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Introduction to Swan-Ganz Catheterization

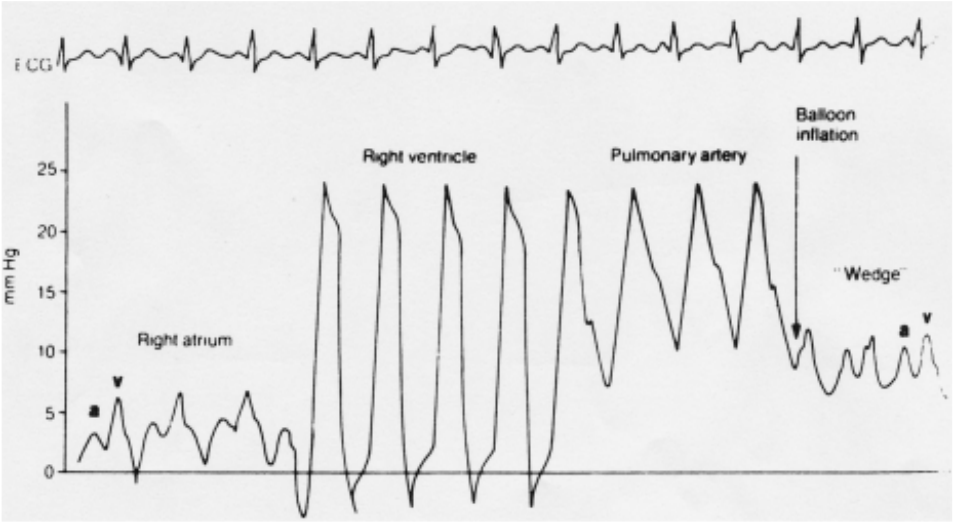
A Swan Ganz (aka Pulmonary Artery Catheter, "Right Heart Cath") is a long flexible catheter inserted through an introducer (aka Cordis) that "floats" through the right heart to lodge in a pulmonary artery branch. It offers several ports for meds in addition to hemodynamic data.

Indications: Often inserted to gauge fluid status and cardiac output/index. Some scenarios:

1) Hypotension following adequate fluid resuscitation
2) Pulmonary edema not responding to diuresis
3) Pulmonary edema with hypotension or pulmonary hypertension
4) Respiratory failure with high PEEP settings

Floating a Swan

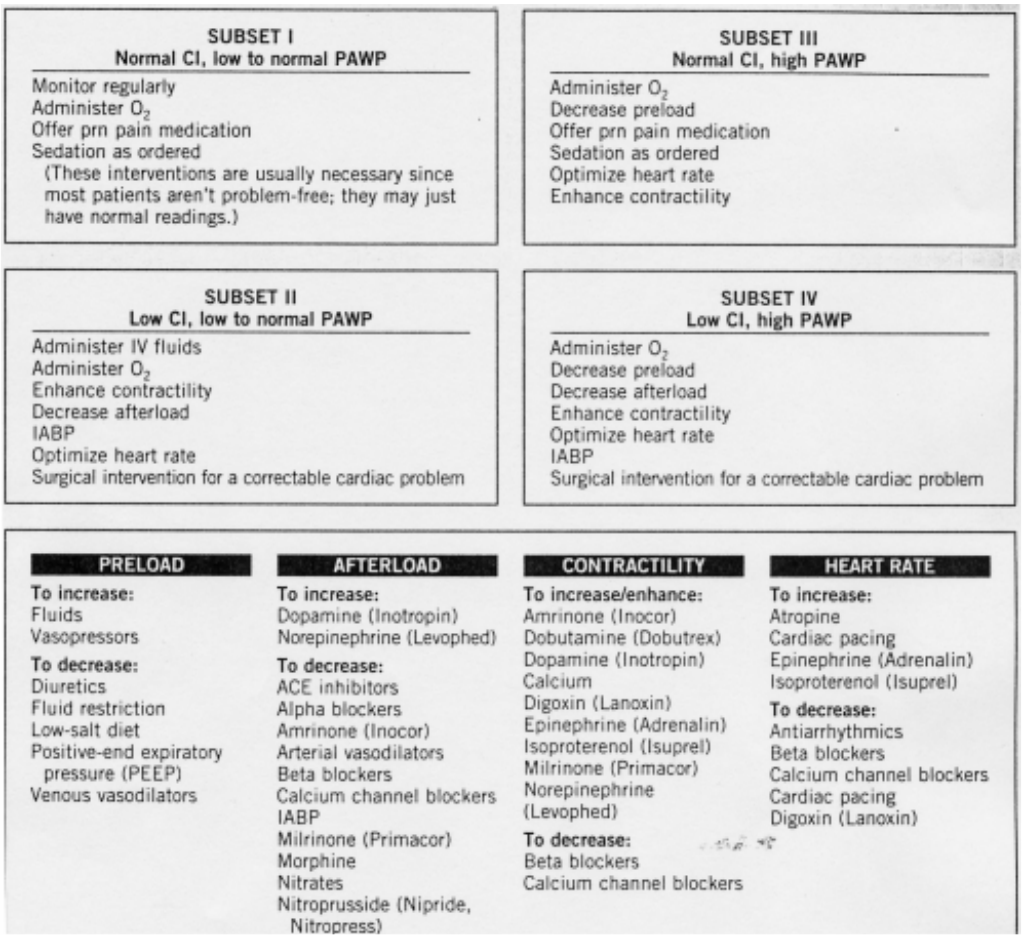
1) Obtain an introducer site. For Swan purposes, the most favorable position in the R IJ, followed by the L subclavian. Next is R subclavian, and the least conducive position is L IJ. Swans can be introduced femorally. Hold on to "swandom" from cordis kit.
2) Maintaining sterile field, unwrap Swan, check balloon for function and leaks.
3) Place "swandom" on Swan. The tip of the Swan goes through the rubber septum first. Push the swandom back toward the ports without unrolling it.
4) Hand off the port hub to a RN so that the ports can be flushed.
5) Insert the Swan into the cordis. Advance about 15cm, then call for Balloon up.
6) Note: When advancing Swan, Balloon **UP**; when withdrawing, Balloon **DOWN**.
7) Advance through RA, RV, PA, and then to wedge (see diagram). A "wedged" waveform is fairly flat; when balloon is deflated, the waveform will become more sine.



Data:
CVP (Central Venous Pressure) – normally ***1-6***
PCWP (aka LV filling pressure) – approximates LV pressure in diastole (except in mitral stenosis). Normal range around **12**. Increased in fluid overload.
CO (cardiac output) – calculated by thermodilution
CI (cardiac index) – cardiac output divided by body surface area; normal ***2.4 - 4.0***
SVR (systemic vascular resistance) – decreased in setting of sepsis; normal ***1600-2400***
PVR (pulmonary vascular resistance); normal ***200-400***

Data Interpretation:

Right heart failure – low CI, high PVR
Left heart failure – high PCWP, low CI, high SVR
Tamponade – high PCWP, high SVR, low CI; CVP = PCWP
Hypotension:
Hypovolemia – low CVP, low PCWP, low CI, high SVR
Cardiogenic – high CVP, high PCWP, low CI, high SVR
Sepsis (Vasogenic) – low CVP, low PCWP, high CI, low SVR



SUBSET I
Normal CI, low to normal PAWP

Monitor regularly
Administer O_2
Offer prn pain medication
Sedation as ordered
(These interventions are usually necessary since most patients aren't problem-free; they may just have normal readings.)

SUBSET III
Normal CI, high PAWP

Administer O_2
Decrease preload
Offer prn pain medication
Sedation as ordered
Optimize heart rate
Enhance contractility

SUBSET II
Low CI, low to normal PAWP

Administer IV fluids
Administer O_2
Enhance contractility
Decrease afterload
IABP
Optimize heart rate
Surgical intervention for a correctable cardiac problem

SUBSET IV
Low CI, high PAWP

Administer O_2
Decrease preload
Decrease afterload
Enhance contractility
Optimize heart rate
IABP
Surgical intervention for a correctable cardiac problem

PRELOAD	AFTERLOAD	CONTRACTILITY	HEART RATE
To increase:	**To increase:**	**To increase/enhance:**	**To increase:**
Fluids	Dopamine (Inotropin)	Amrinone (Inocor)	Atropine
Vasopressors	Norepinephrine (Levophed)	Dobutamine (Dobutrex)	Cardiac pacing
To decrease:	**To decrease:**	Dopamine (Inotropin)	Epinephrine (Adrenalin)
Diuretics	ACE inhibitors	Calcium	Isoproterenol (Isuprel)
Fluid restriction	Alpha blockers	Digoxin (Lanoxin)	**To decrease:**
Low-salt diet	Amrinone (Inocor)	Epinephrine (Adrenalin)	Antiarrhythmics
Positive-end expiratory pressure (PEEP)	Arterial vasodilators	Isoproterenol (Isuprel)	Beta blockers
Venous vasodilators	Beta blockers	Milrinone (Primacor)	Calcium channel blockers
	Calcium channel blockers	Norepinephrine (Levophed)	Cardiac pacing
	IABP	**To decrease:**	Digoxin (Lanoxin)
	Milrinone (Primacor)	Beta blockers	
	Morphine	Calcium channel blockers	
	Nitrates		
	Nitroprusside (Nipride, Nitropress)		