Clinical Profile:
Congestion – c., passive. Hyperemia resulting from interference with flow of blood from capillaries into venules. May also result from myocardial insufficiency.

Patients diagnosed in various stages of congestive heart failure (CHF) (left or right ventricular dysfunction) prompt careful monitoring of ventricular filling pressures [central venous pressure (CVP) and pulmonary artery wedge pressure (PAWP)], historically and treatment to maintain tissue perfusion, decrease intravascular volume and optimize cardiac performance (due to an assumed correlation with end diastolic volume). The Advanced Swan-Ganz catheter provides volumetric measurements of right ventricular ejection fraction (RVEF) and right ventricular end diastolic volume (RVEDV), which will be evaluated herein.

Correlations:
• Correlation #1: Nature of relationship between PCWP and EDV
  It has been established that “in the patient with cardiac disease, regardless of etiology, the pulmonary capillary wedge pressure (PCWP) has little relationship to the left ventricular end diastolic volume [EDV], due to marked changes in compliance or valvular disease.”

• Correlation #2: Role of diastolic function in determining heart failure
  Dysfunction in systole and/or diastole may result in CHF, related to passive backup of blood into the pulmonary and systemic venous beds and/or resistance in ventricular filling. It has been shown that “although there is some degree of diastolic dysfunction in most patients who present clinically with heart failure, as many as 40% of patients with congestive heart failure have normal systolic function and thus, have primary diastolic heart failure.”

• Diagnosing right heart failure when clinical signs are obscured
  Right-sided heart failure is not always clinically evident. This is expected since therapeutic utilization of diuretic drugs will reduce preload significantly, obscuring the clinical signs of right-sided failure. It has become apparent that “our modern therapeutic approaches and their great reliance on diuretic drugs have made the evaluation of ventricular function more difficult clinically and thus more heavily dependent on invasive hemodynamic measurements.”

• Correlation #3: Effect of RVEF on diagnosis of severe chronic failure
  It has been shown that right ventricular (RV) volume determination is useful in the diagnosis of diastolic disorders, such as constrictive pericarditis, cardiac tamponade, or restrictive cardiomyopathy.

In a recent study, statistical analysis identified right ventricular ejection fraction (RVEF) as the “single most important predictor of short-term prognosis in a large cohort of patients who had symptoms in spite of a standardized, optimized, multipharmacologic treatment.” This variable provides guidance and assessment for transplantation timing and indications for patients with uniformly depressed LVEF and severe chronic heart failure.

Outcome: Effect of combining SvO2, RVEF, RVEDV, and CCO
It has been recognized that the Advanced Swan-Ganz catheters, combining continuous venous oximetry (SvO2), continuous cardiac output (CCO), continuous right ventricular end diastolic volume (RVEDV), and continuous right ventricular ejection fraction (RVEF) measurements, will yield not only information regarding oxygen consumption and delivery, but will also allow an even better understanding of hemodynamics. A intermittent indication of pulmonary vascular resistance (PVR) and a continuous systemic vascular resistance (SVR) may be used as an index to left ventricular (LV) and right ventricular (RV) afterload when continuous cardiac output (CCO) is integrated with continuous central and arterial pressure measurements.
Advanced Technology Swan-Ganz Catheter Algorithm

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References:

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