

The Shocked Patient

Adapted from Lichtenstein's FALLS
protocol, with permission

Summary

1. (Ongoing resus) Clinical assessment: formulate the question
2. Rapid shock screen
3. Form a working diagnosis
4. Continue resuscitation
5. Re-scan / monitor progress / further investigations

First, formulate the question

In the shocked patient, US can assist with the following two questions:

- a. Why is the patient shocked?
- b. Should I give more fluids? (Or inotropes, or vasopressors?)

The shock screen won't tell you the diagnosis every time, but it will tell you when it's **safe** to give IV fluids (dry lungs & small IVC)... or when to **stop** (wet lungs, large IVC).

a. Why is the patient shocked?

If you (& the patient) are lucky, the rapid shock screen might reveal one of the following causes:

- Obstructive (TPTX, massive PE, tamponade)
- Cardiogenic (lung rockets)
- Hypovolaemic (fluid loss, 3rd spacing...)

b. Should I give more fluids?

- Are the lungs wet or dry?
- Is the IVC full or empty?

If US demonstrates dry lungs and a small IVC, **give fluids** (but re-scan with every bag of IV fluid: if still shocked & B profile appears, cease fluids).

If US demonstrates wet lungs and distended IVC, the answer is 'no more fluids' and you should reach for inotropes / pressors etc.

(NB look for 'APO mimics' eg fibrosis, and 'fluid overload mimics' eg cor pulmonale)

What if the lung and IVC give conflicting information? (eg lungs dry & large IVC?) (or lungs wet & small IVC?)

This isn't common, but recall that each sign has false positives & negatives (eg IVC distended due to cor pulmonale).

Go back & reassess the patient, then synthesize your findings.

=Be a doctor.

What about large LA/LV?

Surely that suggests I should avoid IVT?

A. Not in isolation.

**Even patients with dilated cardiomyopathy
can suffer hypovolaemic shock.**

**But be sensible & consider smaller boluses,
and correlate with other findings.**

10

How to perform a rapid US screen in the shocked patient

Probe & scanner settings

As this is a rapid screen (not a formal echocardiogram), use the curved (abdominal) probe on abdominal / FAST preset.

Step 1: scan the lungs

What am I looking for? Lung sliding.

Why?

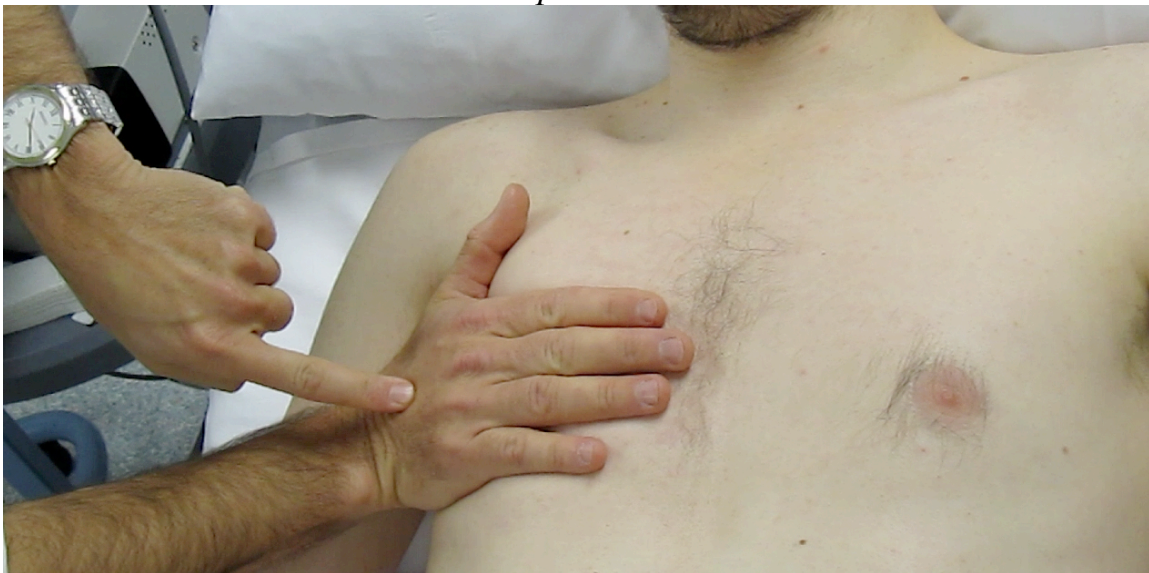
- Tension PTX
- Incorrect ETT placement eg
 - One lung ventilation
 - Oesophageal intubation

Where shall I look? The anterior chest BLUE points (see *Lung* section of this manual) ... or a reasonable approximation.

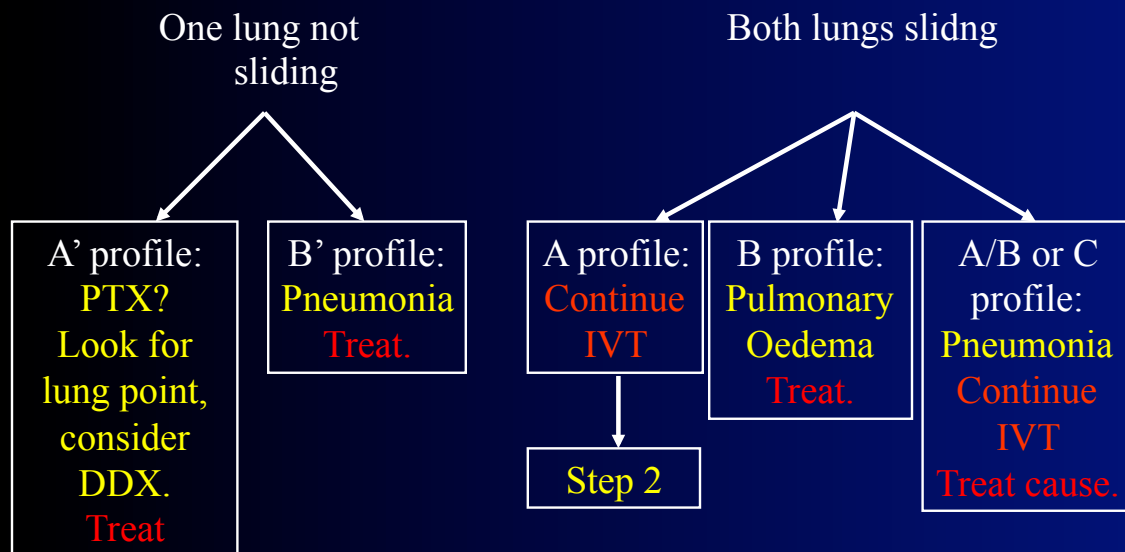
Upper BLUE point



Lower BLUE point



Step 1 findings



Step 2: single view of the heart

- For details (window, probe position, possible results): see *Arrest algorithm*

Subcostal scan heart, curved probe



Controversy

If step 1 has already demonstrated a diagnosis (PTX, pneumonia, APO) some consider it unnecessary to scan the heart, while others prefer to 'make sure' by including the heart.

Example:

If you saw B profile on step 1...

... and step 2 shows poor

LV function

= acute cardiogenic
pulmonary oedema
(APO)

And step 2 shows 'normal'

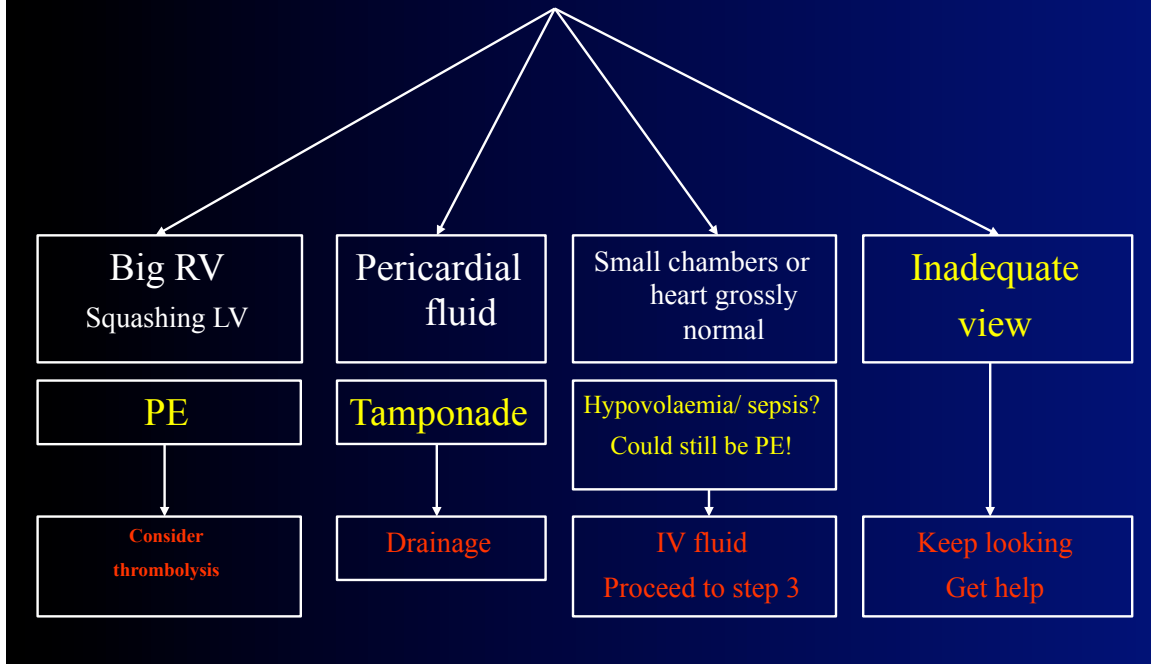
LV

Still probably APO- start
treating
(but re-check clinical picture
to be sure it's not severe
bilateral pneumonia /
ARDS)

LV failure commonly appears as spuriously 'normal' LV on basic 2D echo. So if B profile but heart looks OK, start treating for APO, then proceed to focused TTE & reassess patient.

Results of step 2:

Step 2: single view heart, dry lungs



Step 3: IVC

Do I need to scan the IVC?

- Not if Dx already obvious (eg tamponade).
- Yes if Dx still unclear: dry lungs, small volume heart (e.g. you haven't ruled out PE yet)
- But remember that IVC can be 'falsely' large (eg cor pulmonale) and 'falsely' small (eg XS probe pressure)

Subcostal scan IVC, curved probe



3 possible outcomes:

1. Large IVC ($>2.3\text{cm}$), $<50\%$ collapse = elevated CVP

Multiple causes...but probably not fluid responsive

Actions:

Reassess clinical picture

Consider other tests

Avoid indiscriminate IVT

2. IVC small ($<1.5\text{cm}$) &/or collapsing $\geq 50\%$ = **fluid responsive**

Actions:

Give IVT

Proceed to step 4

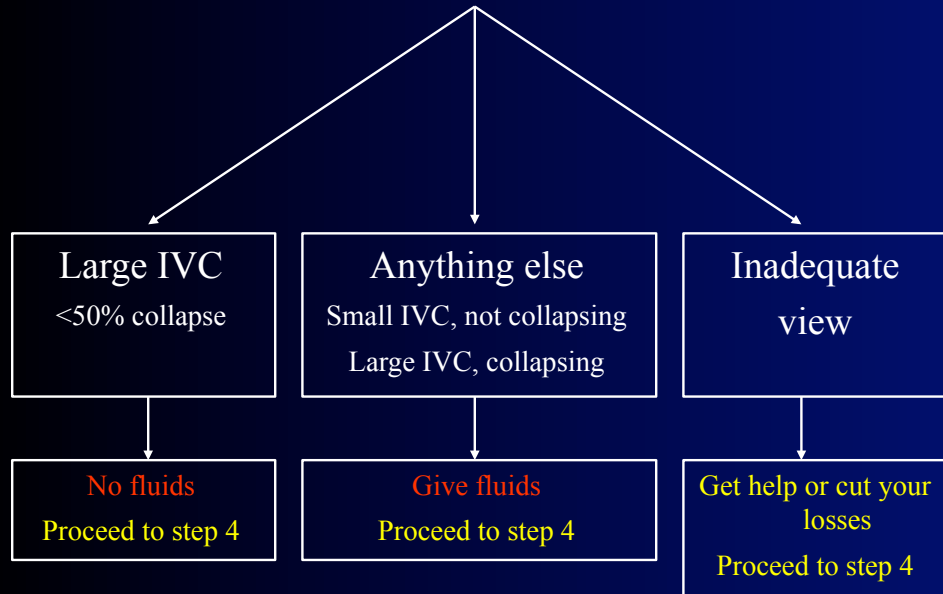
3. Inadequate view: reconsider whether you really need the IVC information

Actions:

Either get help

Or proceed to step 4

Step 3: dry lungs, small vol heart, IVC



Step 4: abdomen & leg veins?

Take a step back & have another look at the patient & other information.

- What causes have I excluded?
- What else is left?
- Can bedside US help any further?
 - Abdomen (hypovolaemia: AAA / free fluid)
 - Leg veins (obstructive: PE)

Who needs step 4?

Anyone with:

Dry lungs, lung sliding present, diagnosis still unclear, and...

shock unresponsive to fluids

Is it sepsis?

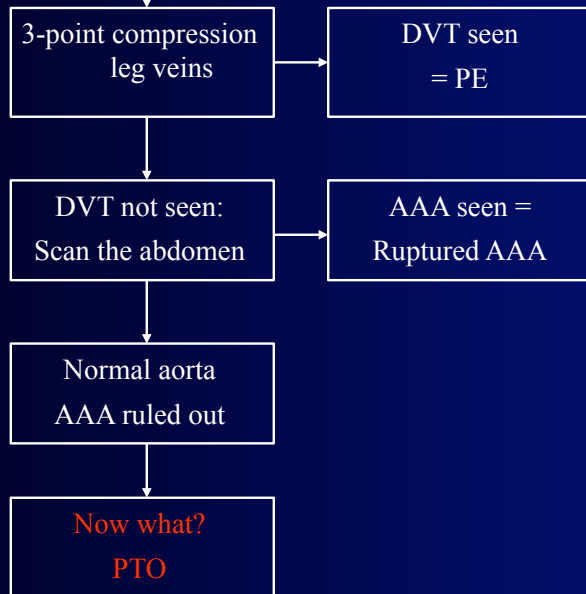
Is it a ruptured AAA?

Is it PE?

Options: either/ both of:

- 3-point compression DVT scan (is it a PE?)
- Abdomen (is it AAA? Free fluid?)

Step 4: dry lungs, diagnosis unclear, shock unresponsive to IV fluids



Now what?

You've reached the end of the scan

If patient still shocked and fluids didn't work

You've ruled out cardiogenic, PTX, tamponade

...but not PE.

If it's still on your list, you need a different test.

But while arranging other tests, **keep scanning the lungs**

If lungs still dry, you can give more IV fluid

Once B profile appears or patient improves, cease fluids

Summary: the shock scan

1. Anterior lung fields (this time 2 points)
2. Single view heart
3. IVC (hypovolaemia / obstructive shock)
4. Take a step back & consider:
 - Leg veins (obstructive: PE)
 - Abdo (hypovol: AAA / free fluid)
 - Other tests

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