Putting it together in the resus room

THE BREATHLESS / SHOCKED PATIENT

Justin Bowra
Critical Care Ultrasound Course
So now we can scan arrested patients.
But most of my patients have a pulse.
The really, really crook patient

Adapted from BLUE, FALLS & RUSH protocols
Breathless+++ 
Or shocked+++ 

What’s the clinical question?
Why is the patient breathless?
Why is the patient breathless?

Why is the patient shocked?
Why is the patient breathless?

Why is the patient shocked?

Can I give more fluids?
US won’t tell you the diagnosis every time, but it will tell you when it’s safe to give IV fluids... or when to stop.
Why is the patient breathless?

- Pneumothorax (PTX)
- Pneumonia
- Acute cardiogenic pulmonary oedema (APO)
- Pulmonary embolism (PE)
- Asthma / COPD
- (Other: rare)
Why is the patient breathless?

- Pneumothorax (PTX)
- Pneumonia
- Acute cardiogenic pulmonary oedema (APO)
- Pulmonary embolism (PE)
- Fluid: pericardial, pleural
- Asthma / COPD
- (Other: rare)
Why is the patient shocked?

- Obstructive (TPTX, massive PE, tamponade)
- Cardiogenic
- Hypovolaemic (fluid loss, 3rd spacing…)
- Distributive (septic, anaphylactic, neurogenic)
- Dissociative (CO, cyanide)
Why is the patient shocked?

- Obstructive (TPTX, massive PE, tamponade)
- Cardiogenic (wet lungs)
- Hypovolaemic (fluid loss, 3\textsuperscript{rd} spacing…)
- Distributive (septic, anaphylactic, neurogenic)
- Dissociative (CO, cyanide)
Should I give more fluids?

- Lungs: wet or dry?
- IVC: collapsing or distended?
Should I give more fluids?

Wet lungs
Distended IVC
... probably not

Dry lungs
Small IVC
...yes

NB: ‘APO mimics’ (eg fibrosis
‘Fluid overload mimics’ (eg cor pulmonale)

But re-scan with every bag of IV fluid
JB’s version
3 steps (+1)

1. Lungs
2. IVC (or IJV if you can’t see IVC)
3. Single view heart
4. Stop & think. Consider:
   - Scanning the leg veins (obstructive: PE)
   - Scanning the abdo (hypovol: AAA / free fluid)
   - Turning off the machine
When you find a problem…

Start fixing the problem!

Even if you only got to the lungs (eg PTX)

But make sure you finish the scan later (in case of dual pathology)
Where should I start my scan?

- It’s up to you. But my advice…..
- Arrested/ suspect ‘tamponade’: start with heart.
- Breathless / shocked: start with lungs.
- If truly undifferentiated, start with the lungs.
Why not scan the heart first?

1. Because lungs/IVC:
   - Easier to scan
   - Faster to scan
   - Provide more direct info

   - E.g. Wet lungs + ‘normal’ TTE = can still be CCF
   - Is there a PTX? A HTX/effusion? Pneumonia?
Most importantly…

If the lungs are dry, your team can keep bolusing IV fluid while you keep scanning.
Step 1

The lungs

4 questions
Step 1

The lungs:
PTX?
Pleural space?
Dry / wet / chunky?
Overall pattern?
If breathless, 3 spots each side: upper & lower anterior, and round the back
If shocked, just 2 spots each side: upper & lower anterior
Why the difference?

1. If breathless, want to see as much lung as possible.

2. If shocked: just want to know if lungs look wet or dry
   (This is just a screening test)
TEST

Dry, wet or chunky?
Step 1 findings

Only one lung is sliding

Both lungs are sliding
Step 1 findings

One lung not sliding

- Wet
- Dry
Step 1 findings

One lung not sliding

- Wet: Pneumonia
  - Treat.

- Dry: PTX?
  - Look for lung point, consider DDX.
  - Treat.
Step 1 findings

Both lungs are sliding

- Both dry
- Both wet
- Mixed or chunky
Step 1 findings

Both lungs are sliding

Both dry: **Continue IVT**

Both wet: **Pulmonary Oedema**
**Treat.**

Mixed or chunky: **Pneumonia**
**Continue IVT**
**Treat cause.**
Is that 100% true?

No, but it’s close.

*NB remember the 90% rule: 90% of the time, you’ll be right.*
Step 2

IVC
Hang on!

Do I need to scan the IVC if I already have a diagnosis from step 1?

(PTX, pneumonia, cardiogenic pulmonary oedema)
NO: if Dx already obvious and patient improving.

YES: if Dx still unclear/ not improving.
NB careful with the IVC if ventilated

Absolute diameter (IVCD) larger
Respiratory variation reversed
Overall, less useful
IVC test

Full or empty or blah?
Step 2: dry lungs, so check the IVC

- Full IVC
- Empty IVC
- Unhelpful/Inadequate view
So: dry lungs, & IVC shows...

Full IVC

Avoid IV fluids
Proceed to step 3

Empty IVC

Give IV fluids

Unhelpful/Inadequate view

Get help or cut your losses
Proceed to step 3
Step 3

*Single* view of heart
Step 3: single view heart
Step 3: single view heart

Big RV
Big IVC
Step 3: single view heart

- Big RV
- Big IVC
- PE (probably)
Step 3: single view heart

- Big RV
- Big IVC
- PE (probably)
  - Consider thrombolysis
Step 3: single view heart

- Big RV
- Big IVC
  - Pericardial fluid
    - Big IVC
  - PE (probably)
    - Consider thrombolysis
Step 3: single view heart

- Big RV
- Big IVC

- PE (probably)
  - Consider thrombolysis

- Pericardial fluid
  - Big IVC

- Tamponade (probably)
Step 3: single view heart

- Big RV
- Big IVC
- PE (probably)
  - Consider thrombolysis
- Pericardial fluid
  - Big IVC
- Tamponade (probably)
  - Drainage / fix dissection
Step 3: single view heart

- Big RV
  - Big IVC
- PE (probably)
- Pericardial fluid
  - Big IVC
- Small / normal heart
  - Collapsing IVC

- Consider thrombolysis
- Tamponade (probably)
- Drainage / fix dissection
Step 3: single view heart

- Big RV
  - Big IVC
- Pericardial fluid
  - Big IVC
- Small / normal heart
  - Collapsing IVC

- PE (probably)
- Tamponade (probably)
- Hypovolaemia/sepsis

- Consider thrombolysis
- Drainage / fix dissection
- Drainage / fix dissection
Step 3: single view heart

- Big RV
  - Big IVC

- Pericardial fluid
  - Big IVC

- Small / normal heart
  - Collapsing IVC

PE (probably)

Tamponade (probably)

Hypovolaemia/sepsis

Consider thrombolysis

Drainage / fix dissection

IV fluid. IVAB??

Consider aorta/EFAST
Step 3: single view heart

- **Big RV**
  - Big IVC
  - **PE (probably)**
    - Consider thrombolysis

- **Pericardial fluid**
  - Big IVC
  - **Tamponade (probably)**
    - Drainage / fix dissection

- **Small / normal heart**
  - Collapsing IVC
  - **Hypovolaemia/ sepsis**
    - IV fluid
    - Consider aorta/EFAST

- **Inadequate view**
Step 3: single view heart

- Big RV
  - Big IVC
  - PE (probably)
    - Consider thrombolysis

- Pericardial fluid
  - Big IVC
  - Tamponade (probably)
    - Drainage / fix dissection

- Small / normal heart
  - Collapsing IVC
  - Hypovolaemia/sepsis
    - IV fluid
      - Consider aorta/EFAST

- Inadequate view
  - !#?!!
Step 3: single view heart

- Big RV
  - Big IVC
  - PE (probably)
    - Consider thrombolysis
- Pericardial fluid
  - Big IVC
  - Tamponade (probably)
- Small / normal heart
  - Collapsing IVC
  - Hypovolaemia/sepsis
    - IV fluid
    - Consider aorta/EFAST
- Inadequate view
  - !#?!!
  - Try another window
    - Try cardiac probe
    - Get help
Step 4

Stop & think
Step 4

- Take a step back
- Have a think
- What causes have I excluded?
- What else is left?
- Can bedside US help any further? …PTO
Step 4

Options: either/ both of:

Abdomen
(is it AAA? Free fluid?)

2 or 3-point compression DVT scan
(if IVC/cardiac views inadequate)
(Is it a PE?)
Now what?

You’ve reached the end of the scan.
Patient still shocked.
Fluids didn’t work.
You’ve ruled out a number of causes.
Now you need a different test.
But what about other Px?

Inotropes / pressors
IV antibiotics
Etc

That’s a doctor question.
If/when you decide your patient needs them, give them.
NB

#1 This is rule-in, not rule-out.

#2 Keep repeating the scan!
Summary

One probe.

One preset.

Start with the lungs.
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