Case Presentation: “PPHN”

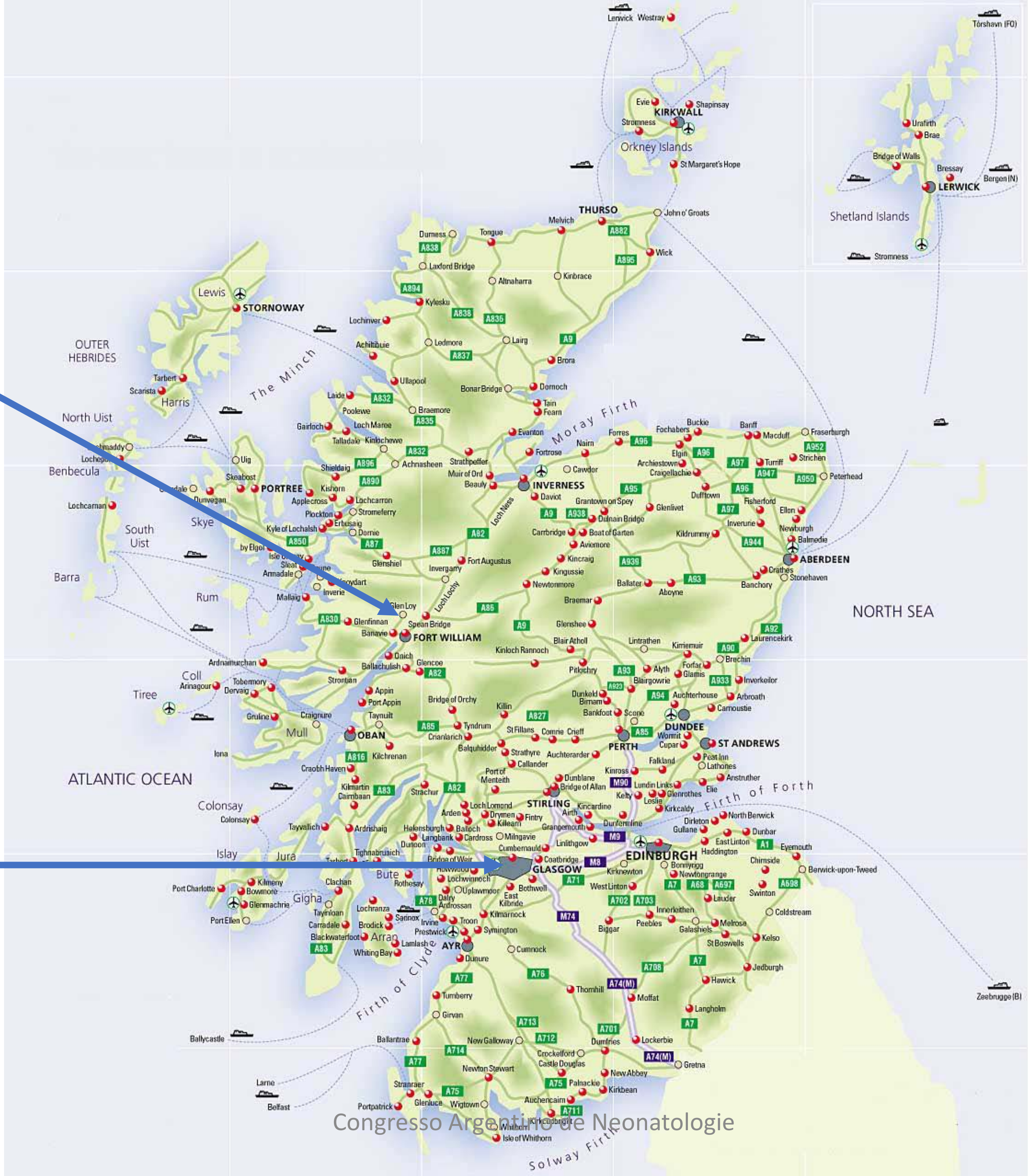
Neil Patel, MD

Royal Hospital for Children,

Glasgow UK

Fort William

Glasgow



Delivery in Fort William

- IVF pregnancy
- Mother, 37 years.
- Previous deep vein thrombosis on low molecular weight heparin

Delivery:

District General Hospital (Fort William, 110 miles from Glasgow)

SVD at 39 weeks gestation, 9am

Apgars: 9@1, 9@5

@30 mins of age

- Poor colour, “dusky”
- Respiratory rate 80 breaths per minute
- Saturations in facial O_2: preductal 89%, post-ductal 60-70%

- Capillary blood gas:

  H^+ 59, PCO_2 6.6 kPa (50mmHg), PO_2 4 kPa (30mmHg),
  base excess -9, lactate 5
- Chest xray:


R
@11.25AM
5 cm

Progress at Fort William

Conference call: Transport team / Paediatric Cardiologist / Receiving Neonatologist in Glasgow

What would you advise?

Progress at Fort William

- Prostaglandin E_1 commenced at 20 nanog/kg/min
- Intubated and ventilated
- Umbilical arterial and venous lines inserted

On arrival of transport team (4 hours of age):

➢PTV: 19/6 FiO_2 0.90

➢Sats 93% pre / 74% post

➢BP 40/32 (35) mmHg

What would you do now? Should the baby go to a cardiac NICU?

Progress at Fort William

- Prostaglandin E_1 commenced at 20 nanog/kg/min
- Intubated and ventilated
- Umbilical arterial and venous lines inserted

On arrival of transport team (4 hours of age):

➢PTV: 19/6 FiO_2 0.90

➢Sats 93% pre / 74% post

➢BP 40/32 (35) mmHg

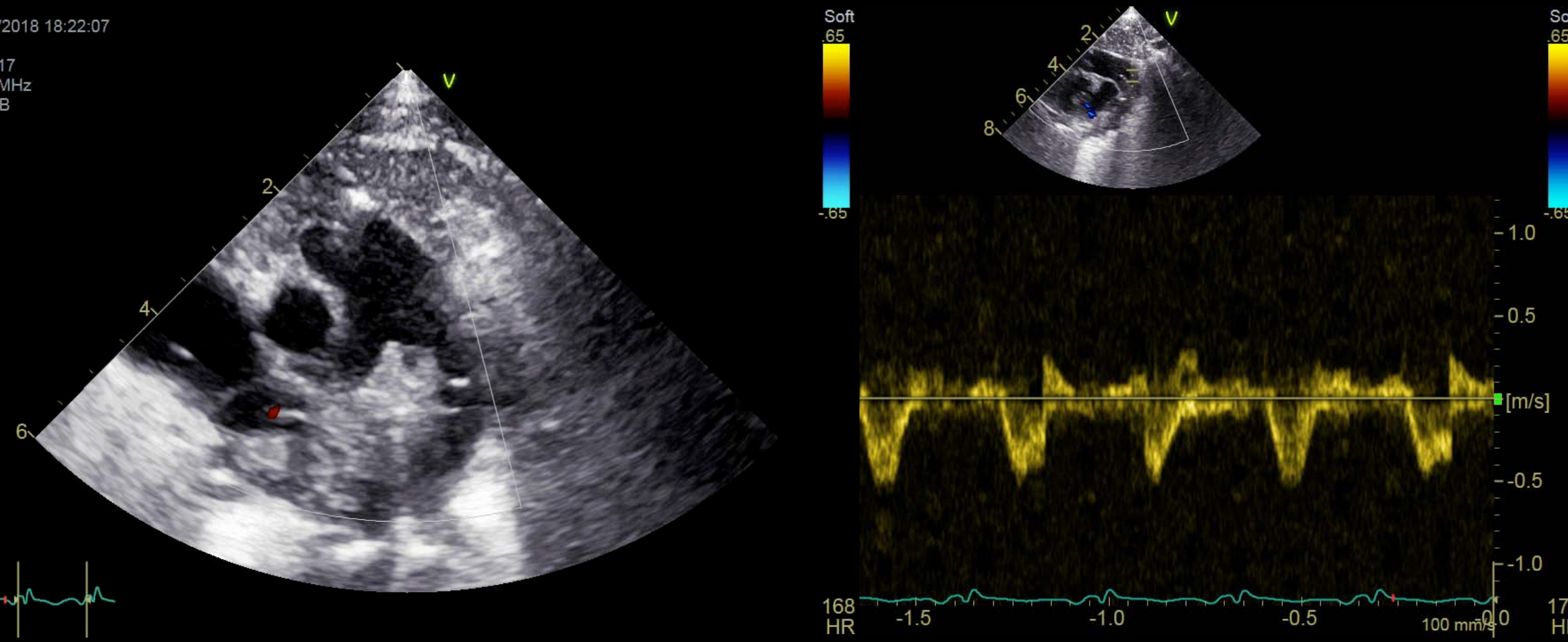
What would you do now? Should the baby go to a cardiac NICU?

- iNO commenced 20ppm: saturations 94% pre ductal, 80% post- ductal
- Dopamine commenced 10 mcg/kg/min

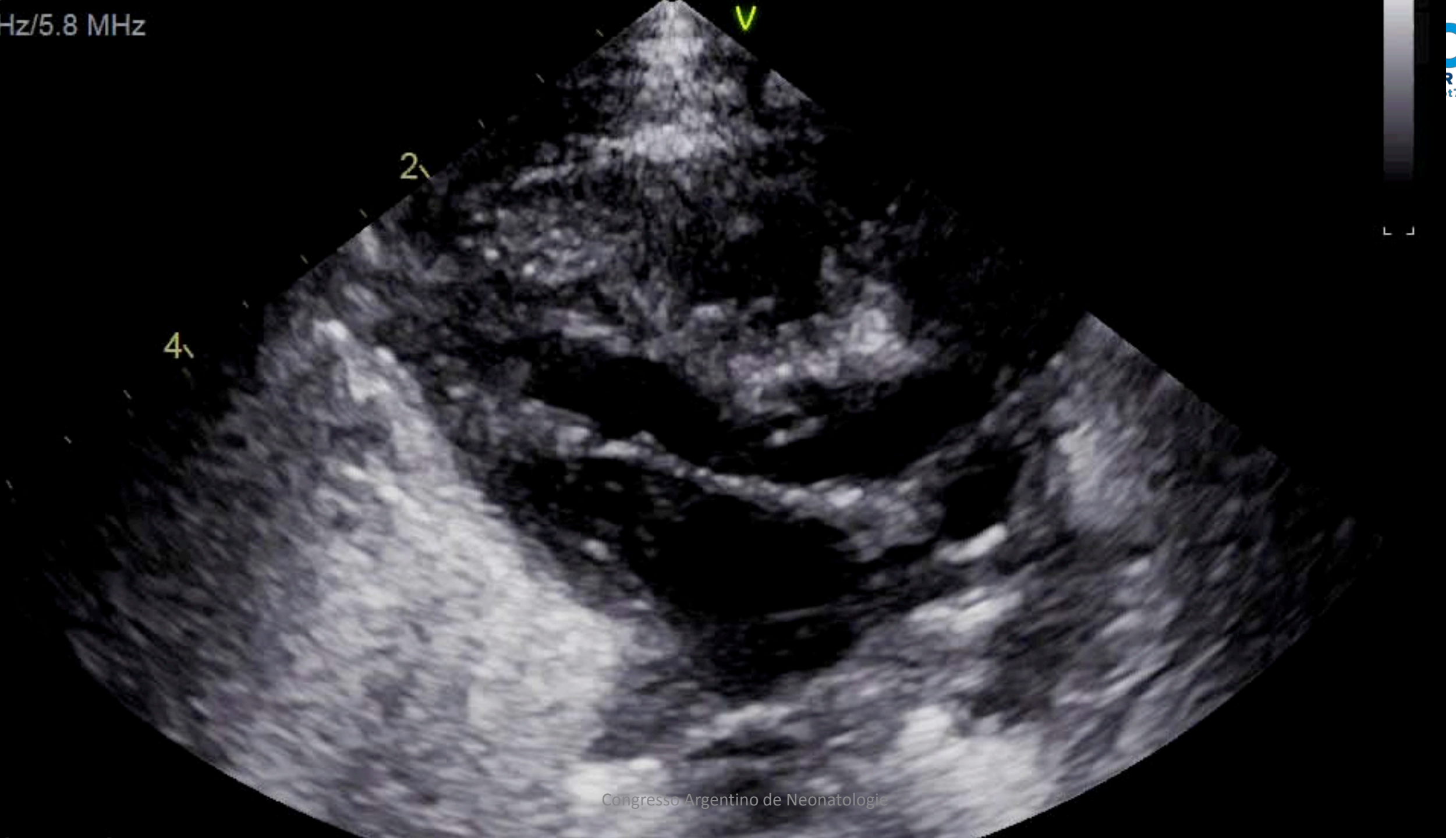
On arrival in at NICU, Glasgow: 9 hours of age:

- FiO_2 0.75. SpO_2 : 95% pre-ductal, 90% post-ductal
- BP 45/38 (41) mmHg
- 2/6 systolic murmur, femoral pulses present, liver 1-2cm
- ET aspirates: “large amounts of mucous and blood”

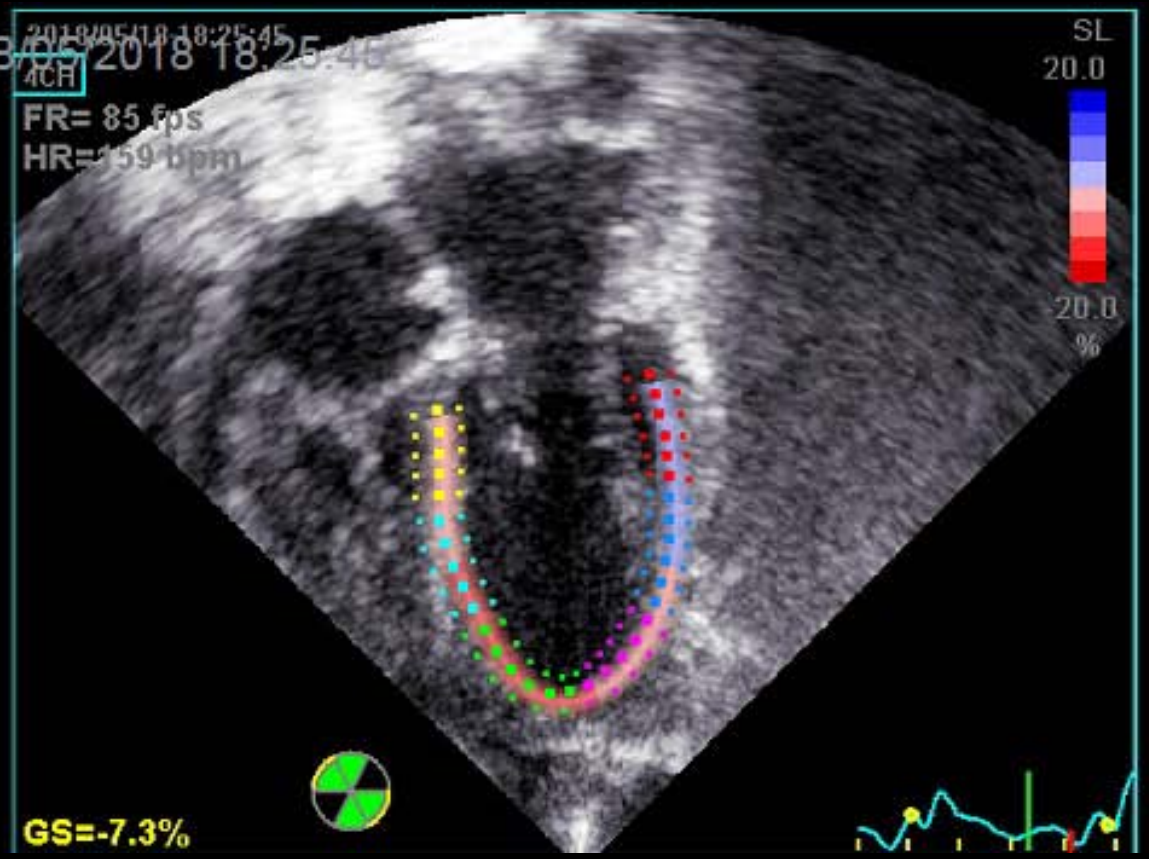
Echocardiogram:

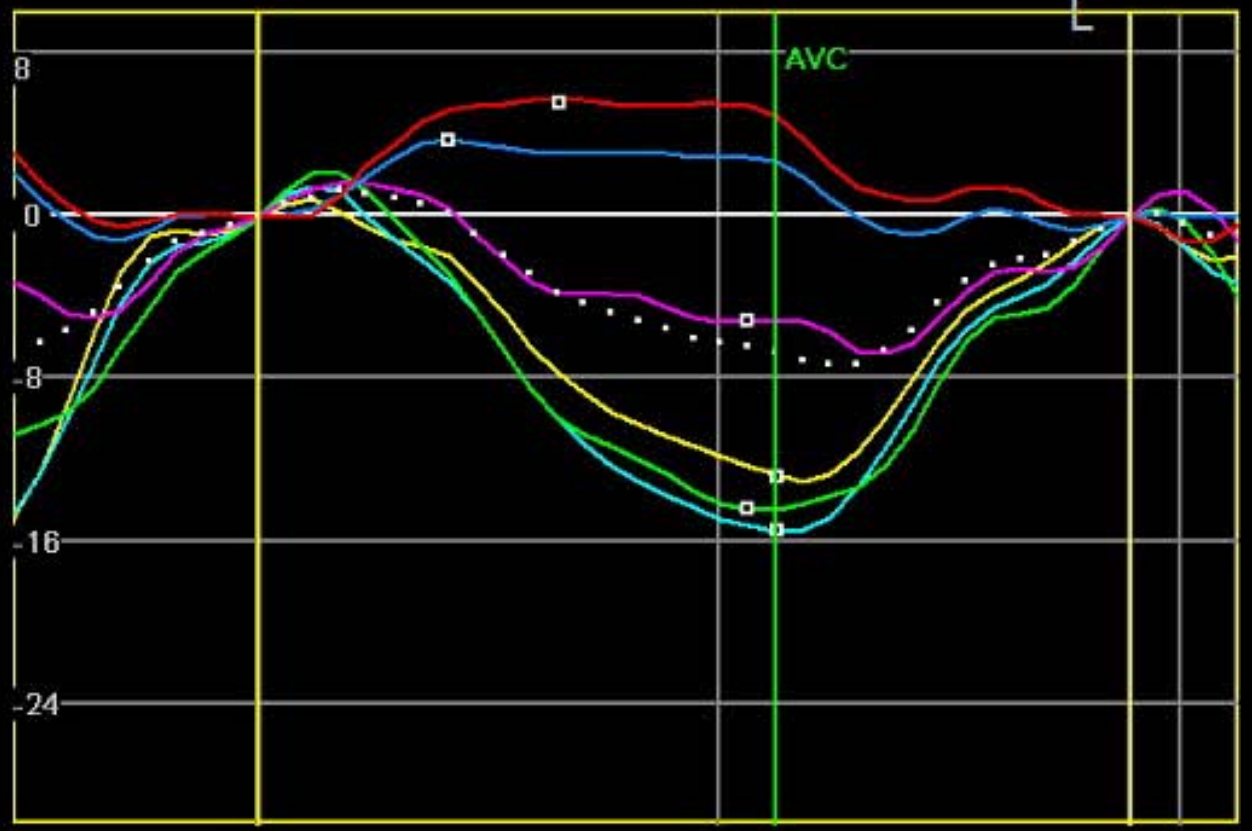

/2018 18:22:07
17
MHz
B
V
2
4
6
Soft
.65
-.65
V
2
4
6
8
Soft
.65
-.65
1.0
0.5
[m/s]
-0.5
-1.0
168
HR
-1.5
-1.0
-0.5
0.0
100 mm/s
173
HR


18/05/2018 18:27:19
ACE
FPS: 85
f: 2.9 MHz/5.8 MHz
P: 0 dB
Soft
70
YEARS
#nhsscot70
4
2
V
Congresso Argentino de Neonatologie
172
HR


Hz/5.8 MHz
V
2
4

Left ventricular systolic strain



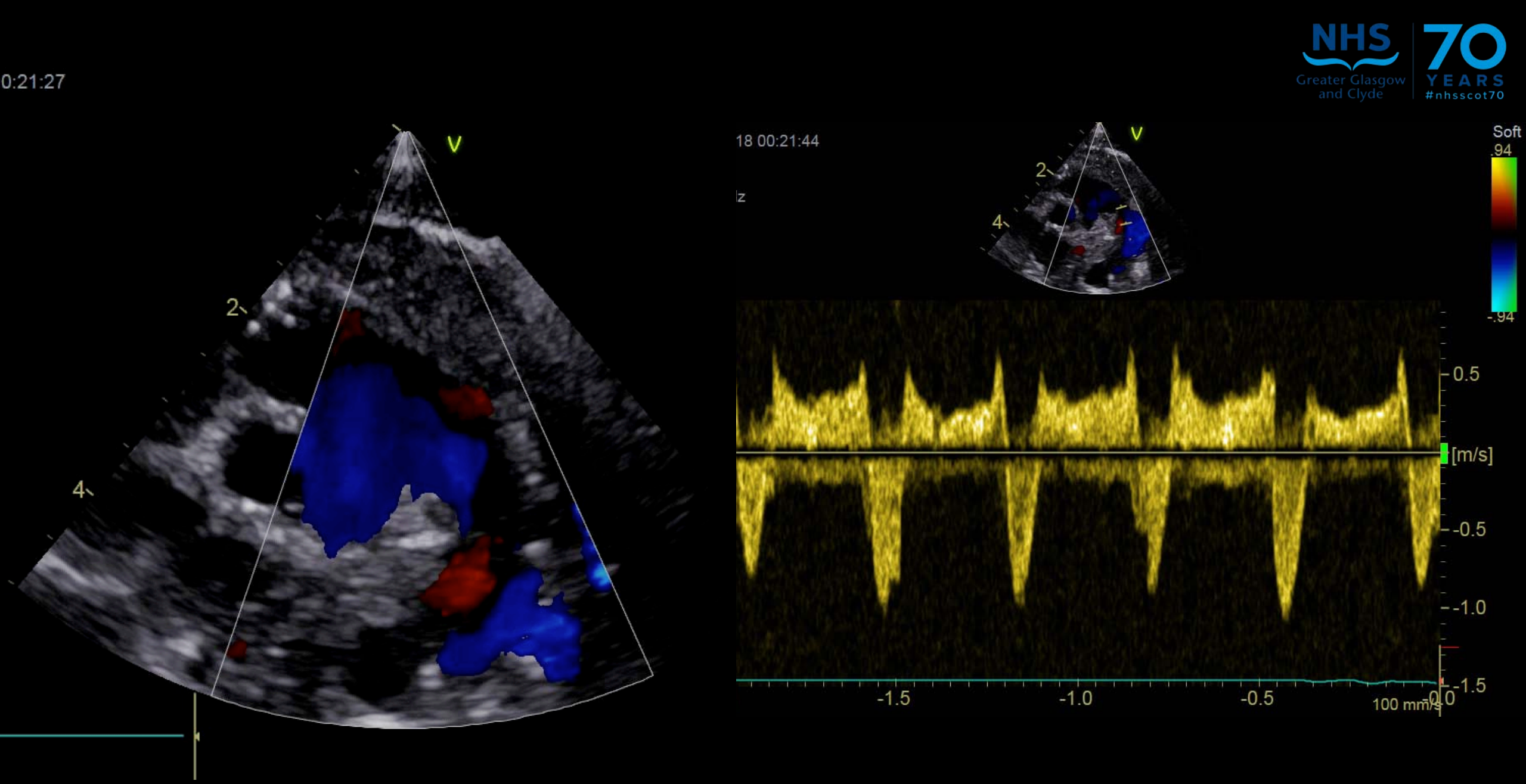


(Normal Global Strain: -22%)

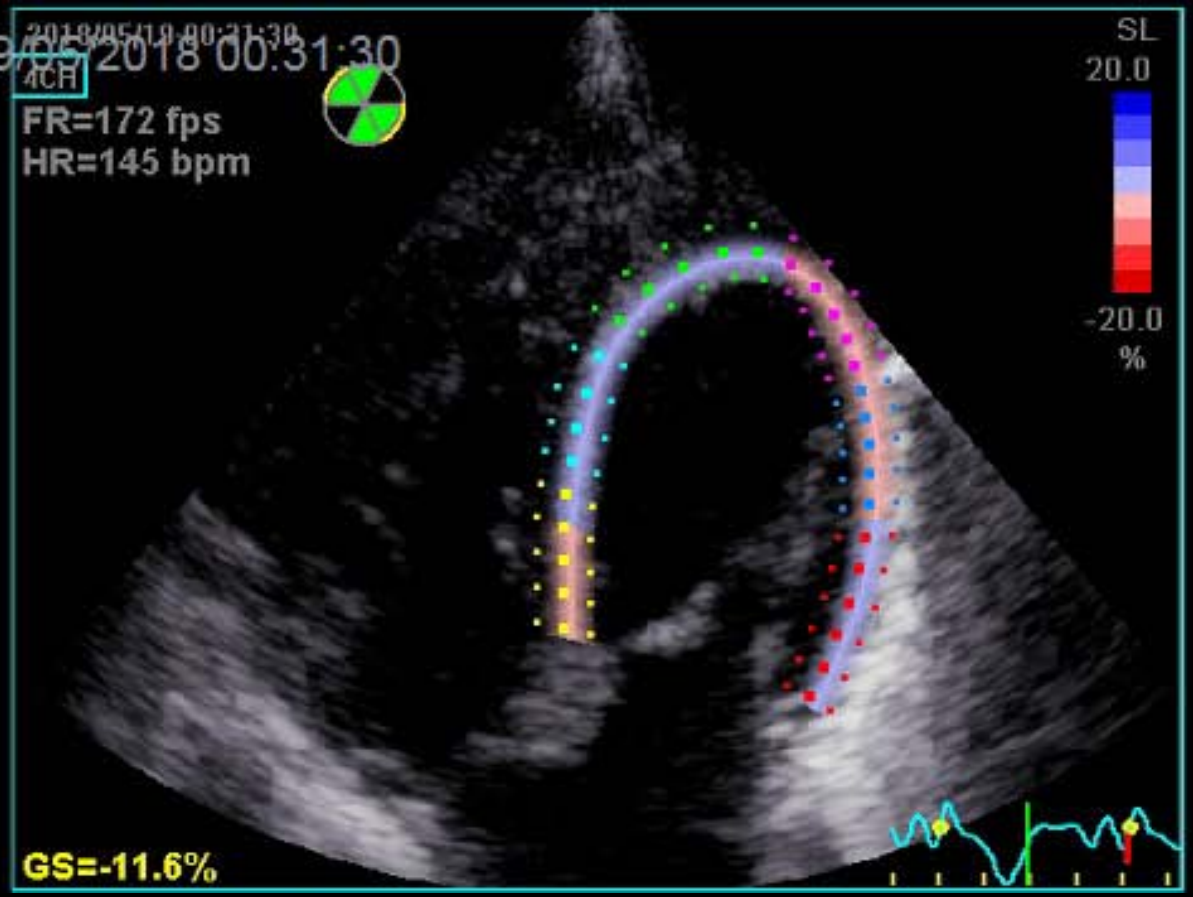
16 hours of age

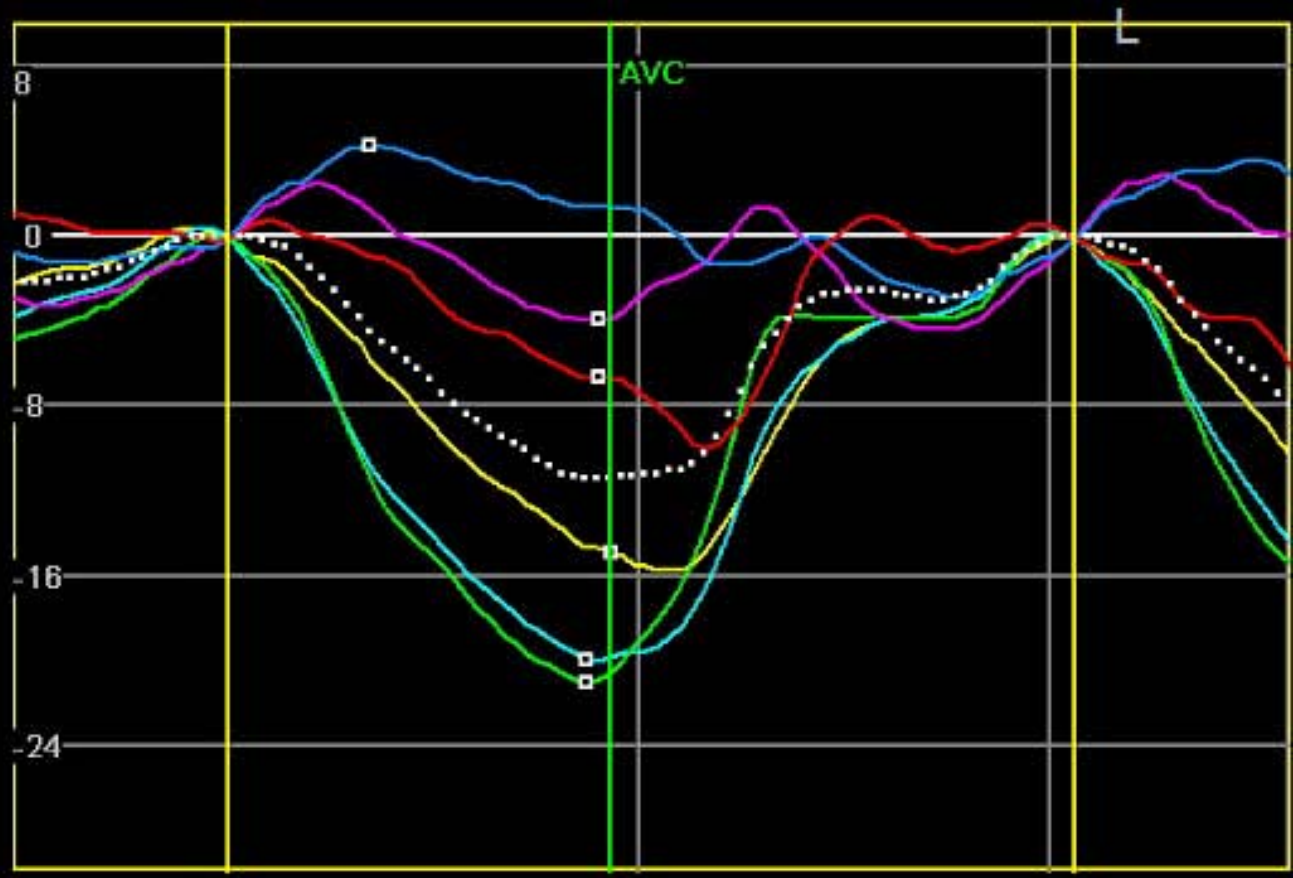
- FiO_2 ↑ 0.85
- SpO_2: preductal 95%, postductal 89%
- Reduced blood pressure: 40/35 (36) mmHg
- Oliguric
- Lactate 3.0 mmol/l

- Echo repeated:


0:21:27
V
2
4
18 00:21:44
z
V
2
4
Soft
.94
-.94
0.5
[m/s]
-0.5
-1.0
-1.5
-1.5
-1.0
-0.5
0.0
100 mm/s

Left ventricular systolic strain





What would you do?

What would you do?

- Epinephrine commenced 0.05 mcg/kg/min

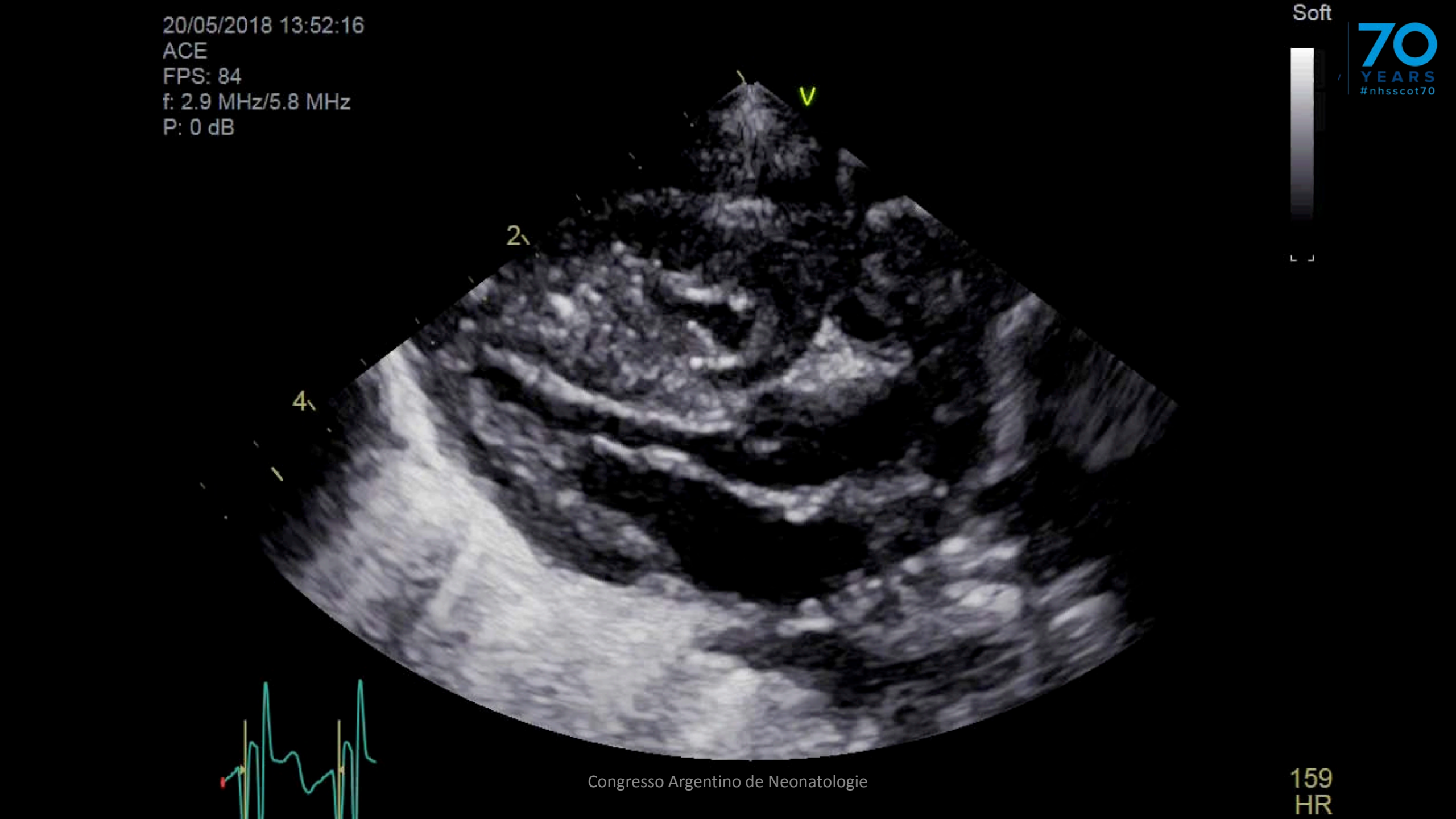
After 6 hours:

- Blood pressure improved: 52 / 36 (42) mmHg
- SpO_2 : preductal 98%, post-ductal 92%
- Urine output improved

50 hours of age

- FiO_2 ↓ 0.38
- SpO_2: Preductal 96%, post-ductal 94%
- BP 60 / 35 (48) mmHg
- Lactate 1.7 mmol/l


FPS: 73
f: 2.9 MHz/5.8 MHz
P: 0 dB
4′
2′
Congresso Argentino de Neonatologie


20/05/2018 13:52:16
ACE
FPS: 84
f: 2.9 MHz/5.8 MHz
P: 0 dB
Soft
V
2
4
Congresso Argentino de Neonatologie
159
HR

Take home messages:

1. ? PPHN or cyanotic congenital heart disease

Improving diagnostic accuracy in the transport of infants with suspected duct-dependent congenital heart disease

Neelam Gupta,[1,6] C Omar Kamlin,[1,4,5] Michael Cheung,[2] Michael Stewart[1] and Neil Patel[3]

"No single finding distinguishes congenital heart disease from PPHN"

Table 5 Proposed guide for distinguishing DDCHD and non-DDCHD

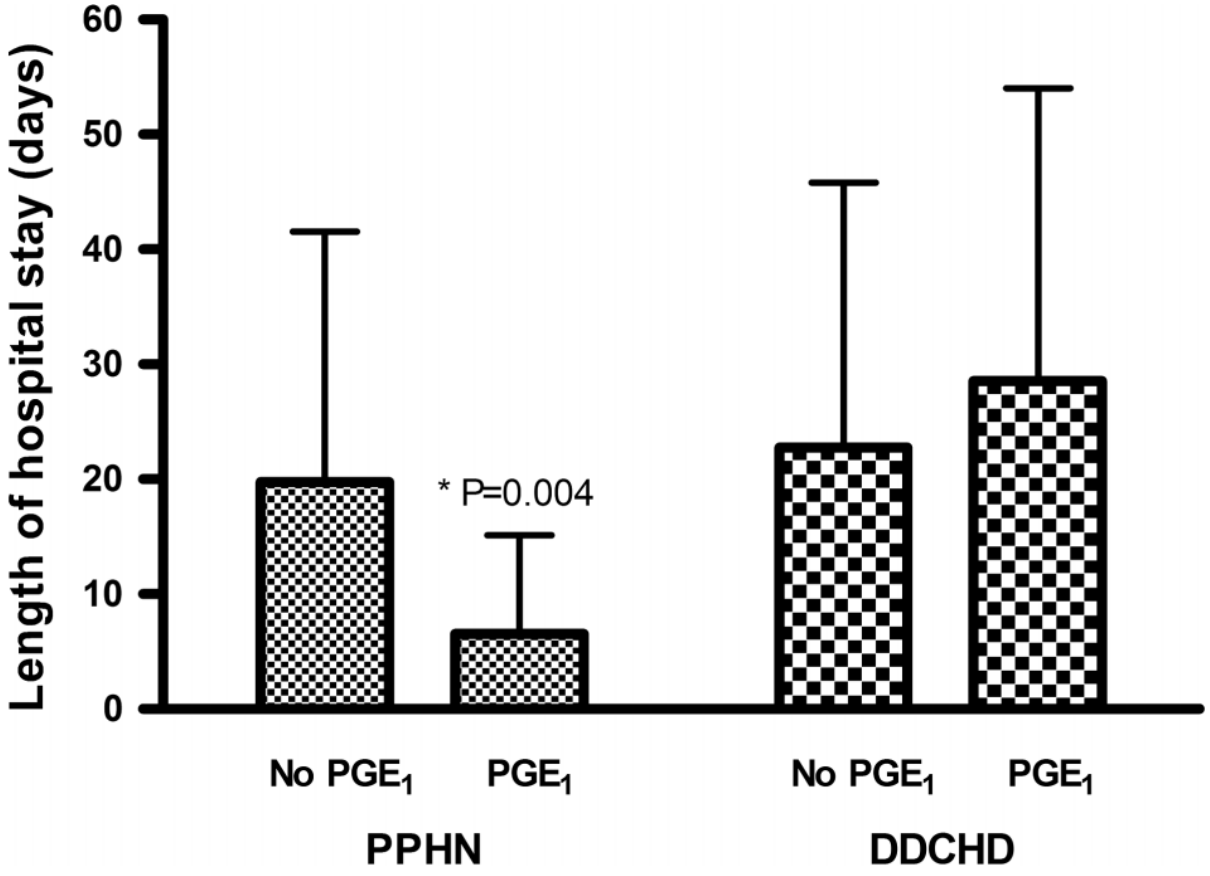
	'Predictive of DDCHD'	'Predictive of non-DDCHD/PPHN'
'Stronger predictors' (significant on multivariate analysis)		Mean BP < 40 mmHg (term infants) Labile SpO2
'Weaker predictors' (significant on univariate analysis only)	Heart murmur Abnormal pulses Cardiomegaly on chest X-ray Upper and lower limb BP difference >10 mmHg PaO_2 < 50 mmHg	Pre-Post ductal SpO2 difference >10% Abnormal lung parenchyma on chest X-ray Lactate >5 Low pH (<7.1) Low BE (<–8.0)

BE, base excess; BP, blood pressure; DDCHD, duct-dependent congenital heart disease; PPHN, persistent pulmonary hypertension of the newborn.

J Paediatr Child Health, 2014

Prostaglandin E1 use during neonatal transfer: potential beneficial role in persistent pulmonary hypertension of the newborn

Gupta et al, Arch Dis Child, F&N, 2013



Take home messages:

1. ? PPHN or cyanotic congenital heart disease: start PGE_1
2. Left ventricular dysfunction may be a contributing factor to PPHN
3. Serial functional echocardiography to guide management
4. Targeted cardiotropic support and time to support LV

Thank you to colleagues in Neonatal Unit and Paediatric Cardiology at RHC, Glasgow