Cardiology Update
There’s Someone in A&E Who’s Pregnant & Breathless...
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There’s someone in A&E who’s breathless and pregnant and

What should I do?

• Panic for 20 sec
• Think, ‘what would I do if she wasn’t pregnant?’ – then (usually) – do it
• Get help from someone who knows what they’re doing
To consider the -

- Causes of breathlessness in pregnancy
- Causes of maternal mortality
- Cardiovascular demands of pregnancy
- Use of cardiac drugs in pregnancy
- Decision making processes in the acutely unwell pregnant woman
Case History 1

21 year old ♀
28/40 weeks pregnant, twins.
Admitted to local hospital with 3 days ↑ SOB & orthopnoea

O/E
Breathless, sitting up
P 123 SR
BP 138/80
HS normal
Chest wheezy, quiet bases
The breathless pregnant woman: which statement is true?

1. All pregnant women get breathless ✓
2. Wheeze may indicate pregnancy induced asthma ✗
3. May be discharged from A&E after exclusion of PE ✗
4. Orthopnoea is a common feature of normal pregnancy ✗
5. CT thorax is contraindicated in pregnancy ✗
6. Influenza vaccination is contraindicated in pregnancy ✗
Breathlessness in Pregnancy

Same DD as non pregnant, but different emphasis

• **Cardiac**
  Orthopnoea…paroxysmal nocturnal dyspnoea…pulmonary oedema
  Ventricular dysfunction
  Native valve disease
  Thrombosed mechanical valve
  Tachyarrhythmia

• **Pulmonary embolus**

• **Respiratory**
  Decompensated asthma
  Pneumonia / influenza

• **Normal**
Case History 1

What happened next...

ΔΔ PE or chest infection

Rx  Enoxaparin 1.5mg/kg
    Oxygen
    Steroids for fetal lung maturation (betamethasone)

CT scan
    Attempted, but would not lie flat
    Scout film = congestion

Further Rx
    IV antibiotics
Cardiovascular changes in pregnancy:
Which statement is true?

During pregnancy

1. Cardiac output rises most rapidly in the 3rd trimester ✗

2. The rise in cardiac output is largely due to a rise in heart rate, typically to around 115bpm ✗

3. Stroke volume increases by 10% ✗

4. Cardiac output rises by 50% ✓

5. Total peripheral vascular resistance rises ✗
Cardiovascular Changes In Pregnancy

Karamermer et al. '07
Maternal Mortality By Cause UK 2011-2013

Total = 9 per 100,000 maternities
22% cardiac

Deaths from
- thrombosis (PE) have fallen with \( \uparrow \) awareness
- heart disease continue to \( \uparrow \)

Dark bars indicate indirect causes of death, pale bars show direct causes of death; Source: MBRRACE-UK
## Major Causes Of Maternal Death From Cardiac Disease UK 2006-2008.

<table>
<thead>
<tr>
<th>Cause of death</th>
<th>Number (early n = 53)</th>
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<tbody>
<tr>
<td>Ischaemic heart disease</td>
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<tr>
<td>Cardiomyopathy</td>
<td>4 (+1 late death)</td>
</tr>
<tr>
<td>Peripartum CM</td>
<td>9 (+6 late deaths)</td>
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<td>Aortic dissection</td>
<td>7</td>
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<tr>
<td>Sudden cardiac death</td>
<td>10</td>
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<tr>
<td>Congenital heart defect</td>
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<td>Endocarditis</td>
<td>2</td>
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<tr>
<td>Pulmonary hypertension</td>
<td>2</td>
</tr>
<tr>
<td>Thrombosed mechanical valve</td>
<td>2</td>
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</tbody>
</table>

50% Substandard Care
Did We Know About Their Heart Disease Before Pregnancy?

2009-2014: 80% cardiac maternal deaths not known to have heart disease before pregnancy

Malhotra 2006
Case History 1

Next morning.....

Worse: unable to sleep, sat in chair all night too breathless to eat

Cardiology opinion

Echo – impaired LV function mitral regurgitation

Tertiary centre phoned for advice

- Furosemide
- Transfer
- Baseline bloods:
  - U&E ‘normal’
    - Cr 48
    - K 4.3
  - ABG on 5L O2:
    - pH 7.43
    - pCO2 4.2
    - pO2 9.8
    - HCO3 21.9
    - Lact 1.76
    - BE -3.6
# Which Drugs Can You Use?

<table>
<thead>
<tr>
<th>Drug</th>
<th>Fetal effect</th>
<th>Pregnancy</th>
<th>Breast feeding</th>
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<tbody>
<tr>
<td>ACEI, ARB</td>
<td>Renal (&amp; cardiac) anomalies</td>
<td>✗</td>
<td>safe</td>
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<tr>
<td>β Blockers</td>
<td>Reduced fetal growth?</td>
<td>✓</td>
<td>safe</td>
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<tr>
<td>Digoxin</td>
<td>nil</td>
<td>✓</td>
<td>safe</td>
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<tr>
<td>Nitrates</td>
<td>nil</td>
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<tr>
<td>Hydralazine</td>
<td>nil</td>
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<tr>
<td>Thiazides</td>
<td>Nil (diabetogenic)</td>
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<td>safe</td>
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<tr>
<td>Furosemide</td>
<td>Nil (↓plasma volume)</td>
<td>✓</td>
<td>safe</td>
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<tr>
<td>Spironolactone</td>
<td>Antiandrogenic</td>
<td>Caution, feminisation?</td>
<td>safe</td>
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</table>
Case History 1

Arrives with CPAP, 20mg furosemide given pre transfer
Sitting upright, unable to speak in sentences
P130 SR
BP 100/85
Gallop rhythm
Chest – widespread crackles and wheeze

• Furosemide 40mg IV
  GTN infusion

• CXR:

• Echo: Dilated LV, severe systolic dysfunction, EF 20%
  Torrential MR
Case History 1

Good diuresis

Joint consultant obstetric, cardiology & obstetric anaesthetic review
Fetal heart beats present
Delivery pack and 2 resuscitaires on CCU

Feels much better, can speak in sentences and lie down
BP148/85

BUT..... P120

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<td>pH(t)</td>
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<td>12.1</td>
<td>22.5</td>
<td>21.6</td>
<td>19.1</td>
<td>18.4</td>
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<tr>
<td>Std Bicarb</td>
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<td>16.8</td>
<td>16.1</td>
<td>16.0</td>
<td>14.9</td>
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<td>Base Excess</td>
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<td>-7.6</td>
<td>-7.7</td>
<td>-7.8</td>
<td>-7.6</td>
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<tr>
<td>Anion Gap</td>
<td>-3.6</td>
<td>-7.6</td>
<td>-7.7</td>
<td>-7.8</td>
<td>-7.6</td>
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What is her metabolic state? **BAD, getting worse**
Is she perfusing her kidneys? **NO**
Which of these is not true?

1. She should be delivered by section in cardiac theatres ✓
2. A cardiac surgeon and perfusion team should be present ✓
3. She should be taken to labour ward HDU post delivery ✗
4. Both consultant obstetric and cardiac anaesthetist should be present ✓
5. The consultant cardiologist should be present ✓
Case History 1

Needs delivery.... now
  ...in cardiac theatres
  ... intra-aortic balloon pump placed *en route* to theatre

Who needs to be in theatre?

Consultant obstetrician & senior colleague
Obstetric & cardiac anaesthetist
Obstetric scrub team
Midwife
2 neonatal resuscitation teams
Perfusionist
Cardiac surgeon
Cardiologist
Case History 1

Uneventful CS under GA
Twins in good condition, electively intubated

TOE on table post delivery: MR now mild, LV unchanged, LVEF 20%

Post op cardiac ITU
Extubated quickly
Remained tachycardic
Acidosis & renal dysfunction resolved

Babies extubated and transferred to local NNU at 1 week
Mother discharged home same day
Cardiology follow up - asymptomatic
-no improvement in LV at 3 months, mod MR

• **Final diagnosis**
  Pre-existing cardiomyopathy unmasked by pregnancy?
  Peripartum cardiomyopathy?
Case History 2

28 year old Somalian, 17/40 2\textsuperscript{nd} pregnancy
Presents to A&E with breathlessness and orthopnoea

1\textsuperscript{st} pregnancy 7 years ago
struggled with breathlessness
multiple courses antibiotics & inhalers for chest infections
NVD at term

Post delivery
breathlessness better

Current pregnancy
increasing breathlessness from early pregnancy
can’t walk son to school
3 pillow orthopnea, sleeps badly, dry cough
Case History 2

Breathless, sitting up
Coughs++ lying flat
P120 sinus rhythm
BP 105/60
HS I___II___I
Chest widespread wheeze
Case History 2

What happened next......

Differential diagnosis?
- Pregnancy induced asthma
- Chest infection

Investigations?
- No, because pregnant

Initial management?
- Oxygen
- Salbutamol nebuliser
- Antibiotics

Initial response?
- ↑ dyspnoea and distress
- ↑ Heart rate 130
Cardiology review

RV heave
Tapping apex
 Apex: loud S1, opening snap, (...mid diastolic murmur?)
Bases quiet, fine crackles and wheeze

Salbutamol nebuliser removed
Furosemide 20mg IV given

CXR – LA dilatation, pulmonary oedema
ECG – SR, p mitrale, p pulmonale, RV+
Echo – oxygen & diuretics given whilst waiting
Case History 2
Case History 2

Echo: isolated severe rheumatic mitral stenosis, valve area 0.8cm²
Question

What next?

1. Continue medical therapy and intervene if decompensates ✗
2. Termination of pregnancy on medical grounds ✗
3. Mitral valve replacement ✗
4. Balloon mitral valvuloplasty at 36/40 ✗
5. Balloon mitral valvuloplasty at 19/40 ✓
Case History 2

19/40
Balloon mitral valvotomy
MVA 2.2cm², no MR

Asymptomatic
39/40
Spontaneous normal delivery

Pre balloon
Gradient 11mmHg
Valve area 0.8cm²

Post balloon
Gradient 3.5mmHg
Valve area 2.2 cm²

5 years later.....
No further intervention
Just completed 3rd pregnancy uneventfully
The Breathless Pregnant Woman

Red flag symptoms
• Orthopnoea...
  ...refuses to lie down in CT scanner
• Paroxysmal nocturnal dyspnoea
• Unable to speak in sentences

Red flag signs
• Tachycardia >100
• Hypotension
• Tachypnoea & accessory muscles
• Sitting upright
• Frothy sputum
• Wheeze or crackles

Red flag tests
• ‘Normal’ but deteriorating renal function
• Metabolic acidosis