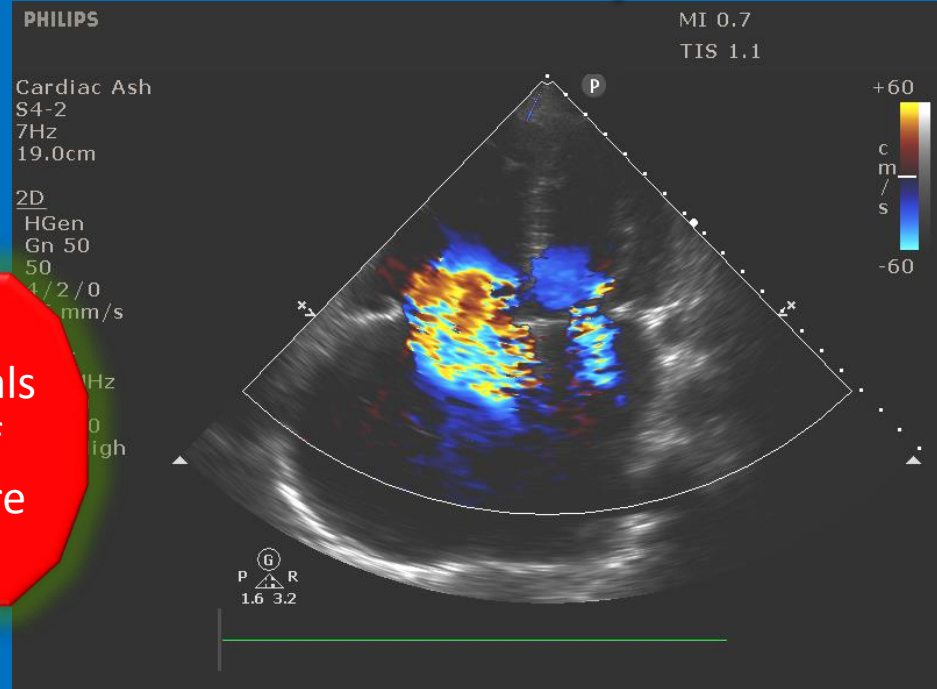
Fluid balance

Noradrenaline
Vasopressin

Perfusion pressure



Goals
of
Care



Cardiac Output

Dobutamine,
Milrinone,
Levosimendan

RV Afterload

NO, Prostacyclins..

Bridge to
Definitive therapy

ECMO, Transplant

Hypertensive Hypotension

Systolic BP < 90 or MAP < 65

Echo looking for LV & RV function

Call expert help!
Complete
assessment of
shock

Suggestion of Pulmonary
hypertension

LV and Lungs
+
TR V_{\max}
TAPSE
RVD
IVC

PE or RV
infarct

Treat
accordingly

Fluid
200ml boluses

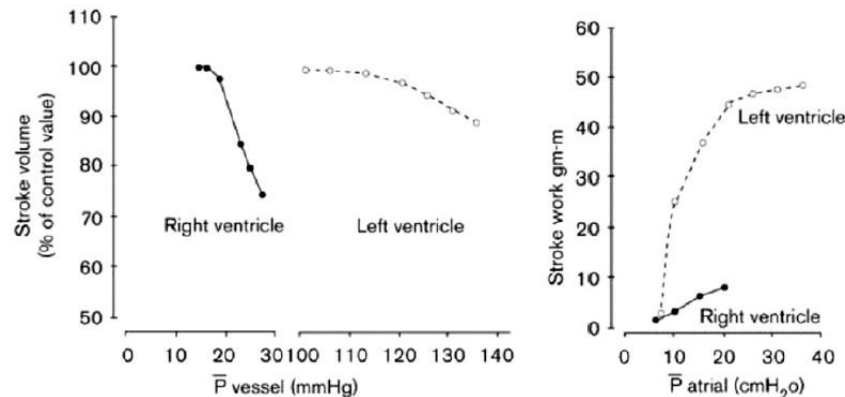
Dobutamine
Infusion

Norad
infusion

Milrinone

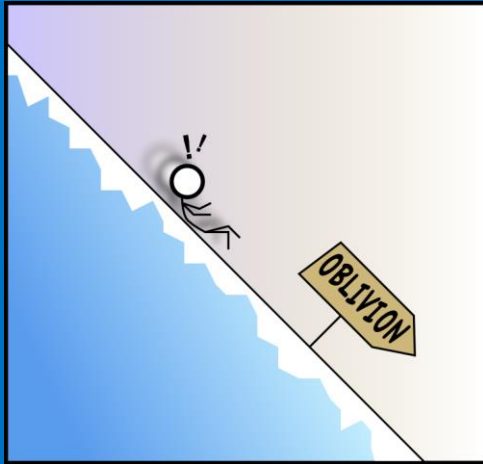
Levosimendan

Treat Trigger
Discuss Goals
of Care
Arterial line
Central Line



Nitric Oxide
Prostacyclins

You have decided to Intubate



Preparation

- Pre-oxygenation
- Invasive monitoring
- Vasoactive

Induction

- Fentanyl
- Propofol
- Ketamine
- Ketofol

Paralysing

- Suxamethonium
- Rocuronium
- Apnoea

Ventilation

- PEEP
- TV

Conclusion

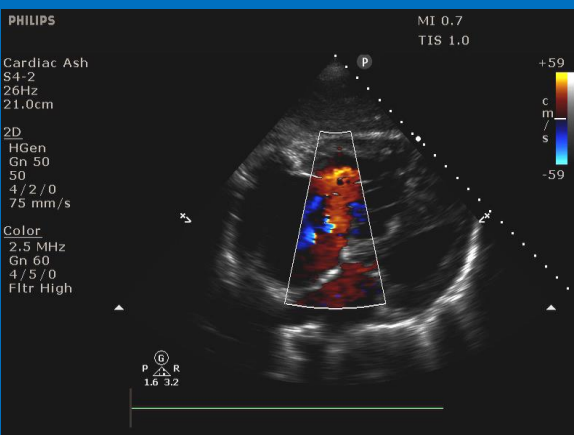
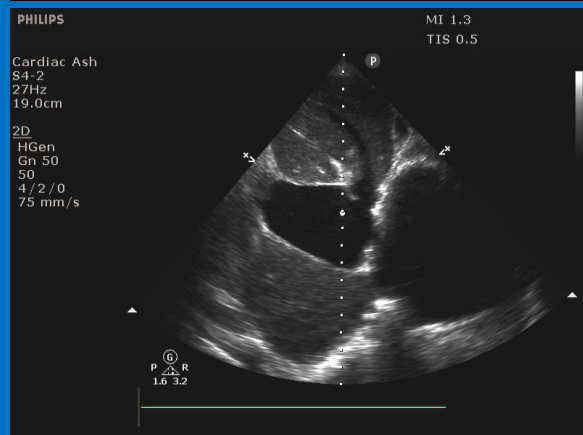
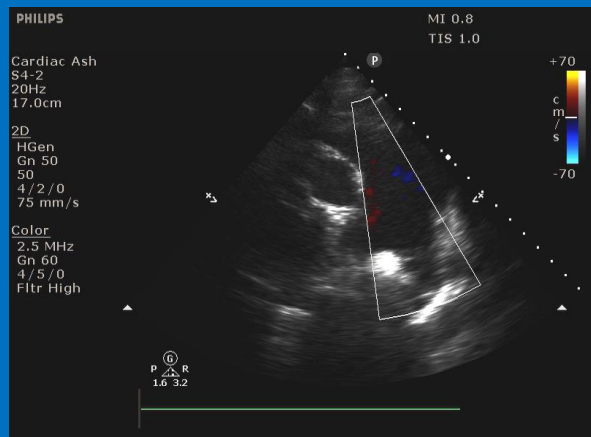
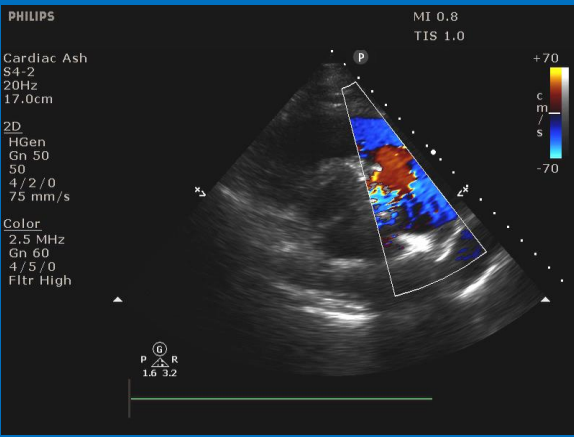
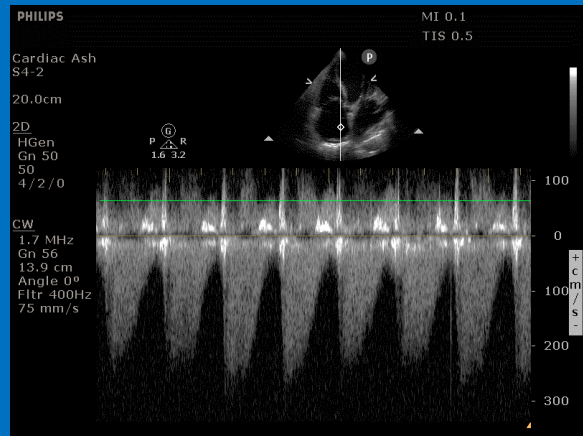
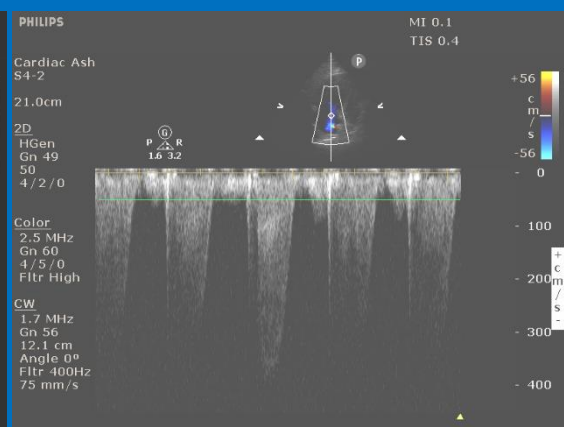
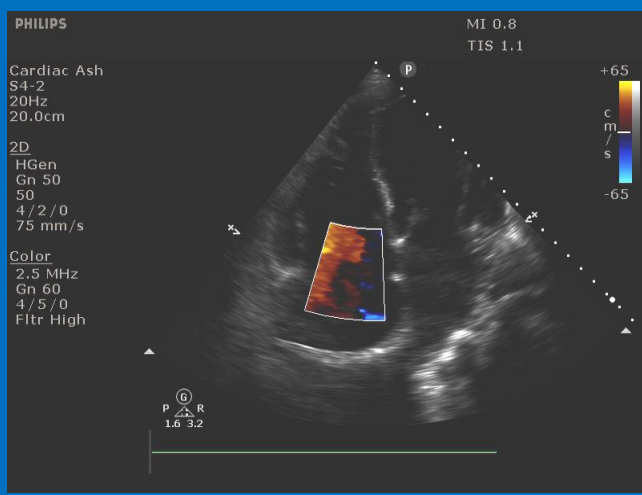
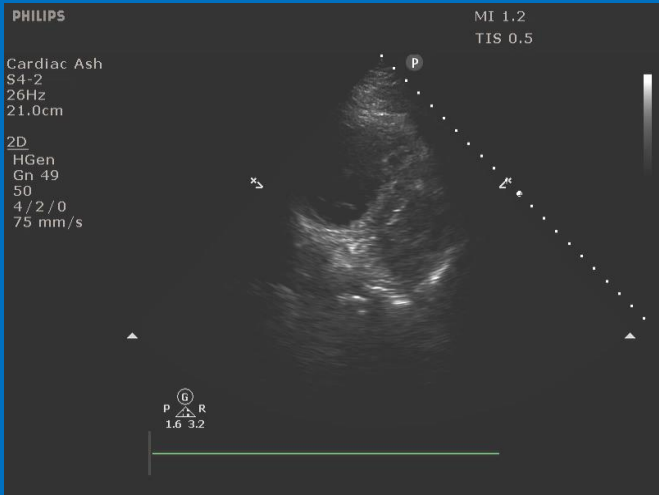
- Pul
- Righ
- Echo
- ther
- Goa



Statistics:

100% of men didn't notice King Kong is on the picture

Don't Forget King Kong



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