Right Heart Catheterization

Right heart catheterization (also known as pulmonary artery catheterization or Swan-Ganz catheterization) is a common procedure in critically ill patients. The catheter is a long thin hollow tube that is placed through a central venous catheter (see Information Sheet on Central Venous Catheterization) and is then guided through the chambers of the heart and into the large blood vessels of the lungs. The catheter is left in place in a pulmonary (lung) artery. This catheter measures pressures in the heart and large blood vessels and checks how well the heart is working.

Common reasons for its use and benefits:

In most cases this procedure is done when the organs of the body are at risk of failure, and when it is not possible to figure out the pressures in the heart or how well the heart is pumping blood without the catheter. Most experts believe that the catheter, when used correctly in carefully selected patients, helps the doctor decide how to better manage some critically ill patients. Some common situations in which doctors recommend right heart catheterization include:

- Low blood pressure (hypotension or shock) - When the blood pressure remains very low despite giving fluids and medications to the patient. The need to measure pressures in the large blood vessels is greatest when the patient is receiving powerful medications that stimulate the heart as a way of keeping the blood pressure up.
- Kidney abnormalities - When urine flow is too low to get rid of the wastes of the body and giving fluids and/or diuretics (medicines intended to stimulate urine output) does not increase urine output.
- Lung water (pulmonary edema) - In patients with a lot of water in their lungs due to heart failure or inflammation of the lungs, the catheter can help monitor treatments to prevent more water from accumulating in the lungs.
- Specific heart abnormalities - There are some abnormalities of the heart - such as when fluid collects around the heart or a heart valve doesn't close properly - in which measurements with the catheter help to make the diagnosis and guide treatments.

Risks:

Some of the risks of central venous catheterization include:

- Pain during placement - Discomfort can result from the needle stick and placement of the catheter at the time it is inserted. Doctors try to lessen the pain with a local numbing medicine (anesthetic like novocaine). The discomfort is usually mild and goes away once the catheter is in place.
- Collapsed lung - This is called a pneumothorax. The lung is very close to the veins of the neck or chest. If the needle passes through the vein, it could pierce the lung causing it to leak and collapse on that side. If this happens, the doctor can place a tube between the ribs into the chest to suck out the air that is leaking from the lungs (see related Information Sheet on Chest Tube Thoracostomy). This complication is particularly dangerous when a patient is on a breathing...
machine. Rarely, collapse of the lung can cause death. This complication can even happen when everything is done correctly.

- Infection - Any tube (catheter) entering the body can make it easier for bacteria to get in and infect the patient. The longer a catheter remains in the body, the more likely it is to become infected. Special care in bandaging the skin at the needle site and changing the connecting tubes and fluids help to decrease this risk. With great care, these catheters can remain in the body for several weeks without becoming infected.

- Bleeding - Bleeding around holes in the veins is usually mild and seals on its own. Since the major arteries run alongside the major veins, the arteries can be punctured by accident. Even bleeding from an artery can stop on its own before serious problems occur. Rarely, the chest fills with blood, which can be life-threatening. In that situation, it may be necessary to place a tube between the ribs to drain out the blood (see related Information Sheet on Chest Tube Thoracostomy).

- Clotting around the catheter - Blood clots can commonly form in and around these catheters inside the veins. Such clots usually do not cause problems. Once the catheter is removed, the body can often dissolve the clot over time. Sometimes, clots can break off and travel out into the lungs. This is called a pulmonary embolism. A blood clot in the lungs can cause breathing problems and, very rarely, death.

- Air entering through the catheter - Rarely, air enters the catheter as it is being inserted. The air bubbles can travel through the heart and cause lung injury and low blood pressure. This problem is called an air embolism. Special care is taken to avoid air entry.

Some risks are specific to the placement of the catheter through the heart to the pulmonary artery.

- Heart rhythm abnormalities - The catheter can accidentally tickle the heart and stimulate its electrical system, causing the heart to beat too fast. In patients who already have heart rhythm problems, the catheter's tickle could cause the heart to go very slow (this is called heart block).

- Rupture of the pulmonary artery - This is a very rare complication in which the catheter breaks the large blood vessel in the lung that it is in. Such a breakage can cause life-threatening bleeding.

Complications can occur even when everything is done correctly. Serious complications are reported in less than 5% of patients. Right Heart Catheter The arrow labeled "1" shows where the catheter would enter the patient's body, usually in the side of the neck. The tip of the catheter labeled "2" is pushed through the chambers of the heart into a large blood vessel of the lung.