ACCU KIT OF THE WEEK

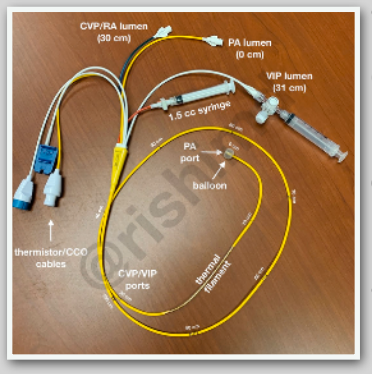
THE ROYAL LONDON HOSPITAL

PA Catheter

Jo-Anne Strul/ JM March 2021

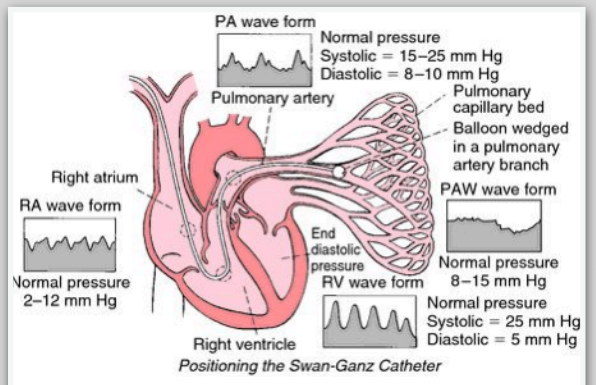
What?

A pulmonary artery catheter (PAC)- a quad lumen thermodilution catheter with various additions. Sizes range from 60-110cm in length, and 4-8F in diameter. The catheter is marked at 10cm increments to aid insertion. Most contain 1.5ml syringe, introducer with a side port for rapid infusion, temperature sensitive wire with a thermistor bead, balloon surround tip containing lumen in the end.

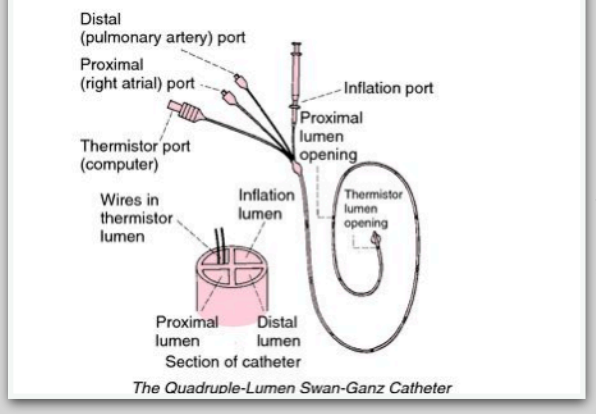


How is it inserted?

Full asepsis, percutaneous seldinger technique (like CVC) with ultrasound guidance. Preferred sites of insertion are right IJ vein > left SC vein > right SC vein > left IJ. Insert the sheath first. The yellow catheter is inserted through this with the transducer attached. Once the RV waveform is seen, the balloon is inflated to allow the PAC to progress through the right heart. Distinct waveforms plus known distances aid certainty re position. Once the PA is reached, the wedge waveform can be used to confirm position. PAC is secured with the balloon deflated. Confirm position with a chest x-ray - the tip should curve, without loops or knots, into a main pulmonary artery.



Positioning the Swan-Ganz Catheter



The Quadruple-Lumen Swan-Ganz Catheter

Why use one?

PACs can be used for continuous cardiac output monitoring and central temperature monitoring. It can give measurements of the right ventricle and right atrium (during insertion) and of the pulmonary artery pressure continuously. Using this value gives an estimate of the left atrial filling pressure (diastolic pressure), also known as the pulmonary capillary wedge pressure, which is normally 2-12 mmHg. PACs can also be used to measure mixed venous saturations, which gives an idea of oxygen extraction and fluid status. PACs are useful in acute heart failure, PA hypertension and post-cardiac surgery.

What are the ports for?

Blue lumen sits in the RA- used for RA pressures and the injectate for cardiac output studies. Can also be used to give fluids/drugs. The white lumen is the proximal infusion port- terminates in the RA, used for infusing fluids and drugs. The red/white connector is the thermistor- a temperature sensitive wire that terminates near the tip of the catheter. The terminal portion of the wire, termed the thermistor bead, lies in one of the main pulmonary arteries. Connection of the thermistor port to a Cardiac output monitor allows determination of Cardiac output using thermodilution. The yellow lumen is the PA lumen (the distal port). It allows measurement of PA pressures. A blood gas drawn from here measures mixed venous saturations. Caustic or hyperosmotic solutions must not be infused through this. The red lumen is for the balloon which is inflated when travelling through the system, and for 'wedging' when in the PA. The ballon must be deflated at all other times.

What are the hazards?

As per CVC, +arrhythmias, heart block, pulmonary infarction, PA rupture, cardiac valve damage. Late complications include thrombosis, endocarditis, inability to remove due to knotting. PACs fell from favour after the PACman trial in 2005 found no mortality benefit when a PAC was used. They still have utility in selected patients, usually on cardiac ICU.