Pulmonary Artery (Swan-Ganz) catheter: troubleshooting the insertion

It won't advance: stuck in the SVC or the RA

- If there is enough catheter length in the patient, but it just won't go in the RV...
- It may be tricuspid regurgitation.
  - The jet of blood regurgitating from the right ventricle may be pushing the catheter out of the RV with each contraction.
  - The solution: fill the balloon with 1.5ml of normal saline, and lay the patient left side down.
  - Gravity should guide the now heavier balloon into the right ventricle.

It won't advance: stuck in the RV

- You have a good RV waveform, but it won't go into the PA...
- It's probably coiled up in the RV. This can happen in patients with pulmonary hypertension.
  - Withdraw it to the SVC, and try again.
  - Use a slow continuous motion – no rapid thrusts.

I deflated the balloon, but it looks wedged again.

- Your catheter tip has migrated to a more distal artery; it is so narrow that the catheter itself no occludes the artery lumen without the need for balloon inflation.
- You can't leave it like that, because it will result in a pulmonary infarction.
- Withdraw the tip a few centimeters and gently attempt to wedge again.

My patient now has an arrhythmia.

- You have irritated the endocardium.
- Just relax it will go away very shortly.

My patient has complete heart block.

- You have now irritated the endocardium in a way which somehow disrupted AV nodal conduction.
- Withdraw the catheter. Get the pacing pads You need to give this patient some pacing while you wait.
  - If you are lucky, it will go away after a brief period of pacing.
  - If you are unlucky, you have injured the AV node and the patient is in for a prolonged period of transvenous pacing.

Where is the catheter tip on Xray?

- On the Xray, the tip should appear 3-5 cm from the midline.
- It should be INFERIOR to the LA position.

The catheter tip needs to be in Wests Zone 3. Is it in the right position?

- To maintain a column of blood between the pressure transducer and the left atrium, the balloon has to be below the atrium (otherwise, no column, duh.) This means you have to send the catheter tip into Wests Zone 3 when you are floating it.
- This should happen naturally because Wests Zone 3 normally enjoys higher blood flow
  - THAT may not be the case in a patient ventilated with positive pressure (blood is pushed around into all zones) or some other reason for a high intrathoracic pressure;
  - To maximize your chance of sending the catheter tip to Zone 3, one may artificially increase the blood flow to that zone by turning the patient on one side.

How can you tell that it is in the third zone?

- On lateral CXR, the tip of the catheter is at or below the left atrium
- Respiratory variation of PAOP is < 50% of the static airway pressure (peak – plateau)
- Change the PEEP: PAOP changes by 50% of the change in PEEP
- The PAWP contour has recognizable a and v waves; in Zones 1 and 2 it is unnaturally smooth.

You can also use peripheral ABG and wedge ABG parameters. Usually, nobody can be bothered.

- Wedge PO<sub>2</sub> minus Arterial PO<sub>2</sub> = 19mmHg
- Arterial PCO<sub>2</sub> minus Wedge PCO<sub>2</sub> = 11mmHg
- Wedge pH minus Arterial pH = 0.008